



Dauphin County 2015 Hazard Mitigation Plan Update

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Dauphin County Hazard Mitigation Plan Update

Certification of Annual Review Meetings

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

YEAR	DATE OF MEETING	PUBLIC OUTREACH ADDRESSED?*	SIGNATURE
2010	N/A	N/A	To the best knowledge of the Dauphin County HMPSC, no HMP progress reports were submitted from municipalities for the period from 2010-2014 although some mitigation actions were accomplished in this period. Progress on actions is discussed in detail in Section 6.1 of this plan.
2011	N/A	N/A	
2012	N/A	N/A	
2013	N/A	N/A	
2014	N/A	N/A	
2015			
2016			
2017			
2018			
2019			

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

Dauphin County Hazard Mitigation Plan Update

Record of Changes

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

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1. Introduction

1.1. Background

Across the United States, natural and man-made disasters have led to increasing levels of deaths, injuries, property damage, and interruption of business and government services. The time, money, and effort needed to recover from these disasters exhausts resources, diverting attention from important public programs and private agendas. Since 1955 there have been 53 Presidential Disaster Declarations and nine Presidential Emergency Declarations in Pennsylvania, 13 and five of which have included Dauphin County. The emergency management community, citizens, elected officials, and other stakeholders in Dauphin County, Pennsylvania recognize the impact of disasters on their community and support proactive efforts needed to reduce the impact of natural and human-made hazards.

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

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

Accordingly, the Dauphin County Hazard Mitigation Plan Steering Committee (HMPSC) composed of government and agency leaders from Dauphin County, in cooperation with the elected officials of the County and its municipalities have prepared this Hazard Mitigation Plan (HMP) update. The HMP update is the result of work by citizens of the County to develop a pre-disaster multi-hazard mitigation plan that will not only guide the County towards greater disaster resistance, but will also respect the character and needs of the community.

1.2. Purpose

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

- Protecting life, safety, and property by reducing the potential for future damages and economic losses that result from natural and human-made hazards;
- Qualifying for additional grant funding, in both the pre-disaster and the post-disaster environment;
- Qualifying for additional credit under the Community Ratings System (CRS);
- Speeding recovery and redevelopment following future disaster events;
- Demonstrating a firm local commitment to hazard mitigation principles; and
- Complying with both state and federal legislative requirements for local hazard mitigation plans, improving community resiliency following a disaster event.

1.3. Scope

The Dauphin County 2015 Hazard Mitigation Plan update has been prepared to meet requirements set forth by the Federal Emergency Management Agency (FEMA) and Pennsylvania Emergency Management Agency (PEMA) in order for the County to be eligible for funding and technical assistance from state and federal hazard mitigation programs. It will be updated and maintained to address both natural and human-made hazards determined to be of significant risk to the County and/or its local municipalities. The most recent HMP completed in 2010 considered natural hazards only. The HMPSC determined that human-made hazards should be incorporated in the plan update; therefore, the 2015 HMP update is an all-hazards plan. Updates will take place at a minimum of every five years and will take place sooner following significant disaster events.

1.4. Authority and References

Authority for this plan originates from the following federal sources:

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

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

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

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

- FEMA 386-1: Getting Started. September 2002.
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA 386-3: Developing the Mitigation Plan. April 2003.
- FEMA 386-4: Bringing the Plan to Life. August 2003.
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.
- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA 386-8: Multijurisdictional Mitigation Planning. August 2006.
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.

- FEMA. Local Mitigation Planning Handbook. March 2013.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011.
- FEMA National Fire Incident Reporting System 5.0: Complete Reference Guide. January, 2008.
- FEMA Hazard Mitigation Assistance Unified Guidance. September 11, 2013.
- FEMA. Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials. March 1, 2013
- FEMA. Mitigation Ideas. A Resource for Reducing Risk to Natural Hazards. January 2013.
- FEMA and U.S. Department of Transportation. Hazard Mitigation Planning: Practices for Land Use Planning and Development near Pipelines. January 2015.

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

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

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

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

2. Community Profile

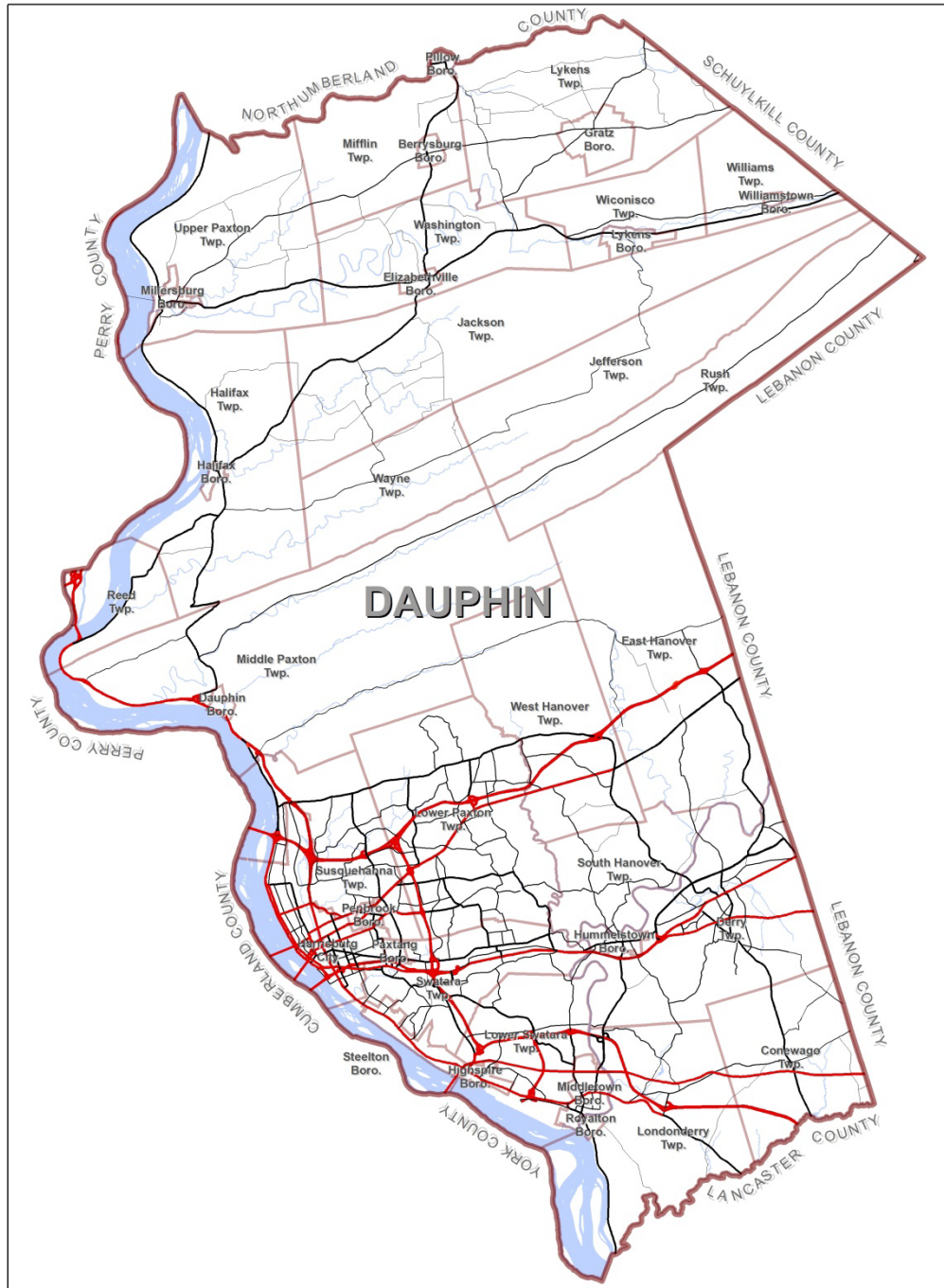
2.1. *Geography and Environment*

Dauphin County is 525 square miles in size, ranking 44 out of Pennsylvania's 67 counties (PA DCED, 2005). The County is located in south central Pennsylvania and is bordered by Northumberland County to the north, Lancaster and York counties to the south, Lebanon and Schuylkill counties to the east, and Cumberland and Perry counties to the west. See Figure 2.1-1 which shows the location of Dauphin County, its local municipalities, and surrounding counties.

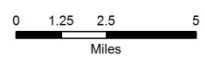
Dauphin County is situated on the eastern side of the Appalachian Mountains and its topography is bisected by portions of two physiographic provinces. The northern portions of the County are located within three sections of the Ridge and Valley Province. The Anthracite Upland Section consists of low, linear hills and upland surrounded by an escarpment, valley, and mountain rim. The Blue Mountain Section is characterized by linear ridges to the south and valleys to the north. The Great Valley Section consists of broad valleys and karst terrain. The southernmost portion of the County is located within the Gettysburg-Newark Lowland Section of the Piedmont Province. The Gettysburg-Newark Lowland Section is characterized by rolling lowlands, shallow valleys, and isolated hills (PA DCNR, 2002). Dauphin County's Physiographic Provinces are shown in Figure 2.1-2.

The County is located within two sub basins of the Lower Susquehanna drainage basin (PA DEP, 2009). The area north of Peters Mountain is included in the Lower Central Susquehanna River sub basin and is primarily drained by Mahantango Creek, Wiconisco Creek, Armstrong Creek, and Powells Creek. The region south of Peters Mountain is located in the Lower Susquehanna River sub basin and is drained by Swatara Creek, Clarks Creek, Stoney Creek, Fishing Creek, Paxton Creek, Spring Creek, Laurel Run, and Conewago Creek. All these creeks drain into the Susquehanna River (Dauphin County Planning Commission, 2008). Dauphin County's watersheds are shown in Figure 2.1-3.

Figure 2.1-1 Base Map of Dauphin County.



- Legend**
- Road - Functional Class
 - Principal Arterial
 - Minor Arterial
 - Major Collector
 - Minor Collector
 - Local
 - Ramp
 - County Boundaries
 - Municipal Boundaries
 - Rivers and Major Streams




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BASE MAP

DAUPHIN COUNTY, PENNSYLVANIA

Prepared Date: April 2015
 Prepared By: Tri-County Regional Planning Commission
 Source Data: Pictometry 2014, Dauphin County IT (GIS Dept),
 and TCRPC



Figure 2.1-2 Physiographic Provinces of Dauphin County.

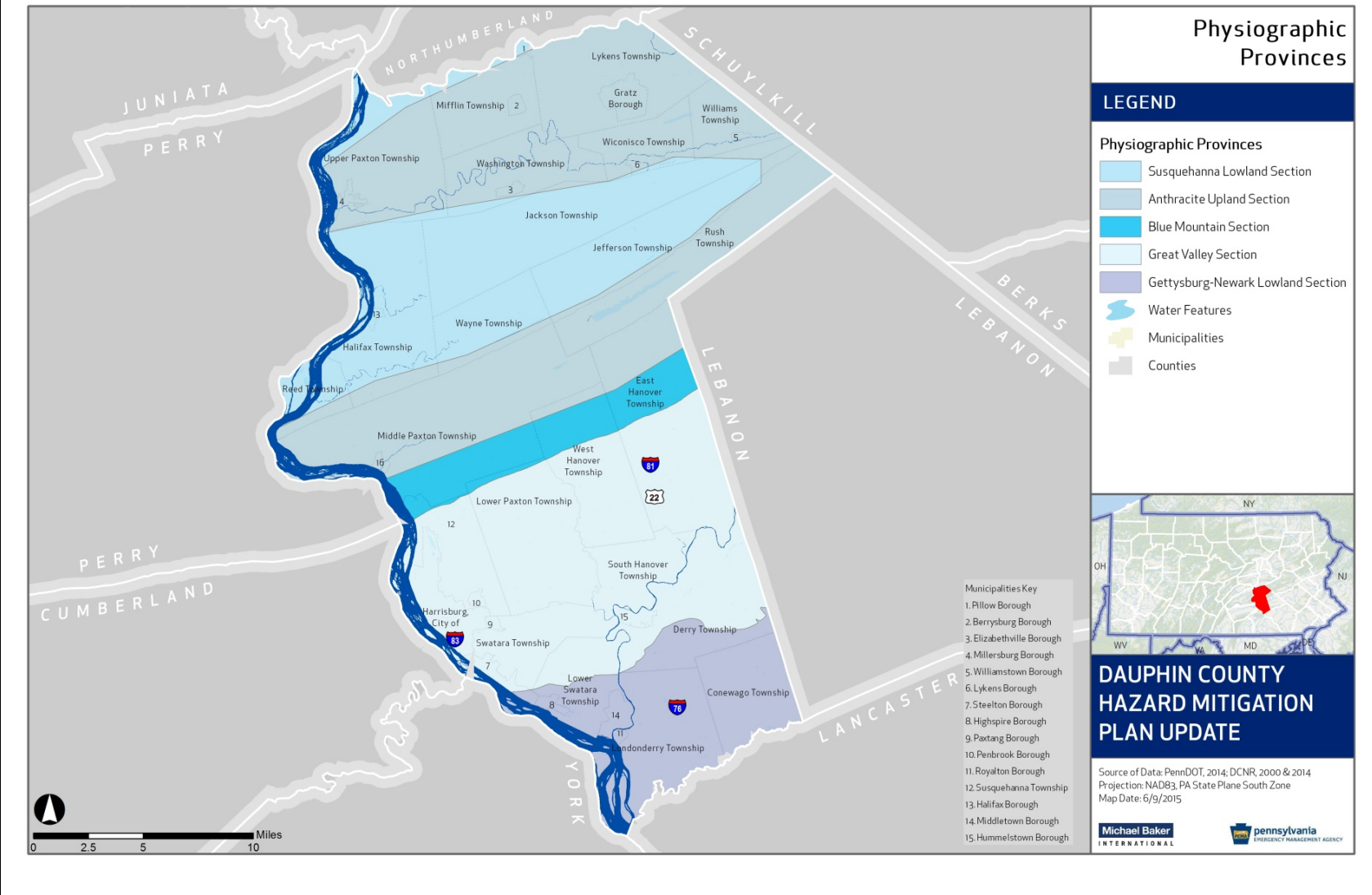
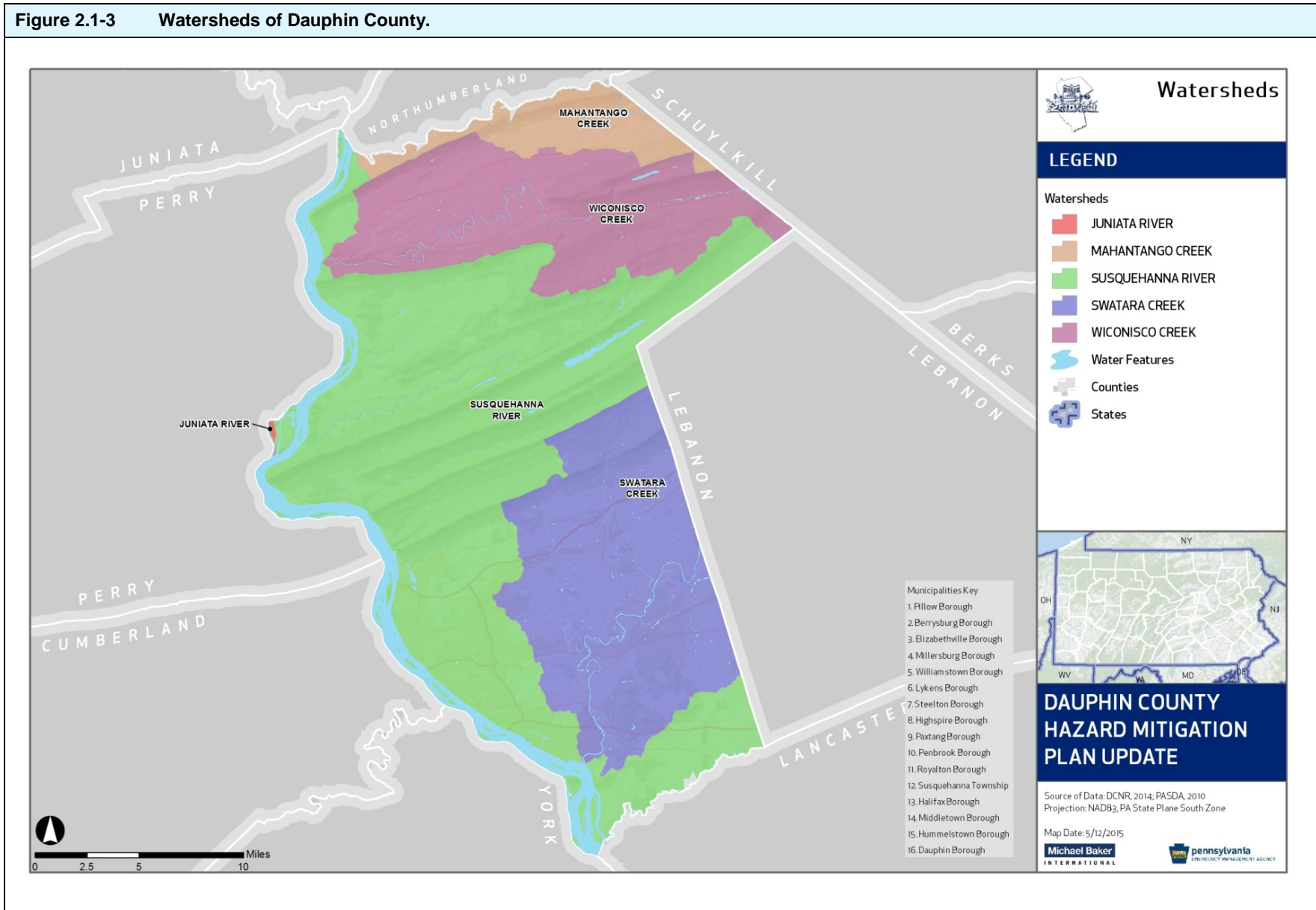


Figure 2.1-3 Watersheds of Dauphin County.



2.2. Community Facts

Established in 1785, Dauphin County was divided from Lancaster County and named after the heir apparent (or Dauphin) of the King of France to show appreciation for the efforts of France in the Revolutionary War (Dauphin County Planning Commission, 2008). The City of Harrisburg (Harrisburg) is the County seat and was designated the location of Pennsylvania's state capital in 1812. The County is within a two hour drive of Philadelphia; Washington, DC; and Baltimore, Maryland and within 3.5 hours of Pittsburgh.

Dauphin County includes 23 townships, 16 boroughs, and 1 city. The County's largest municipality in terms of population is Harrisburg, followed closely by Lower Paxton Township. At 54.6 square miles, Middle Paxton Township is the largest municipality from a land area perspective.

Dauphin County has an extensive transportation system due in large part to its location relative to the New York- Philadelphia-Washington, DC metropolitan area and the Appalachian/Midwest markets. Major highways traverse the County including Interstate 81 (I-81), Interstate 83 (I-83), Interstate 283 (I-283), U.S. 22, U.S. 322, U.S. 422, PA 283, and the Pennsylvania Turnpike (I-76). Freight rail is a significant component of the County's transportation network with Norfolk Southern maintaining rail lines and operating two multi-modal facilities in the County; one in Harrisburg and one in Rutherford (Swatara Township). Augmenting the highway and freight rail system is local and intercity bus, passenger rail including Amtrak, and passenger and freight airline service at Harrisburg International Airport. In addition there are 22 additional public and private airports and heliports located throughout the County.

The Dauphin County 2008 Comprehensive Plan, which is currently being updated and scheduled for completion in 2016, notes that early settlers of Dauphin County lived along the Susquehanna River. In the mountainous and wooded northern portion of Dauphin County, lumber mills developed as did hosiery mills, canning operations, tanneries, dairies, and coal mining operations. Conversely, the relatively flat terrain of the southern portions of Dauphin County was ideal for farming. Brownstone quarries, brick making companies, shoe factories, stove making operations, and furniture companies also located in the southern portions of the County.

The County Comprehensive Plan further notes the impact Dauphin County's geographic location has had on development of its transportation network and industry: "The strategic crossroads location, at a point where the Susquehanna River emerges from the Appalachian Mountain ridges into the junction of five valleys is important. This location made the Harrisburg Metropolitan Area the hub of Central Pennsylvania's Colonial trading activity" (Dauphin County Planning Commission, 2008). These influences have led to the region, in particular Dauphin County and neighboring Cumberland County, to become a regional transportation hub. The interstates and state highways that traverse the region make it accessible to the major metropolitan areas of the Northeast Atlantic Region. Several large trucking firms have recognized the strategic location of the region for accessing east coast and mid-west markets and have selected it to locate sizable warehouse/distribution facilities in proximity to highways and freight rail.

From an employment perspective, the Healthcare & Social Assistance industry employs the largest number of workers in Dauphin County at 27,391; followed by Public Administration at 24,433 reflecting Harrisburg's designation as the state capital. Additional industries comprising Dauphin County's top ten industry sectors by employment are shown in Table 2.2-1.

INDUSTRY	EMPLOYEES	PERCENT EMPLOYEES
Health Care and Social Assistance	27,391	19.59%
Public Administration	24,433	17.47%
Retail Trade	14,733	10.54%
Accommodation and Food Services	12,975	9.28%
Finance and Insurance	12,796	9.15%
Education Services	11,817	8.45%
Manufacturing	11,164	7.98%
Admin., Support, Waste Mgt., Remediation	9,047	6.47%
Transportation and Warehousing	8,683	6.21%
Wholesale Trade	6,783	4.85%

Source: Pennsylvania Department of Labor and Industry, Dauphin County Area Profile, 1st Quarter 2013.

A total of 178,190 people were employed in Dauphin County in 2010 with Harrisburg hosting 31% of the employees due to its designation as the state capital. Additional municipal employment centers are located in the southern portion of the County and include Derry Township, Lower Paxton Township, Swatara Township, and Susquehanna Township. Table 2.2-2 shows employment projections from 2010 to 2040 and reflects that County employment is projected to increase by 20 percent. With nearly 180,000 current employees and over 215,000 employees projected by 2040, ensuring safe and efficient transportation is and will continue to be an important hazard mitigation planning consideration.

MUNICIPALITY	2010	2015	2020	2030	2040
Berrysburg Borough	44	46	47	50	53
Conewago Township	528	545	562	599	638
Dauphin Borough	72	75	77	82	87
Derry Township	26,939	27,817	28,694	30,557	32,542
East Hanover Township	1,875	1,936	1,997	2,127	2,265
Elizabethville Borough	312	322	332	354	377
Gratz Borough	75	78	80	85	91
Halifax Borough	36	37	38	41	43
Halifax Township	802	828	854	909	969
Harrisburg City	55,640	57,456	59,271	63,116	67,211
Highspire Borough	262	271	279	297	317
Hummelstown Borough	1,103	1,139	1,174	1,251	1,332
Jackson Township	435	449	463	493	525
Jefferson Township	59	61	63	67	71

MUNICIPALITY	2010	2015	2020	2030	2040
Londonderry Township	860	888	916	976	1,039
Lower Paxton Township	25,040	25,850	26,659	28,398	30,249
Lower Swatara Township	7,528	7,774	8,020	8,540	9,093
Lykens Borough	229	237	244	260	277
Lykens Township	616	636	656	699	744
Middle Paxton Township	748	773	797	848	904
Middletown Borough	3,643	3,761	3,879	4,132	4,401
Mifflin Township	383	396	408	434	463
Millersburg Borough	807	834	860	915	975
Paxtang Borough	714	738	761	810	862
Penbrook Borough	406	419	432	461	490
Pillow Borough	43	45	46	49	52
Reed Township	21	22	22	24	25
Royalton Borough	82	85	87	93	99
Rush Township	2	2	2	2	2
South Hanover Township	625	645	665	709	755
Steelton Borough	1,645	1,699	1,752	1,866	1,987
Susquehanna Township	18,354	18,951	19,547	20,818	22,171
Swatara Township	22,426	23,151	23,876	25,433	27,091
Upper Paxton Township	1,185	1,223	1,261	1,344	1,432
Washington Township	1,112	1,148	1,184	1,261	1,343
Wayne Township	32	33	34	36	39
West Hanover Township	3,045	3,144	3,243	3,454	3,678
Wiconisco Township	328	339	349	372	396
Williams Township	75	78	80	85	91
Williamstown Borough	59	61	63	67	71
Total Employment	178,190	183,982	189,774	202,114	215,250

According to the Pennsylvania Department of Labor and Industry (L & I) as of November 2014, Dauphin County had a civilian labor force of 137,800 with 131,800 employed and 6,000 unemployed. This translates to an unemployment rate of 4.4 percent; slightly lower than Pennsylvania's unemployment rate of 5.1 percent.

Based on 2005 real property tax, the total value of real property in Dauphin County is \$13,101,194,123 (L & I, 2005). Hazard related incidents in the County could likely have an impact on the County's real property value.

Dauphin County is an area of national historic significance with fifty-three national register sites and eleven historic districts included on the National Register of Historic Places with many reflecting the influence of trade and commerce that shaped the nation (Dauphin County Planning Commission, 2008). Notable historic structures include the State Capitol building and

Dauphin County Courthouse in Harrisburg and the Milton S. Hershey Mansion in Derry Township.

2.3. Population and Demographics

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

Dauphin County's population has been steadily increasing since the 1940s with 2010 population at 268,100 citizens. Refer to the following table. While population is increasing, the increase is not as sizable as the population increase which occurred in the 1940s and 1950s.

YEAR	POPULATION
1940	177,410
1950	197,784
1960	220,255
1970	223,713
1980	232,317
1990	237,813
2000	251,798
2010	268,100

Source: U.S. Census, Dauphin County Comprehensive Plan.

Recent demographic trends in the County are summarized in Table 2.3-2. Median age has been increasing and is consistent with Pennsylvania's median age of 40. The 20 to 64 age cohort saw the greatest population increase between 2000 and 2010. While the number of senior citizens did not substantially increase between 2000 and 2010, mitigation actions should be developed that take the increasing number of citizens age 65 and older into account. As some senior citizens may not be able to drive, special evaluation plans may be required. Further, hearing or vision impairments could make receiving emergency instructions difficult. Needs of citizens with disabilities should also be addressed in hazard mitigation planning actions. According to the U.S. Census, American Community Survey 2013 Estimates, 12 percent of Dauphin County citizens may have a disability (U.S. Census, American Community Survey 2013 Estimates).

DEMOGRAPHIC DATA POINT	2000	2010
Total Population	251,798	268,100
Male/Female	120,853/130,945	129,619/138,481
Median Age (years)	37.9	39.4
Under 5 years	15,490	16,794
5 – 19 years	51,052	51,987
20 – 64 years	149,412	162,478
65 years and older	35,844	36,841

Source: U.S. Census.

Dauphin County's population increased 6.5 percent from 251,798 to 268,100 between 2000 and 2010. Several municipalities located throughout the County experienced population increases

greater than 20 percent including: Lykens Township, Reed Township, Rush Township, South Hanover Township, and West Hanover Township. Refer to Table 2.3-3.

Table 2.3-3 Municipal population in Dauphin County.			
Municipality	US Census Population		
	1990	2000	2010
Berrysburg Borough	376	354	368
Conewago Township	2,832	2,847	2,997
Dauphin Borough	845	773	791
Derry Township	18,408	21,273	24,679
East Hanover Township	4,569	5,322	5,718
Elizabethville Borough	1,467	1,344	1,510
Gratz Borough	696	676	765
Halifax Borough	911	875	841
Halifax Township	3,449	3,329	3,483
Harrisburg City	52,376	48,950	49,528
Highspire Borough	2,668	2,720	2,399
Hummelstown Borough	3,981	4,360	4,538
Jackson Township	1,797	1,728	1,941
Jefferson Township	385	327	362
Londonderry Township	4,926	5,224	5,235
Lower Paxton Township	39,162	44,424	47,360
Lower Swatara Township	7,072	8,149	8,268
Lykens Borough	1,986	1,937	1,779
Lykens Township	1,238	1,095	1,618
Middle Paxton Township	5,129	4,823	4,976
Middletown Borough	9,254	9,242	8,901
Mifflin Township	676	662	784
Millersburg Borough	2,729	2,562	2,557
Paxtang Borough	1,599	1,570	1,561
Penbrook Borough	2,791	3,044	3,008
Pillow Borough	341	304	298
Reed Township	259	182	239
Royalton Borough	1,120	963	907
Rush Township	201	180	231
South Hanover Township	4,626	4,793	6,248
Steelton Borough	5,152	5,858	5,990
Susquehanna Township	18,636	21,895	24,036
Swatara Township	19,661	22,661	23,362

Municipality	US Census Population		
	1990	2000	2010
Upper Paxton Township	3,680	3,930	4,161
Washington Township	1,816	2,047	2,268
Wayne Township	847	1,184	1,341
West Hanover Township	6,125	6,505	9,343
Wiconisco Township	1,372	1,168	1,210
Williams Township	1,146	1,135	1,112
Williamstown Borough	1,509	1,433	1,387
Dauphin County	237,813	251,798	268,100

Dauphin County is the 10th most densely populated county in Pennsylvania, and the County's population density increased slightly between 2000 and 2010 with 479 people per square mile in 2000 and 510 people per square mile in 2010. Refer to Table 2.3-4. Population distribution throughout Dauphin County's municipalities varies from a high of 6,115 people per square mile in Harrisburg to a low of 41 people per square mile in Rush Township. The County's population distribution is greatly impacted by geography with municipalities located in mountainous areas and those including state game lands less densely populated. Population density should be taken into consideration when developing mitigation actions as the magnitude of a hazard increases proportionate to density.

Municipality	Area Sq. Mi.	Persons / Sq. Mi.	
		2000	2010
Dauphin County	525.3	479	510
Berrysburg Borough	0.7	506	526
Conewago Township	16.7	170	179
Dauphin Borough	0.4	1,933	1,978
Derry Township	27.2	782	907
East Hanover Township	39.9	133	143
Elizabethville Borough	0.5	2,688	3,020
Gratz Borough	3.0	225	255
Halifax Borough	0.3	2,917	2,803
Halifax Township	27.9	119	125
Harrisburg City	8.1	6,043	6,115
Highspire Borough	0.7	3,886	3,427
Hummelstown Borough	1.3	3,354	3,491
Jackson Township	38.9	44	50
Jefferson Township	24.2	14	15

Table 2.3-4 Dauphin County population density by municipality.

Municipality	Area Sq. Mi.	Persons / Sq. Mi.	
		2000	2010
Londonderry Township	22.8	229	230
Lower Paxton Township	28.1	1,581	1,685
Lower Swatara Township	12.1	673	683
Lykens Borough	1.3	1,490	1,368
Lykens Township	26.4	41	61
Middle Paxton Township	54.6	88	91
Middletown Borough	2.0	4,621	4,451
Mifflin Township	15.4	43	51
Millersburg Borough	0.8	3,203	3,196
Paxtang Borough	0.4	3,925	3,903
Penbrook Borough	0.5	6,088	6,016
Pillow Borough	0.5	608	596
Reed Township	5.9	31	41
Royalton Borough	0.3	3,210	3,023
Rush Township	23.4	8	10
South Hanover Township	11.4	420	548
Steelton Borough	1.8	3,254	3,328
Susquehanna Township	13.4	1,634	1,794
Swatara Township	13.2	1,713	1,770
Upper Paxton Township	26.0	151	160
Washington Township	18.6	110	122
Wayne Township	13.9	85	96
West Hanover Township	23.2	280	403
Wiconisco Township	10.1	116	120
Williams Township	8.8	129	126
Williamstown Borough	0.3	4,777	4,623

Source: U.S. Census Bureau, Tri-County Regional Planning Commission.

From a race and ethnicity perspective, Dauphin County citizens are predominantly white. The number of citizens of Hispanic or Latino and Asian decent has increased by 81 percent and 74 percent, respectively between 2000 and 2010. Refer to Table 2.3-5. Consistent with this trend, the number of citizens speaking a language other than English increased 32 percent with 46 percent of these citizens speaking Spanish or Creole. Additional languages spoken other than English include: Other Indo-European (29 percent), Asian and Pacific Island (18 percent), and Other languages (7 percent). It may be important to consider hazard mitigation strategies to address language barriers to ensure all residents are able to effectively receive emergency instructions.

DEMOGRAPHIC INDICATOR	2000	2010	% CHANGE
One Race	247,138	259,816	5%
White	194,158	194,910	0%
Black or African American	42,580	48,386	14%
American Indian and Alaska Native	415	578	39%
Asian	4,931	8,580	74%
Pacific Islander	82	78	-5%
Some Other Race	4,972	7,284	47%
Two or More Races	4,660	8,284	78%
Hispanic or Latino	10,404	18,795	81%
Speak a language other than English	20,166	26,554 ⁽¹⁾	32%

Source: U.S. Census.
⁽¹⁾ Number was obtained from the U.S. Census American Community Survey, 2013 Estimates as this question was not asked as part of Census 2010.

Median household income and median family income in Dauphin County, \$54,066 and \$68,368 respectively, have been increasing and are relatively consistent with state income levels. Per capita income has also been increasing with state per capita income slightly lower than Dauphin County. Average wage rates in Dauphin County are slightly higher than state averages. Refer to Table 2.3-6.

INCOME	DAUPHIN COUNTY		PENNSYLVANIA	
	2000	2013 ESTIMATES(1)	2000	2013 ESTIMATES ⁽¹⁾
Median Household Income	\$41,507	\$54,066	\$40,106	\$52,548
Median Family Income	\$50,974	\$68,368	\$49,184	\$66,646
Per Capita Income	\$22,134	\$29,234	\$20,880	\$28,502
WAGES (2013)	DAUPHIN COUNTY		PENNSYLVANIA	
Average Hourly Wage	\$22.26		\$21.77	
Average Annual Wage	\$46,300		\$45,280	

Source: U.S. Census, American Community Survey, 2012 Estimates: Estimated count of population between 2008-2013. PA Department of Labor & Industry, Occupational Employment Statistics Survey, 2013.
⁽¹⁾ Questions pertaining to income were not included in Census 2010; therefore, 2013 American Community Survey data was used to provide comparison to Census 2000 income levels.

U.S. Census data reflects an 8.3 percent increase in the number of housing units in Dauphin County between 2000 and 2010. Refer to Table 2.3-7. The numbers of vacant housing units and renter-occupied housing units have also increased. Vacant buildings are not always maintained leading to potential structural deficiencies. These buildings may be particularly

vulnerable to arson and criminal activity. Citizens renting homes are often more transient than homeowners; therefore, communicating with Dauphin County citizens who rent a home may be more difficult than communicating with homeowners. Communication strategies should be developed to make certain that citizens who rent housing units are given proper notification relative to hazard mitigation actions.

HOUSING CHARACTERISTIC	2000	2010
Total Housing Units	111,133	120,406
Occupied Housing Units	102,670	110,435
Vacant Housing Units	8,463	9,971
Owner-Occupied Housing Units	67,136	71,491
Renter-Occupied Housing Units	35,534	38,944
Median Home Value	\$99,900	\$158,800 ⁽¹⁾

Source: U.S. Census, American Community Survey, 2012 Estimates: Estimated count of population between 2009 - 2013.
⁽¹⁾ *Questions pertaining to home value were not included in Census 2010; therefore, American Community Survey 2013 estimates were used to provide comparison to Census 2000 home value levels.*

Housing projections prepared by TCRPC for Dauphin County reflect that the number of occupied housing units in the County is projected to steadily increase from 110,435 in 2010 to 122,433 in 2040. The projections were prepared to the municipal level with Middle Paxton, South Hanover, and West Hanover Townships projected to increase the number of occupied housing units by over 20 percent between 2010 and 2040. The projections are useful in determining the location of future land development for hazard mitigation planning purposes.

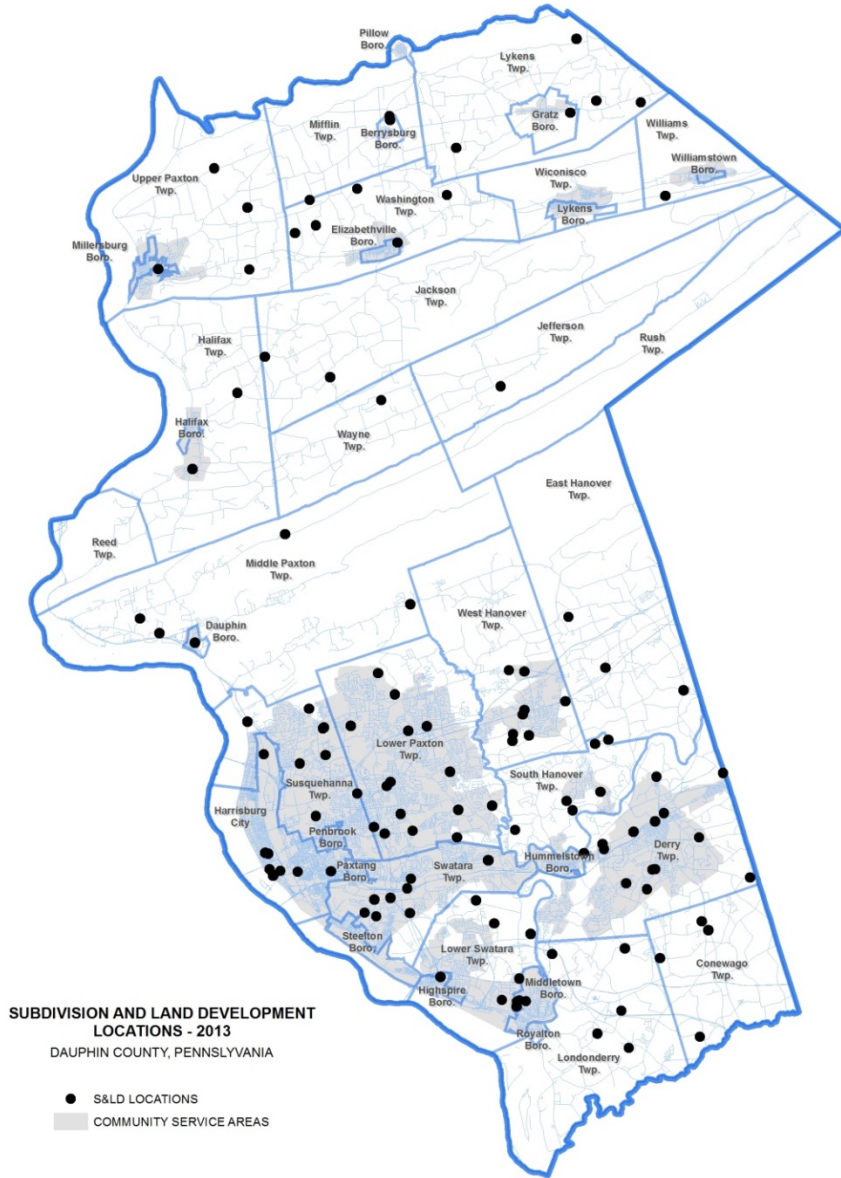
Based on current County subdivision and land development activity, land development is expected to increase over the HMP planning period between 2015 and 2020. Similar to the housing projections noted above, subdivision and land development activity is useful for hazard mitigation planning purposes. Dauphin County Planning Commission’s (DCPC’s) annual report includes subdivision and land development reviews and residential development activity. According to the 2013 annual report, DCPC acted on 123 subdivision and land development plans in 2013, the first year since 2005 that there has been an increase in the number of plans reviewed. Refer to Table 2.3-8.

YEAR	PLANS REVIEWED
2004	291
2005	320
2006	257
2007	250
2008	172
2009	141

Table 2.3-8 Dauphin County Subdivision and Land Development Plans Reviewed (2004 - 2013) (Dauphin County Planning Commission, 2013).	
YEAR	PLANS REVIEWED
2010	130
2011	119
2012	103
2013	123

Figure 2.3-1 shows the location of proposed subdivision and land development plan submission activity. This map is a good indication of future development activity (pending plan approval). Knowing the location of potential future development is helpful as municipalities prepare new hazard mitigation actions. From a residential perspective, a total of 357 lots are proposed in Lower Paxton Township and 171 in Harrisburg. Over 7 acres of commercial and industrial land development activity have been proposed in Derry Township and Swatara Township over the past several years.

Figure 2.3-1 Proposed Dauphin County Subdivision and Land Development Activity (Dauphin County Planning Commission, 2013).



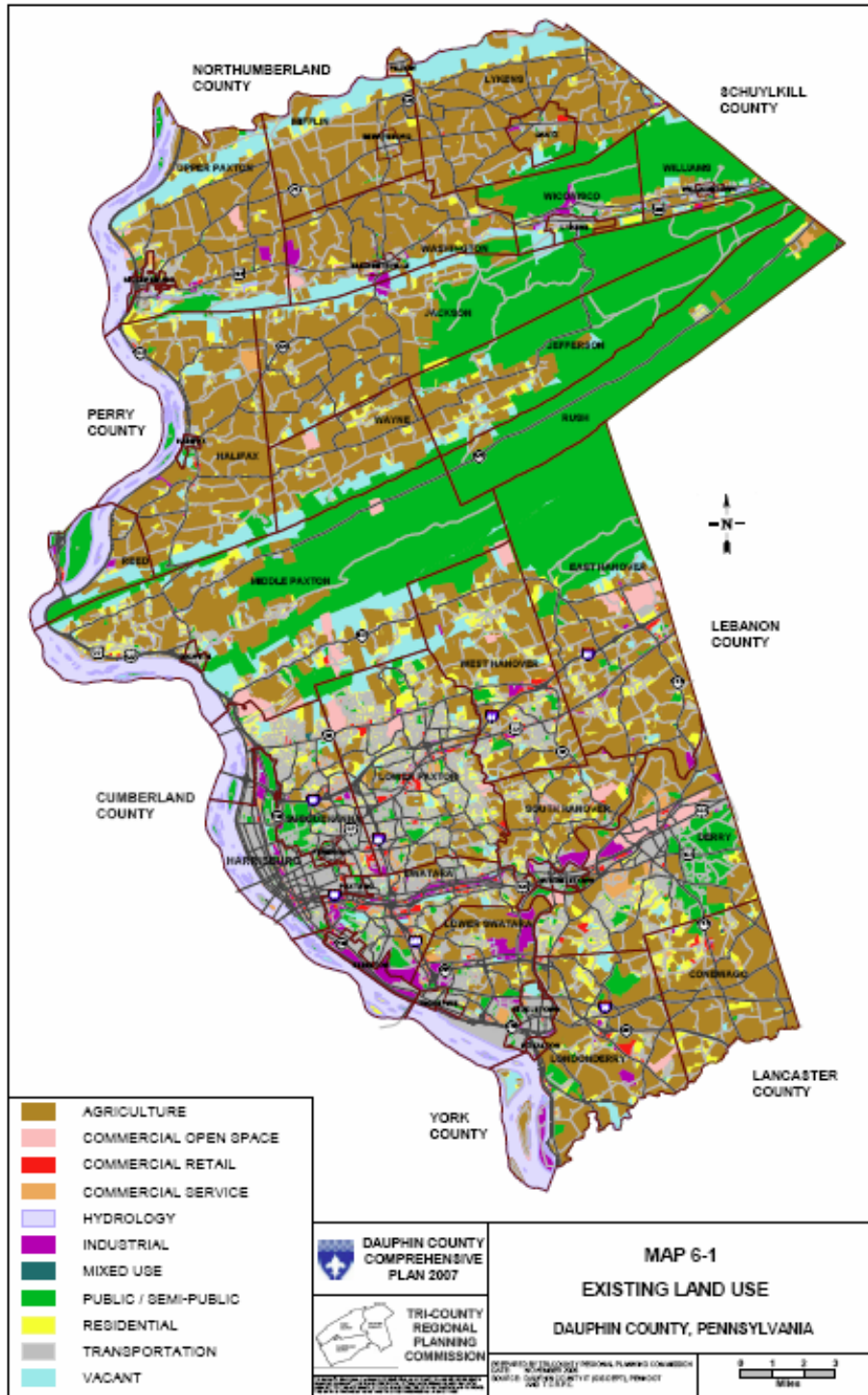
2.4. Land Use and Development

Land Use in Dauphin County is illustrated in Figure 2.4-1. Even with a sizeable population, over one-third of Dauphin County's land area is agriculture and over one quarter is designated as public/semi-public lands. Based on the County's 2008 comprehensive plan, this land includes 90,584 acres of state game lands and state forests located in the following townships: Middle Paxton, East Hanover, Rush, Jefferson, Jackson, Wayne, Wiconisco, and Williams. Vacant land, 43,197 acres, primarily includes land with environmental constraints such as steep slopes, wetlands, and floodplains.

Table 2.4-1 demonstrates the County's land use classification based on the 2008 Comprehensive Plan. Updated comprehensive plan information will be included in Dauphin County's next scheduled HMP update.

LAND USE DESIGNATION	ACREAGE	PERCENT OF ACREAGE
Agriculture	116,836	33%
Commercial Open Space	4,848	1%
Commercial Retail	3,176	1%
Commercial Services	4,054	1%
Hydrology	19,759	6%
Industrial	6,746	2%
Mixed Use	298	0%
Public/Semi-Public	90,584	26%
Residential	52,206	15%
Transportation	13,350	4%
Vacant	43,197	12%

Figure 2.4-1 Dauphin County Land Use, (Dauphin County Planning Commission, 2008).



While future growth in the County can be estimated through review of the population, housing, employment projections and development activity discussed previously, planning for growth is extremely useful in that it provides an area with a framework to guide future growth based on infrastructure and citizen input. Tri-County Regional Planning Commission (TCRPC), which provides planning services for the tri-county region of Dauphin, Cumberland, and Perry counties, adopted a Regional Growth Management Plan (RGMP) in 2011. The plan includes a Planned Growth Area (PGA) strategy which utilizes a process where local and County officials participate in an organized effort to identify areas already served by existing infrastructure such as water, sewer, transportation facilities, emergency services, and parks and schools and establish the most practical future development areas (TCRPC, 2011).

The PGA strategy does not preclude land not located in a future development area (PGA) from being developed. Rather, the process attempts to guide and coordinate increased land use density and intensity where there is existing and available capital infrastructure and should be a municipality's first preference for managing future growth. The PGA strategy promotes the delineation of PGAs around Community Service Areas (CSAs) where existing infrastructure is located.

Dauphin County's CSAs and PGAs are shown in the following figures. Hazard areas including Special Flood Hazard Areas (SFHAs), Subsidence Areas, Karst Features, and Landslide Susceptibility are included as layers on the mapping. SFHAs, Subsidence Areas, and Karst Features are included as layers on Figure 2.4-2 and Landslide Susceptibility on Figure 2.4-3 to show the general location of hazard areas in community service areas. SFHAs, Subsidence Areas, and Karst Features are included as layers on Figure 2.4-4 and Landslide Susceptibility on Figure 2.4-5 to show the general location of hazard areas in planned growth areas. As CSAs and PGAs are general locations for proposed future growth prepared for regional planning purposes, it is important to note that site specific environmental features such as floodplains, karst areas, subsidence areas, and areas of landslide susceptibility are identified and protected during land development review at the municipal level. Details regarding SFHAs are included in Section 4.3.2, Landslides in Section 4.3.4, and Subsidence Areas and Karst Features in Section 4.3.7.

Figure 2.4-2 Dauphin County Community Service Areas and SFHAs/Subsidence Areas/Karst Features.

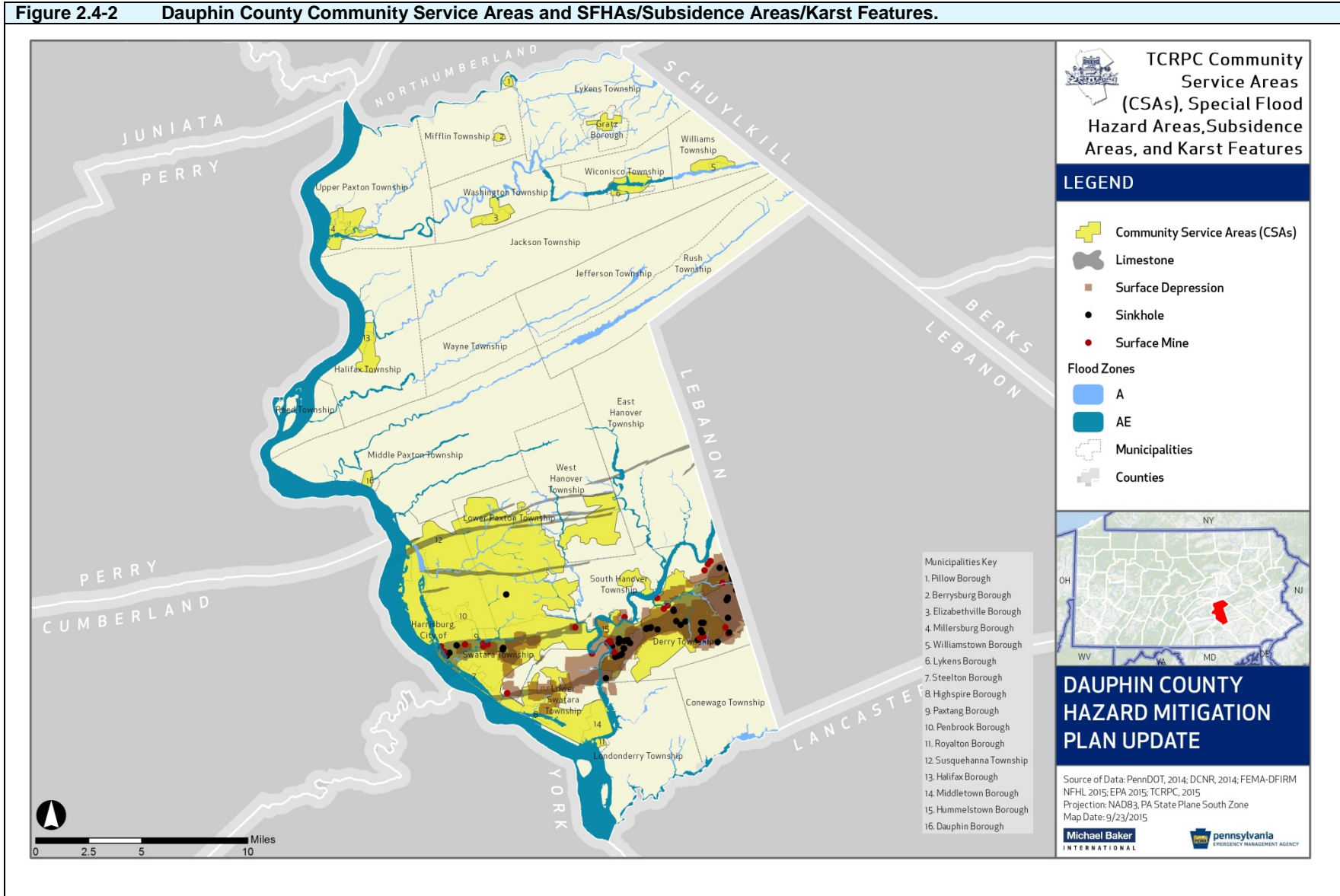


Figure 2.4-3 Dauphin County Community Service Areas and Landslide Susceptibility.

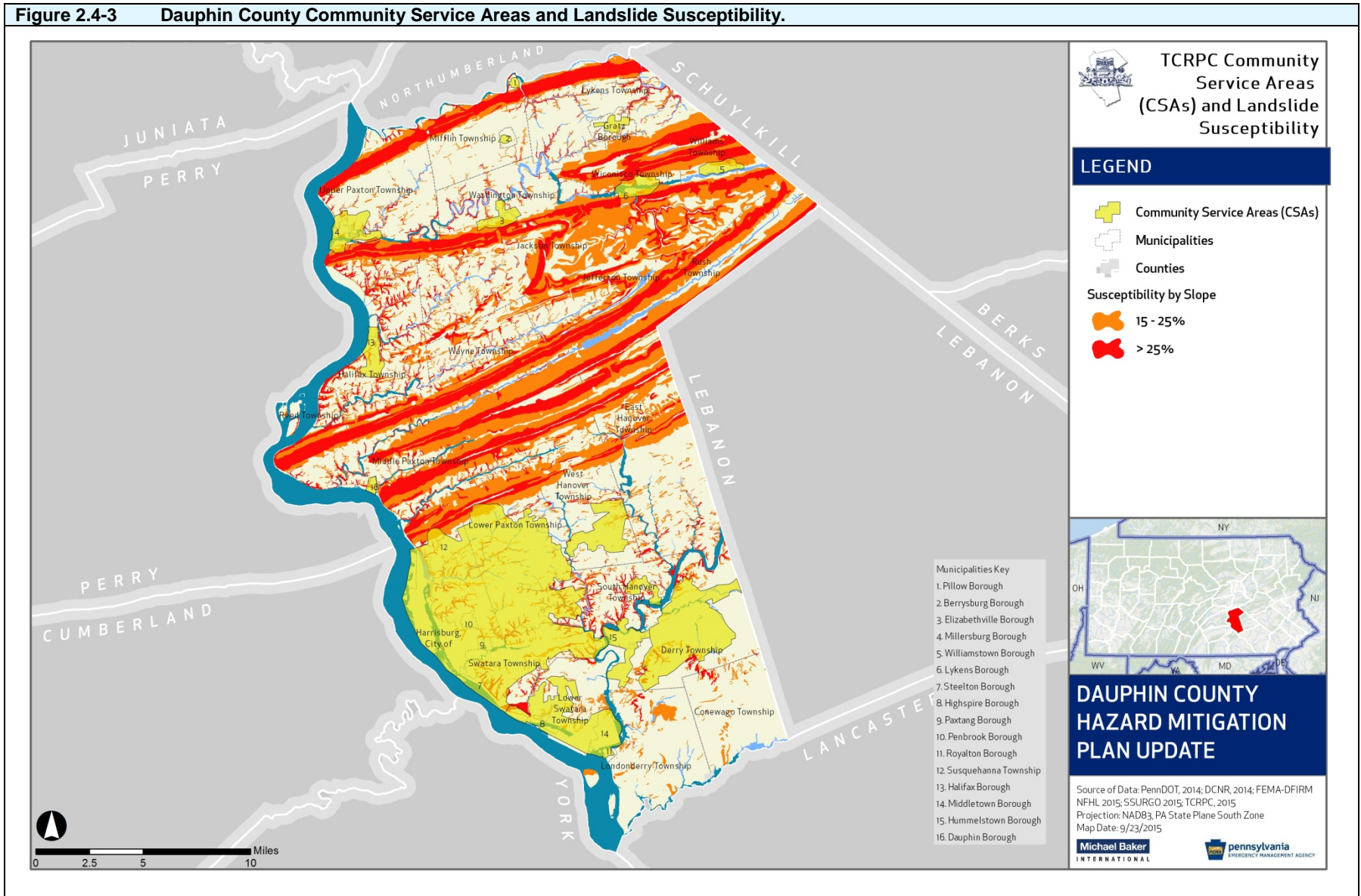


Figure 2.4-4 Dauphin County Planned Growth Areas and SFHAs/Subsidence Areas/Karst Features.

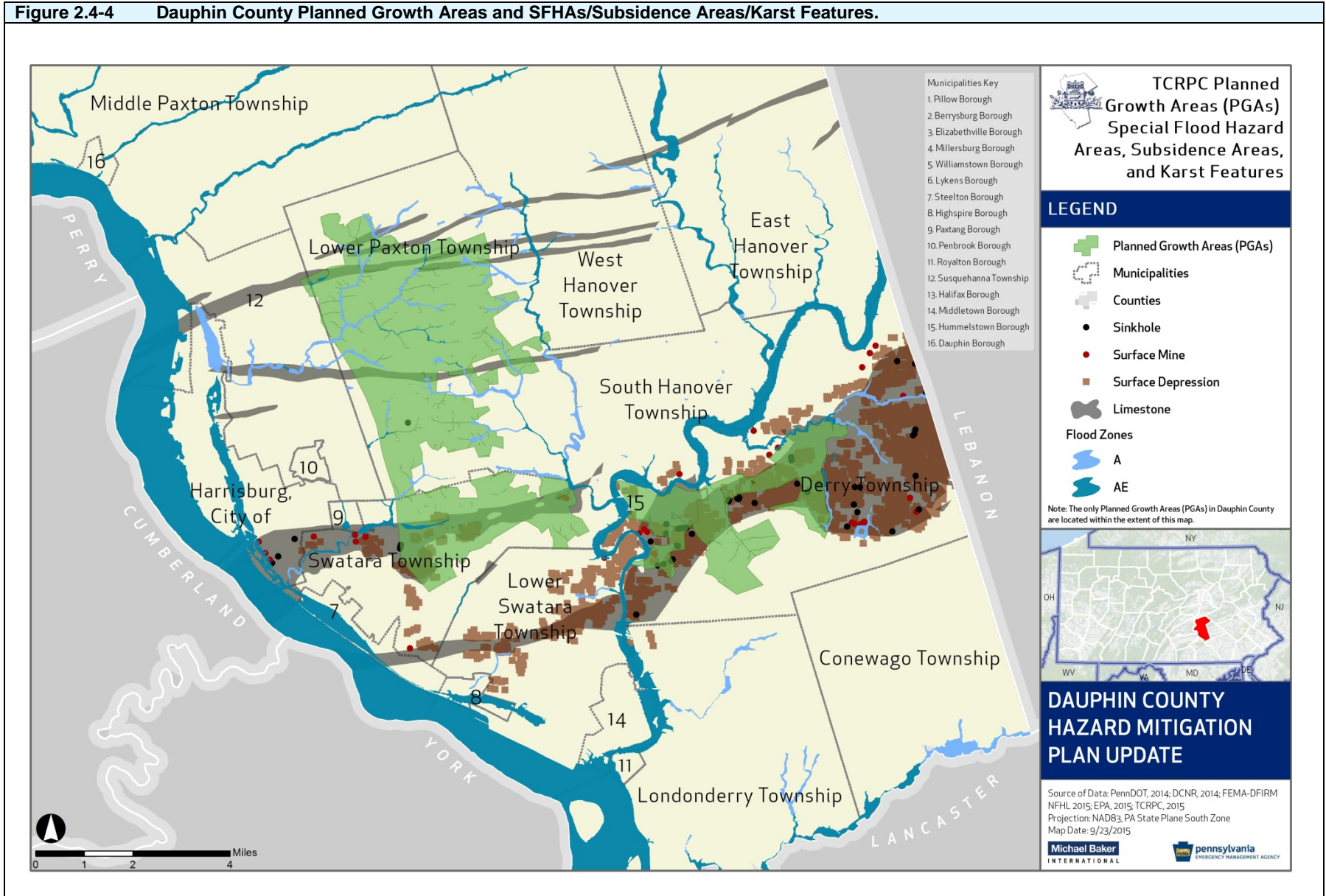
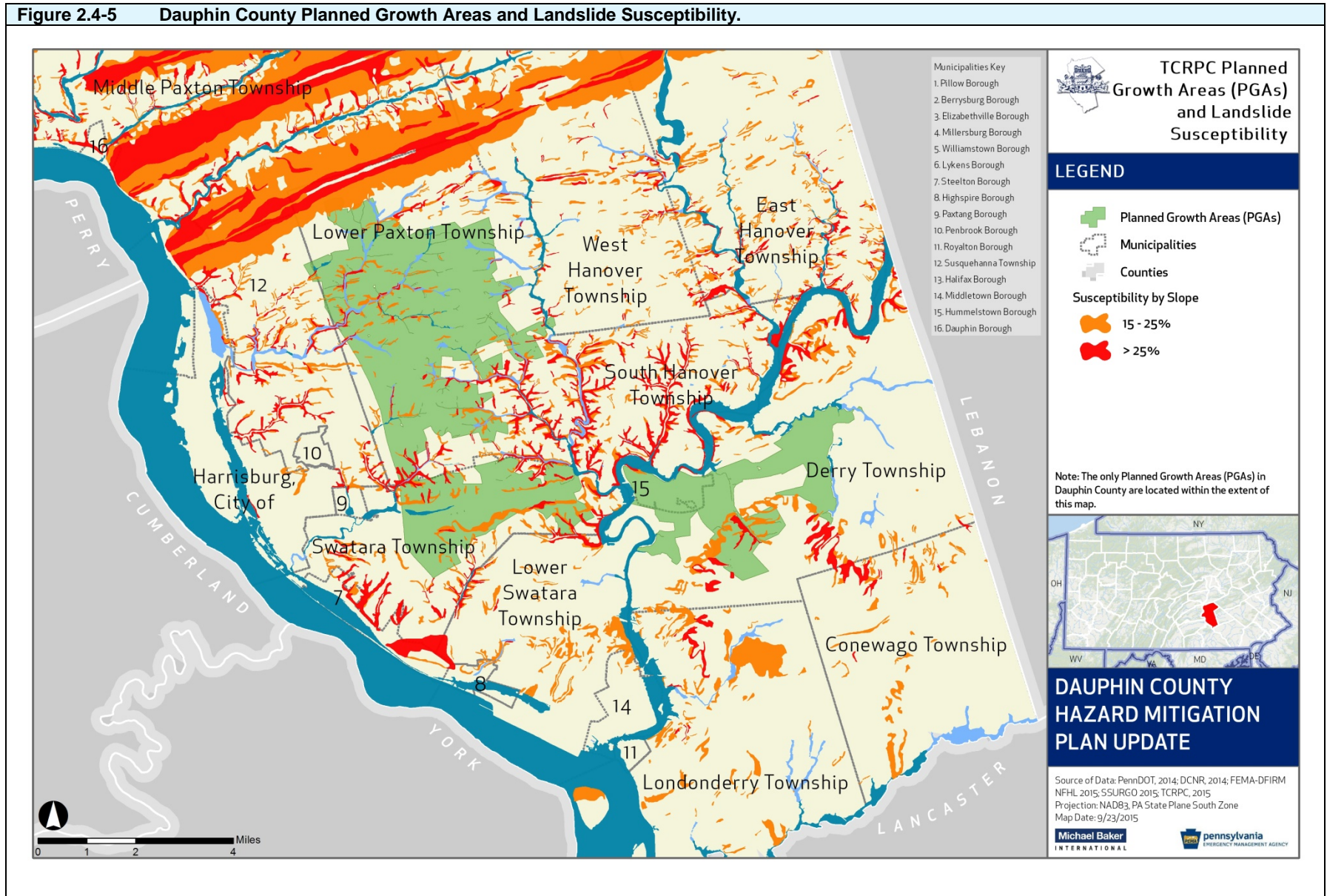


Figure 2.4-5 Dauphin County Planned Growth Areas and Landslide Susceptibility.



2.5. Data Sources and Limitations

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

Flood hazard data used in this plan is Dauphin County's effective DFIRM database from 2012, which is a digital representation of features of Flood Insurance Rate Maps (FIRMs). Dauphin County GIS Division provided other GIS datasets including transportation infrastructure, boundaries, community facilities, and natural features like karst features and wooded areas. Additional data for the base map was provided by the Pennsylvania Department of Transportation (PennDOT), National Parks Service, Pennsylvania Game Commission, and the Pennsylvania Department of Conservation and Natural Resources (DCNR).

Additional information used to complete the risk assessment for this plan was taken from various government agency and non-government agency sources. Those sources are cited where appropriate throughout the plan and on each map with full references listed in *Appendix A – Bibliography*. It should be noted that numerous GIS datasets were obtained from the Pennsylvania Spatial Data Access (PASDA) website (<http://www.pasda.psu.edu/>). PASDA is the official public access geospatial information clearinghouse for the Commonwealth. 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 each hazard, 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 U.S. 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 this information on their website in various formats. For tornado incidents, The Tornado Project which compiles and makes tornado event data available to the emergency management community was used to augment NCDC data.

In addition, geospatial overlays were used to identify the vulnerability of structures and critical facilities. These overlays include:

- Flood: structures and critical facilities located in the SFHA
- Landslide: structures and critical facilities located on slopes over 15%

- Subsidence: structures and critical facilities located in karst areas
- Wildfire: structures and critical facilities located in wildfire high hazard areas (as rated by DCNR)
- Environmental Hazards: structures and critical facilities located within 1.5 miles of a hazardous material facility
- Transportation Accidents:
 - Structures and critical facilities located within 0.25 miles of major roads
 - Structures and critical facilities located within 0.25 miles of rail lines
 - Structures and critical facilities located within 5 miles of an airport.

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. Version 2.2 of this software was used to estimate losses for floods in Dauphin County. For more information about the methodology employed to prepare the HAZUS model and estimate losses, see *Appendix F – HAZUS Methodology and Results Reports*.

This HMP evaluates the vulnerability of the County's critical facilities. For the purposes of this plan, critical facilities are those entities that are essential to the health and welfare of the community. The list of critical facilities included in *Appendix E* was developed by the HMPSC based on reviewing and updating a list of critical facilities prepared for the 2010 HMP update. Coordinates of critical facilities were used to evaluate vulnerability for several hazards as discussed in Section 4.3 – Hazard Profiles and Vulnerability Analysis. The HMPSC identified pipelines as a critical facility under the 'Utilities' category in the 2015 plan. Due to the linear nature of pipelines, they were not mapped for purposes of vulnerability analysis. A discussion on pipelines is included in Section 4.3.15 – Transportation Accidents. Table 2.5-1 summarizes the critical facilities in Dauphin County by type and municipality.

Data pertaining to human-made hazards was obtained from several data sources. Dauphin County Emergency Management Agency (DEMA) maintains a Hazmat database that was used to identify hazardous materials releases and transportation incidents. Transportation incidents were also identified through the Pennsylvania Department of Transportation annual crash statistics reports; the National Transportation Safety Board (NTSB) Aviation Accident Database; the U.S. Department of Transportation (USDOT), Federal Railroad Administration's Ten Year Accident/Incident Overview; and incident/accident data from the USDOT Pipeline and Hazardous Materials Safety Administration. PHMSA's Hazmat Incident Database was used to augment hazardous materials releases identified by DEMA.

Every attempt was made to provide consistency in reported data and in data sources. The baseline population comes from the 2010 US Census and as such the calculated population at risk to flooding and hazardous material releases is derived from the 2010 Census Block geography.

Estimating potential losses that may occur as a result of hazard events requires a full range of information and accurate data. There are a number of site-specific characteristics that reduce a given structure's vulnerability and consequential losses. Examples include first-floor elevation, the number of stories, construction type, foundation type and the age and condition of the

structure. The address and parcel databases include the building and land assessment value for addresses but do not include information on key variables that impact vulnerability, such as specific information on building height, construction type and first floor elevations. As a result, the risk and vulnerability assessments rely on an absence/presence analysis to describe where structures and critical facilities might be vulnerable to a particular hazard.

Finally, Dauphin County's comprehensive plan was in the process of being updated when the HMP update was being prepared. According to DCPC, the updated comprehensive plan will likely be adopted in 2016. The HMP should be modified once the comprehensive plan is adopted to incorporate updated data sources used in this plan.

Dauphin County 2015 All-Hazard Mitigation Plan Update

Table 2.5-1 Critical facilities by type and municipality (Dauphin County GIS, 2015).													
MUNICIPALITY	COMM. FACILITIES	CORRECTION CENTERS	EMERGENCY SHELTERS	EMS	EOC	FIRE	HOSPITAL	MISC. FACILITIES	NURSING HOMES	POLICE	SCHOOLS	UTILITIES	TOTAL
Berrysburg Borough	0	0	1	0	1	1	0	0	0	0	0	0	3
Conewago Township	1	1	0	0	1	0	0	0	0	0	1	0	4
Dauphin Borough	0	0	2	0	1	0	0	0	0	0	0	1	4
Derry Township	4	0	5	2	1	1	1	1	1	3	10	3	32
East Hanover Township	1	0	3	0	1	1	0	0	0	0	1	1	8
Elizabethville Borough	2	0	1	0	1	1	0	0	1	0	0	0	6
Gratz Borough	0	0	0	0	1	1	0	0	0	0	0	0	2
Halifax Borough	2	0	0	0	1	0	0	0	0	1	0	1	5
Halifax Township	1	0	3	0	1	1	0	0	0	0	3	2	11
Harrisburg City	12	3	12	0	2	6	1	9	1	2	12	1	61
Highspire Borough	0	0	1	0	1	1	0	0	0	1	0	1	5
Hummelstown Borough	1	0	2	0	1	1	0	0	0	1	2	0	8
Jackson Township	0	0	1	2	1	1	0	0	0	0	2	0	7
Jefferson Township	0	0	0	0	1	1	0	0	0	0	0	1	3
Londonderry Township	2	0	2	1	1	1	0	1	0	0	1	2	11
Lower Paxton Township	1	0	2	0	1	3	1	1	1	1	13	1	25
Lower Swatara Township	1	0	3	1	1	1	0	2	1	1	5	1	17
Lykens Borough	0	0	1	1	1	1	0	0	0	0	0	1	5
Lykens Township	0	0	0	0	0	0	0	0	0	0	0	1	1
Middle Paxton Township	3	0	7	0	1	1	0	0	0	0	1	0	13
Middletown Borough	1	0	3	1	1	1	0	1	1	1	2	4	16
Mifflin Township	1	0	0	0	0	0	0	0	0	0	0	0	1
Millersburg Borough	1	0	2	0	0	1	0	0	0	1	1	1	7
Paxtang Borough	0	0	0	0	1	1	0	0	0	0	1	0	3
Penbrook Borough	0	0	0	0	1	1	0	0	0	1	1	0	4
Pillow Borough	0	0	0	0	1	1	0	0	0	0	0	0	2
Reed Township	0	0	0	0	1	0	0	0	0	0	0	0	1
Royalton Borough	0	0	0	0	0	0	0	0	0	1	0	0	1
Rush Township	0	0	0	0	1	0	0	0	0	0	0	0	1

Dauphin County 2015 All-Hazard Mitigation Plan Update

Table 2.5-1 Critical facilities by type and municipality (Dauphin County GIS, 2015).													
MUNICIPALITY	COMM. FACILITIES	CORRECTION CENTERS	EMERGENCY SHELTERS	EMS	EOC	FIRE	HOSPITAL	MISC. FACILITIES	NURSING HOMES	POLICE	SCHOOLS	UTILITIES	TOTAL
South Hanover Township	0	0	4	0	1	1	0	0	0	0	2	0	8
Steelton Borough	1	0	1	0	1	1	0	0	0	1	0	0	5
Susquehanna Township	4	0	3	1	1	2	0	2	7	4	7	4	35
Swatara Township	7	3	4	2	1	5	0	1	3	1	8	4	39
Upper Paxton Township	1	0	2	1	2	0	0	0	1	0	1	2	10
Washington Township	0	0	4	0	1	0	0	0	0	1	3	2	11
Wayne Township	0	0	0	0	1	0	0	0	0	0	0	0	1
West Hanover Township	0	1	1	1	1	3	0	0	0	1	2	1	11
Wiconisco Township	0	0	0	0	1	1	0	0	0	0	0	1	3
Williams Township	0	0	0	0	0	0	0	0	0	0	1	0	1
Williamstown Borough	0	0	0	1	1	1	0	0	0	1	0	0	4
TOTAL	47	8	70	14	37	42	3	18	17	23	80	36	395

3. Planning Process

3.1. Update Process and Participation Summary

The Dauphin County Hazard Mitigation Plan Steering Committee (HMPSC) was responsible for preparing the County’s 2010 Hazard Mitigation Plan (HMP) adopted February 23, 2011. The 2010 HMP was an update to the County’s first Hazard Mitigation Plan adopted in 2004. The preparation of both the original HMP and HMP update was led by the Dauphin County Emergency Management Agency (DEMA) in conjunction with Dauphin County municipalities.

To facilitate preparation of the 2015 HMP, PEMA contracted with Michael Baker, Jr., Inc. (Baker), a Philadelphia, Pennsylvania firm. Baker subcontracted with Vernon Land Use, LLC (Vernon) of Mechanicsburg, Pennsylvania to assist in updating Dauphin County’s HMP.

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

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

The plan format is structured in accordance with the most current planning guidance from FEMA, Local Mitigation Handbook (2013), and PEMA, Standard Operating Guide (SOG) (October 2013). As a result, the 2010 and 2015 HMP differ slightly in format and content as follows.

- **Format.** Changes to the plan format are summarized in the following table.

Table 3.1-1 Format changes between the 2010 and 2015 Dauphin County HMP.	
2009 HMP SECTION	2015 HMP SECTION
1.1 Introduction (including Planning Process)	1. Introduction, 2. Community Profile, 3. Planning Process
2.1 Hazard Identification and Risk Assessment	4. Risk Assessment
3.1 Hazard Mitigation Goals	6. Mitigation Strategy
4.1 Capability Assessment	5. Capability Assessment
5.1 Hazard Mitigation Strategy	6. Mitigation Strategy
6.1 Plan Maintenance Procedures	7. Plan Maintenance, 8. Plan Adoption
Appendices	9. Appendices

- Hazard Definitions.** A standard list of hazard definitions, Risk Assessment Hazard Descriptions, has been developed. Therefore, hazards identified in the 2010 HMP Update are referred to in the 2015 HMP Update using slightly different terminology. For example, ‘Flooding’ in the 2010 HMP Update is referred to as ‘Flood, Flash Flood, Ice Jam’ in the 2015 HMP Update. ‘Hazardous Materials’ in the 2010 HMP Update is referred to as ‘Environmental Hazards’ in the 2015 HMP Update.
- Mitigation Techniques.** FEMA’s 2013 Local Mitigation Handbook reduces the number of mitigation techniques from six to four as shown in the following table. The major difference is that emergency services is no longer a mitigation technique category, as emergency services activities are more appropriately located in an emergency response plan.

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

- Planning Process Data Collection Tools.** Standard data collection and documentation tools were developed as part of the SOG and were tailored for Dauphin County in the 2015 HMP including: forms to identify risk, jurisdictional capabilities, and evaluate and prioritize mitigation actions.

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

3.2. The Planning Team

The Planning Team assembled for the 2015 HMP Update included representatives from DEMA, regional planning and environmental organizations, and Dauphin County municipalities. A subset of the Planning Team, the HMPSC was assembled to guide the overall direction of the HMP Update and make day-to-day decisions pertaining to its completion in conjunction with the consultant team. The HMPSC worked throughout the HMP Update to plan and convene meetings, collect information, conduct public outreach, and develop and prioritize the mitigation strategy.

Members of the 2015 HMPSC are listed in the following table.

NAME	ORGANIZATION
Dan Scully	DEMA (County POC)
Steve Libhart	DEMA
Chris Fisher	DEMA
Rebekah Hoffner	DEMA
Steve Letavic	Londonderry Township
Alan Knoche	Lower Swatara Township
Chris McGann (via phone)	Millersburg Borough
Ben Pratt	Susquehanna River Basin Commission
Tim Reardon	Tri-County Regional Planning Commission

Alexis Williams of Michael Baker Jr., Inc. and Tracey Vernon of Vernon Land Use were Consultant Points of Contact (POCs) and also participated in the HMPSA.

The stakeholders listed in Table 3.2-2 served on the 2015 Planning Team, demonstrating their commitment to actively participate in the planning process by attending meetings; completing assessments, surveys, and worksheets; and/or submitting comments. The Planning Team consisted of county and local officials including municipal supervisors and council members and emergency management coordinators. In addition, representatives from the State Planning Team who worked on Pennsylvania’s Hazard Mitigation plan were also included on the planning team. Additional details on State Planning Team participation are included in Section 3.3 – Meetings and Documentation.

MUNICIPALITY/ORGANIZATION	PARTICIPANT(S)
Berrysburg Borough	Diane Kennedy, Michael J. Ward
Conewago Township	Jenna Seesholtz
Dauphin Borough	Bob Rusbatch
Derry Township	Steve Beard, Charles Emerick, Pat O’Rourke, Tim Roche
East Hanover Township	Ronald Johnson
Elizabethville Borough	Russell Walborn
Gratz Borough	Cindy Shade, Dwight Davis, Larry Shade
Halifax Borough	Jeff Enders
Halifax Township	Steven E. Schreffler
Harrisburg City	Brian Enterline
Highspire Borough	Terence Watts
Hummelstown Borough	Bob Martindill, Michael O’Keefe, Steve Wyld
Jackson Township	Donald E. Shutt Jr.
Jefferson Township	Brenda Osman, John Witmer
Londonderry Township	Steve Letavic
Lower Paxton Township	Matt Miller, Ralph Palm
Lower Swatara Township	Alan Knoche
Lykens Borough	Jeanette M. Crabb, William Fee
Lykens Township	Jean Deppen, Ray Deppen

MUNICIPALITY/ORGANIZATION	PARTICIPANT(S)
Middle Paxton Township	Bob Rusbatch (residents Liz Rodda and Steve Wisegarver)
Middletown Borough	Tom Foreman, Tim Konek
Mifflin Township	Michael J. Ward
Millersburg Borough	Gary Daniels, Chris McGann, Sean Grimm
PA DCNR	Jake Glick
PA Department of Environmental Protection	Kerry Leib, Tom Bold
PA Department of General Services	Frank Walkowiak
PA Department of Labor & Industry	Tina Lingle
PA Department of Transportation	Paul Chalecki
PA State System of Higher Education	Alan Margraf
Paxtang Borough	Denny Beaver, Robin Bloss, Ed Wenger
PEMA	Paul Chalecki, Tom Hughes, Ernest Szabo
Penbrook Borough	Jim Armbruster, Robert Rhoads
Pillow Borough	Carol Hoch, Dennis Smeltz
Reed Township	Donald Shutt Jr.
Royalton Borough	Amy Burrell
Rush Township	Brenda Osman, Katie Brennan
South Hanover Township	Penny Pollick, Jay Robertson
Steelton Borough	Tim Lehman
Susquehanna Township	Richard E. Lenker, Brad Reist
Swatara Township	Paul Cornell, Craig Powers
Upper Paxton Township	Sean Grimm, Ronald Hepner, John Orr, Bob Stoner
Washington Township	Russell Walborn, Donna Sitlinger
Wayne Township	Donald Shutt Jr.
West Hanover Township	Bill McCahan, Daniel Rosario
Wiconisco Township	Ronald Pinchorski
Williams Township	John McCready
Williamstown Borough	John McCready

In order to represent the diverse stakeholders in the County, the HMPSC developed a list of stakeholders to work with the Planning Team on the HMP Update. Stakeholder participation is discussed in Section 3.4.

3.3. Meetings and Documentation

The first meeting of the HMPSC to discuss the 2015 HMP Update was held January 30, 2015 at DEMA offices. The meeting included an overview of the hazard mitigation planning process per PEMA’s SOG, review of the project schedule and identification of proposed planning meetings including dates and locations, and identification of additional project stakeholders to include in the hazard mitigation planning process. A few of the planning meetings conducted as part of the 2010 HMP were held in the northern and southern portions of the County and the HMPSC determined it was important to convene meetings in both the northern and southern portions of the County as a way to increase municipal and stakeholder participation. Detailed information pertaining to stakeholders and stakeholder outreach is included in Section 3.4 – Public & Stakeholder Participation.

PEMA priorities for the current plan update were reviewed including: focus on the Planning Process including full municipal participation, comprehensive capability assessment including NFIP review, and an implementable mitigation strategy.

HMPSC members completed an 'Evaluation of Identified Hazards and Risk' survey as part of the kick-off meeting. This survey, included in *Appendix C - Meeting and Other Participation Documentation*, listed hazards profiled in the 2010 Hazard Mitigation Plan and prompted HMPSC members to identify if the frequency of occurrence, magnitude of impact, and/or geographic extent of each hazard increased, decreased, or did not change since the 2010 HMP plan preparation. The survey also provided the opportunity to assess hazards not profiled in the HMP plan to determine if those hazards should be included as part of the HMP Update. It was noted that the 2010 HMP profiled natural hazards only. The HMPSC determined that it wanted the County's plan to be an all-hazards plan; therefore, human-made hazards were included in the HMP update.

HMPSC members identified 16 hazards to profile as part of the HMP Update including 10 natural hazards and six human-made hazards. The hazards were also reviewed with the Planning Team and stakeholders at kickoff meetings conducted in February 2015. Hazard profiles are included in Section 4.3 – Hazard Profiles and Vulnerability Analysis.

The HMPSC reviewed the County's list of critical facilities developed for the 2010 HMP and updated the list to reflect current County conditions. Refer to *Appendix E – Critical Facilities*.

As part of the 2015 HMP, the Baker team focused on a key opportunity for the County. The HMPSC determined a focus should be on involving the State Planning Team, which developed the Commonwealth hazard mitigation plan, in the Dauphin County HMP Update as a way to better integrate state and county hazard mitigation planning. As such the State Planning Team was invited to participate in all hazard mitigation planning meetings. The following agencies were invited to participate: PA Department of Agriculture, PA Department of Conservation and Natural Resources (DCNR), PA Department of General Services (DGS), PA Department of Health (DOH), PA Department of Public Welfare, PA Governor's Office of Homeland Security, PA Department of Community and Economic Development (DCED), PA Department of Environmental Protection (DEP), PA Department of Labor and Industry (L&I), PEMA, PA Department of Transportation (PennDOT), Pennsylvania State Police, USACE Philadelphia, USACE/ Silver Jackets, and PA State System of Higher Education.

In addition, as significant amounts of flooding associated with Tropical Storm Lee occurred in the County in 2011, the HMPSC determined that additional efforts associated with increased municipal participation in FEMA's National Flood Insurance Program (NFIP) Community Rating System (CRS) should be a priority in the HMP Update.

Finally, during the HMPSC kick-off meeting, bi-weekly HMPSC conference calls were scheduled between January and May to obtain HMPSC input throughout development of the HMP Update. A total of six conference calls were held.

The HMPSC conducted a detailed review of draft goals, objectives, and actions for the 2015 HMP Update and developed the final goals, objectives, and actions during a series of conference calls. Once developed, the HMPSC evaluated mitigation actions for feasibility and effectiveness using the Mitigation Action Assessment methodology described in the SOG and prioritized mitigation actions using the multi-objective mitigation action prioritization matrix described in the SOG. A Mitigation Action Plan was developed by the Planning Team with the final Mitigation Action Plan included in Section 6.4 – Mitigation Action Plan.

Meeting minutes and documentation from HMPSC meetings and conference calls are included in *Appendix C – Meeting and Other Participation Documentation*.

Dauphin County’s municipalities actively participated as part of the Planning Team. Municipal involvement in developing the 2015 HMP Update is detailed in Section 3.5 – Multi-Jurisdictional Planning.

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

January 30, 2015. The Steering Committee Kick-Off Meeting was held Friday, January 30, 2015 as discussed above. HMPSC members identified a total of 16 hazards to profile as part of the HMP update.

February 11, 2015. HMPSC Conference Call #1. The HMPSC finalized details for Kick-Off meetings that were held with the Planning Team and stakeholders. A draft press release and public notice were approved. The list of critical facilities was reviewed and updated and the Capability Assessment Survey was discussed. HMPSC members agreed to complete the Capability Assessment Survey from the County’s perspective.

Figure 3.3-1 HMP Update Planning Process Public Notice.



February 17 and February 19, 2015. Hazard Mitigation Planning Kick-Off meetings were held on Tuesday, February 17 at DEMA offices and Thursday, February 19 at Halifax Fire Department. These meetings, along with the time frame for the planning process, were advertised via a legal notice in the Patriot News published on February 15, 2015. A copy of the public notice is included as Figure 3.3-1.

The meetings provided the Planning Team and stakeholders with an opportunity to review the hazard mitigation planning process, discuss the Capability Assessment, and review and provide input on hazards impacting municipalities and the County as a whole.

Capability Assessment Surveys were distributed to municipalities attending the meetings and each municipality was asked to complete and return the survey to the Consultant POC. In an effort to help municipalities complete required forms, a survey was prepared for each

municipality and included the NFIP worksheet pre-populated with community specific information from FEMA's Community Information System (CIS) database. Capability Assessment Surveys were e-mailed to each municipality after the kick off meeting.

Meeting attendees completed the 'Evaluation of Identified Hazards and Risk' worksheet used during the HMPSC kick-off meeting. Meeting attendees evaluated each hazard identified in the County's 2010 HMP for frequency of occurrence, magnitude of impacts, and or/geographic extent changes. Other hazards not previously profiled in the HMP were evaluated for the potential to impact the County. The Consultant POC informed participants that worksheet results would be combined with results from the HMPSC along with additional data to determine the final list of hazards to profile in the 2015 HMP.

Municipal participation requirements in the hazard mitigation planning process were also discussed including that each municipality must attend one meeting, complete at least one hazard mitigation planning form, and have at least one mitigation action.

Twenty-one of Dauphin County's 40 municipalities and eleven stakeholder organizations representing local and regional watershed associations, utilities, hospitals, education, and the American Red Cross were represented at the kick-off meetings. Six members of the State Planning Team participated including representatives from the Pennsylvania Department of Environmental Protection (DEP), the Pennsylvania Department of General Services (DGS), the Pennsylvania Department of Labor and Industry (L&I), the Pennsylvania State System of Higher Education, (State System), and PEMA. DEMA provided the opportunity to attend kick-off meetings via GoToMeeting attending in person was not feasible. A total of eleven people attended one of the two kick-off meetings via GoToMeeting.

February 25, 2015. HMPSC Conference Call #2. The HMPSC finalized the list of hazards to profile in the 2015 HMP based on review of results of hazard evaluation worksheets and input from the HMPSC. The HMPSC also finalized details for the Risk Assessment and Mitigation Solutions Workshops that were held with the Planning Team and stakeholders.

March 11, 2015. HMPSC Conference Call #3. The HMPSC reviewed goals and began review of mitigation actions from the 2010 HMP. A total of 31 goals and 64 actions were included in the 2010 HMP. As the 2010 HMP did not include objectives, the 2015 HMP needed to be modified to include a mitigation strategy including goals, objectives, and actions per PEMA's 2013 SOG. It was discussed that 2010 goals would be reviewed as objectives for the 2015 HMP update. The 2010 goals (2015 objectives) were categorized by the Consultant POC for the HMPSC's review according to four proposed goals. The HMPSC reviewed and commented on the proposed goals and existing objectives from the 2010 plan and discussed whether each objective should be continued, changed, or deleted. The HMPSC began review of the 2010 HMP mitigation actions.

March 17 and March 19, 2015. Risk Assessment and Mitigation Solutions Workshops were held on Tuesday, March 17 at DEMA offices and Thursday, March 19 at Halifax Fire Department. The workshops provided an opportunity for participants to review preliminary hazard findings and assess local and county risk to each of the hazards using a hazard risk

evaluation form (Hazards in Your Community). The form included the 16 hazards to be profiled for the 2015 HMP Update and requested meeting participants to rank hazards relative to spatial extent, probable impact, probability of future events, and overall significance. Results of the hazard risk evaluation form were used to prepare the 2015 Risk Factor ranking.

The Consultant POC reviewed new goals and existing objectives from the 2010 HMP. Municipal-specific Mitigation Action Evaluation forms were e-mailed to each municipality prior to the workshop and a hard copy was provided to municipalities attending the workshop. The Mitigation Action Evaluation form solicited input on municipal-specific mitigation actions by identifying if an action was completed, in-progress, ongoing, or should be discontinued.

Municipalities were also asked to comment on what was accomplished for the action during the reporting period and/or the reason for discontinuation. Municipalities were also asked to identify progress on actions not identified in the 2010 plan, identify new actions to accomplish in the next 5 years, and complete a New Mitigation Action form for new mitigation actions.

Twenty-nine of Dauphin County's 40 municipalities and four stakeholder organizations representing local watershed associations, utilities, and the American Red Cross were represented at the workshops. A member of the State Planning Team from PennDOT attended and a total of six people attended via GoToMeeting.

April 8, 2015. HMPSC Conference Call #4. The HMPSC completed review of the mitigation actions from the 2010 HMP. The Consultant POC noted comments from the actions, and the objectives on the prior HMPSC conference call, would be compiled and used to development 2015 HMP objectives and actions.

April 17, 2015. Office Hours. To accommodate schedules for those municipalities unable to attend the Kick-Off Meeting or Risk Assessment and Mitigation Solutions Workshop, the Consultant POC met with municipalities during office hours held at DEMA offices. The purpose of the office hours was to discuss information presented at the Kick-Off Meeting and Risk Assessment and Mitigation Solutions Workshop; complete the hazard risk evaluation form (Hazards in Your Community); review and comment on municipal mitigation actions using the Mitigation Action Evaluation form; as well as to discuss and develop new mitigation actions.

Office hours were held Friday, April 17, 2015 from 8:00 AM to 4:30 PM. Municipalities were given the opportunity to schedule a time to meet during the day. Four municipalities participated in office hours.

May 6, 2015. HMPSC Conference Call #5. The Consultant POC noted that e-mail invitations for the Draft Plan Review meeting were sent to municipalities on April 24, 2015 with a follow up e-mail reminder to be sent two weeks prior to the meeting on June 1, 2015. The HMPSC began developing objectives and actions for the 2015 using results of the 2010 HMP mitigation strategy review completed on prior conference calls.

May 15, 2015. Hazard Mitigation Planning Workshop. While not part of the hazard mitigation planning process, DEMA representatives Chris Fisher and Dan Scully participated in a workshop convened by the Pennsylvania Chapter of the American Planning Association. Baker

assisted the Pennsylvania Chapter in coordinating the day-long workshop focused on educating professional planners in the Harrisburg region about hazard mitigation planning. DEMA discussed Dauphin County's efforts in increasing municipal participation in the CRS. These efforts are further detailed in Section 4.3.2 – Flood, Flash Flood, Ice Jam.

May 20, 2015. HMPSC Conference Call #6. The HMPSC discussed final details for the Draft Plan Review meeting to be held June 1, 2015. Reminder e-mail invitations were sent to municipalities and stakeholders on May 19, 2015. A press release approved by DEMA on May 12, 2015 was sent to several local media outlets to encourage citizen participation in the Draft Plan Review meeting. The HMPSC completed the mitigation strategy including goals, objectives, and actions for the 2015 HMP. It was noted that a few additional actions might be added or modified based on the draft plan review meeting and subsequent draft plan review.

June 1, 2015. Draft Plan Review Meeting. A public meeting to review the draft plan was held at Dauphin County Conservation District offices on Monday, June 1, 2015 from 7:00 PM to 8:30 PM. In addition to the public, municipalities and other stakeholders were invited to attend.

The meeting included a review of the HMP process, 2015 hazards and risk assessment, outreach, and the mitigation action plan. Also, Mari Radford, a hazard mitigation planner from FEMA Region 3, attended the meeting to talk about the NFIP CRS and answer any questions municipalities have regarding the application process and maintaining program participation. Involvement from FEMA at the meeting helped the County's efforts in promoting CRS participation.

Attendees were informed that an electronic copy of the draft HMP update would be available for download and review on the project website starting on June 26, 2015 at www.pennsylvaniiahmp.com/dauphin-hmp. Comments and information received from the Draft Plan Review Meeting were incorporated into the Draft HMP Update before posting to the project website. Twenty-seven people attended the meeting including representatives from 16 municipalities.

June 11, 2015. Conference Calls. Conference calls were held on June 11, 2015 with two municipalities unable to attend one of the above noted meetings. The Consultant POC presented the PowerPoint presented at the Draft Plan Review meeting on June 1, 2015 and solicited feedback on the draft plan.

July 14, 2015. Draft Plan Review. A meeting was held on July 14, 2015 with a municipality unable to participate in one of the above noted meetings. The Consultant POC reviewed a PowerPoint summarizing the Draft Plan and reviewed the municipality's mitigation action strategy.

3.4. Public & Stakeholder Participation

The HMPSC identified, at the January 30 Steering Committee Kick-Off Meeting, stakeholders to engage in order to obtain comprehensive input about hazards impacting, or with the potential to impact, Dauphin County. Table 3.4-1 lists stakeholder organizations identified to participate in the HMP Update.

Table 3.4-1 Dauphin County HMP Update Stakeholders.		
STAKEHOLDERS		
American Red Cross of the Susquehanna Valley	Capital Area Intermediate Unit	Capital Region Water
Clarks Creek Watershed Preservation Association	Cumberland County Emergency Management Operations Division	Dauphin County Conservation District
Franklin County Department of Emergency Services	Juniata County Department of Emergency Services	Lancaster County Emergency Management Agency
Lebanon County Emergency Management Agency	Met Ed Electric Utility/ First Energy	Norfolk Southern Corp.
Northumberland County Department of Public Safety	PA American Water	Paxton Creek Watershed and Education Association
Penn State Cooperative Extension	Penn State Hershey Medical Center	Perry County Emergency Management
Pinnacle Health	PPL Electric Utilities	Schuylkill County Emergency Management Agency
Stony Creek Watershed Association	Swatara Watershed Association	Susquehanna Area Regional Airport Authority (SARAA)
Three Mile Island Nuclear Power Plant/ Exelon	Tri-County Conewago Creek Association	Tri-Valley Watershed Association
Twin Valley Conservation	UGI Utilities	United Water Pennsylvania
Wiconisco Creek Restoration Association	York County Department of Emergency Services	

In addition to the organizations identified at the beginning of the planning process, the following organizations provided input and assistance during the development of the HMP Update:

- Dauphin County Department of Community & Economic Development (DCDCED)
- PA Department of Community and Economic Development (DCED), Governor’s Center for Local Government Services (GCLGS)
- FEMA, Region 3 CRS
- PA Historical and Museum Commission (PHMC)
- U.S. Nuclear Regulatory Commission (NRC)
- USDOT, Pipeline and Hazardous Materials Safety Administration (PHMSA), National Pipeline Mapping System and Office Of Hazardous Materials Safety

Table 3.4-2 lists individuals from stakeholder organizations who participated in the planning process by either participating in meetings or providing data to assist in the plan update.

Table 3.4-2 Stakeholder participants in the 2015 Dauphin County HMP Update.	
ORGANIZATION	PARTICIPANT(S)
American Red Cross	Lois Craven, Chris Doty
Capital Area Intermediate Unit	Len Kapp
Capital Region Water	Mike Deily
Clarks Creek Watershed Association	Sherry McLain, Brett Zankel, Paula Zankel
DCCD	Bob Christoff, Eric Naguski
DCDCED	George Connor
FEMA Region 3	Mari Radford
Met Ed Electric Utility/ First Energy	Karen Baxter
PA DCNR	Jake Glick
PA American Water Company	Justin Brame, Jon Prawdzik
PA DCED, GCLGS	Rob Brady
PA Historical and Museum Commission	Jeremy Young
PA Public Utility Commission	Tom Charles, Dan Searforce
Pinnacle Health	Frank Hess
PPL	Harry Devine, II
Tetra Tech	John Mizerk
Tri-Valley Watershed Association	Pam Ulicny
UGI	Eric Swartley
USDOT PHMSA	Karen Gentile, Anthony Murray
U.S. Nuclear Regulatory Commission, Office of Public Affairs Region I	Neil Sheehan

Stakeholders were invited to the HMP Kick-Off meetings on February 17, 2015 and February 19, 2015; the Risk Assessment and Mitigation Solution Workshops held March 17, 2015 and March 19, 2015; and to the Draft Plan Review Meeting held June 1, 2015. E-mail invitations were sent to stakeholders in advance of the meetings with copies included in *Appendix C - Meeting and Other Participation Documentation*.

As part of the Kick-Off meetings, stakeholders were invited to complete the 'Evaluation of Identified Hazards and Risk' worksheet. Stakeholders evaluated each hazard identified in the County's 2010 HMP for frequency of occurrence, magnitude of impacts, and/or geographic extent changes. Other hazards not previously profiled in the HMP were evaluated for the potential to impact the County.

As part of the Risk Assessment and Mitigation Solution Workshops, stakeholders invited to complete a hazard risk evaluation form (Hazards in Your Community) which listed hazards to be profiled for the 2015 HMP Update. Stakeholders were asked to rank each hazard from the perspective of their organization. For example, utilities were asked to evaluate hazards from the perspective of their buildings and facilities. Hazards were ranked relative to spatial extent, probable impact, probability of future events, and overall significance. Stakeholders were also encouraged to provide additional information pertaining to the listed hazards as well as list additional hazards not identified on the hazard risk evaluation form, but ones which could impact their organization. Results of the hazard risk evaluation form were reviewed as part of the preparation of the 2015 Risk Factor ranking.

After each meeting, stakeholders who attended the workshop were sent a follow-up e-mail thanking them for their attendance. The e-mail noted that a stakeholder may be contacted for input on data or potential mitigation actions and included a link to the project website. An e-mail was also sent to stakeholders not available to attend the meetings. The e-mail welcomed their future input and included a link to the project website where meeting materials were posted.

Stakeholders, along with the general public and planning team were invited to attend the Draft Plan Review meeting for the HMP Update held on June 1, 2015 from 7:00 PM – 8:30 PM at the Dauphin County Conservation District. An e-mail invitation was sent to municipalities and stakeholders on April 24, 2015 and a reminder e-mail sent May 19, 2015. A press release was approved by Dauphin County and sent to local news organizations including the Patriot News, Penn Live, and the Upper Dauphin Sentinel. A total of 27 people attended the meeting and provided input. Three members of the public attended the meeting. A copy of the e-mail invitation sent to municipalities and stakeholders, minutes, a sign-in sheet, completed comment forms, press release, and press coverage are included in *Appendix C - Meeting and Other Participation Documentation*.

As noted above, all stakeholders were e-mailed a link to the project website: <http://www.pennsylvaniahmp.com/dauphin-hmp>. The website included general resources pertaining to hazard mitigation planning and posting of upcoming events and project announcements. In addition, planning meeting materials and the Draft HMP Update were also posted to the project website. As of August 2015, the project website had 320 visits, and an additional 70 visits to the draft plan page. Figure 3.4-2 includes a screen shot from the project website.

The draft HMP was posted on the project website for review starting on June 26, 2015. Comments were received from two stakeholders and incorporated into the draft plan. These comments are included in *Appendix C – Meeting and Other Participation Documentation*.

Figure 3.4-2 Dauphin County HMP Project Website (www.pennsylvaniahmp.com/dauphin-hmp).



3.5. Multi-Jurisdictional Planning

Dauphin County had full municipal participation in the 2010 HMP Update with each of Dauphin County's 40 municipalities passing a resolution to adopt the HMP.

Each municipality was part of the Planning Team developed for the 2015 HMP Update and was invited to participate in several meetings held in northern and southern portions of the County as noted in Section 3.3.

The first opportunity for a municipality to attend a hazard mitigation planning meeting was at the HMP Kick-Off meetings which were held on February 17, 2015 and February 19, 2015. A total of 21 municipalities attended the meetings. Meeting invitations were e-mailed to municipalities by the County POC on February 5, 2015. Municipal participation requirements in the hazard mitigation planning process were discussed including that each municipality is required to attend

one meeting, complete at least one hazard mitigation planning form, and have at least one mitigation action.

Capability Assessment Surveys were distributed to municipalities attending the meetings and each municipality was asked to complete and return the survey to the Consultant POC. In an effort to help municipalities complete required forms, a survey was prepared for each municipality and included the NFIP worksheet pre-populated with community specific information from FEMA's CIS database. Capability Assessment Surveys were e-mailed to each municipality after the kick off meeting.

Municipalities completed the 'Evaluation of Identified Hazards and Risk' worksheet which evaluated each hazard identified in the County's 2010 HMP for frequency of occurrence, magnitude of impacts, and or/geographic extent changes. Other hazards not previously profiled in the HMP were evaluated for the potential to impact the municipality. After the Kick-Off meeting, municipalities that attended the meeting were sent an individual follow up e-mail thanking them for their attendance. The municipality's Capability Assessment Survey was attached to the e-mail as well as the risk evaluation worksheet. An e-mail was also sent to each municipality not able to attend one of the two Kick-Off meetings.

The second opportunity for a municipality to attend a hazard mitigation planning meeting was at a Risk Assessment and Mitigation Solutions Workshop which was held March 17, 2015 and March 19, 2015. Twenty-nine municipalities attended one of the workshops. Meeting invitations were e-mailed to municipalities on March 2, 2015. In addition a follow-up e-mail was sent to each municipality on March 13, 2015 with a copy of the municipality's Mitigation Action Evaluation form attached. At the workshop the Mitigation Action Evaluation form was reviewed. Municipalities were asked to provide input on whether each 2010 HMP action was completed, in-progress, ongoing, or should be discontinued. Municipalities were also asked to comment on what was accomplished for the action during the reporting period and/or the reason for discontinuation. In addition, municipalities were asked to identify progress on actions not identified in the 2010 plan, identify new actions to accomplish in the next 5 years, and complete a mitigation action form for new mitigation actions.

The workshop also provided municipalities the opportunity to comment on the relative level of risk for each hazard as compared to the County by completing a hazard risk evaluation form (Hazards in Your Community). The form listed hazards to be profiled for the 2015 HMP Update and prompted municipalities to rank hazards relative to spatial extent, probable impact, probability of future events, and overall significance. Results of the hazard risk evaluation form were used to prepare the 2015 Risk Factor ranking. The form also afforded municipalities the opportunity to provide input on specific instances of a listed hazard in their community and on additional hazards that may impact their community.

Follow-up e-mails were sent to all Dauphin County municipalities on March 20, 2015. An e-mail was sent to municipalities who attended the workshop thanking them for their attendance, providing a link to the project website, and inviting them to meet during office hours on April 17, 2015 at DEMA offices. The e-mail noted that the purpose of an additional meeting would be to assist municipalities requiring additional assistance in developing mitigation actions that reflect community needs and answer any questions pertaining to the hazard mitigation planning process.

A separate e-mail was sent to municipalities not available to attend the HMP Workshop and invited them to attend office hours at DEMA offices on April 17, 2015 and including a link to the

project website with an explanation that project related materials would be available through the website. Four municipalities participated in office hours.

An additional opportunity to attend a meeting associated with the HMP Update was held on Monday, June 1, 2015 at the Draft Plan Review meeting. A total of 16 municipalities attended the meeting.

To accommodate schedules of municipalities not able to attend one of the meetings, conference calls were held June 11, 2015 and a meeting was held July 14, 2015. The Consultant POC presented the PowerPoint presentation discussed at the Draft Plan Review meeting on June 1, 2015. This provided municipalities with the opportunity to view the presentation and submit input.

Municipal participation in the 2015 HMP Update planning process is summarized in Table 3.5-1. All of Dauphin County's 40 municipalities met planning requirements.

Documentation of participation in meetings and completion of surveys is included in *Appendix C - Meeting and Other Participation Documentation*.

Dauphin County 2015 All-Hazard Mitigation Plan Update

Table 3.5-1 Dauphin County 2015 HMP Update Municipal Participation.								
MUNICIPALITY	MEETINGS				SURVEYS/FORMS			
	HMP Kick-Off (2/17/15 & 2/19/15)	RA & Mitigation Solutions Workshop (3/17/15 & 3/19/15)	HMP Office Hours (4/17/15)	Draft Plan Review Meeting (6/1/15)/ Conf. Call/Mtg.	Hazard Evaluation & Identification Worksheet	Capability Assessment Survey / NFIP Worksheet	Hazard-Risk Review	Mitigation Action Review
Berrysburg Borough		X				X	X	X
Conewago Township				X		X	X	X
Dauphin Borough	X	X			X	X	X	X
Derry Township	X	X	X			X	X	X
East Hanover Township	X		X			X	X	X
Elizabethville Borough	X	X					X	
Gratz Borough				X			X	X
Halifax Borough	X					X	X	X
Halifax Township		X					X	
Harrisburg City	X	X				X	X	
Highspire Borough	X	X			X	X	X	X
Hummelstown Borough	X					X		X
Jackson Township		X				X	X	X
Jefferson Township	X					X		
Londonderry Township		X			X	X	X	X
Lower Paxton Township		X	X			X	X	X
Lower Swatara Township	X	X		X	X	X	X	X
Lykens Borough	X	X		X		X	X	X
Lykens Township				X		X		
Middle Paxton Township	X	X		X	X	X	X	X
Middletown Borough				X		X	X	X
Mifflin Township		X				X	X	
Millersburg Borough	X	X		X	X	X	X	
Paxtang Borough		X				X	X	
Penbrook Borough				X		X	X	X

Dauphin County 2015 All-Hazard Mitigation Plan Update

Table 3.5-1 Dauphin County 2015 HMP Update Municipal Participation.								
MUNICIPALITY	MEETINGS				SURVEYS/FORMS			
	HMP Kick-Off (2/17/15 & 2/19/15)	RA & Mitigation Solutions Workshop (3/17/15 & 3/19/15)	HMP Office Hours (4/17/15)	Draft Plan Review Meeting (6/1/15)/ Conf. Call/Mtg.	Hazard Evaluation & Identification Worksheet	Capability Assessment Survey / NFIP Worksheet	Hazard-Risk Review	Mitigation Action Review
Pillow Borough				X				X
Reed Township		X		X		X	X	X
Royalton Borough		X				X	X	X
Rush Township	X					X		
South Hanover Township	X	X			X		X	
Steelton Borough	X	X				X	X	X
Susquehanna Township		X				X	X	
Swatara Township	X			X		X	X	X
Upper Paxton Township	X	X			X	X	X	
Washington Township	X	X				X	X	X
Wayne Township		X		X		X	X	X
West Hanover Township	X	X	X	X	X		X	X
Wiconisco Township		X					X	
Williams Township		X				X	X	
Williamstown Borough		X					X	

4. Risk Assessment

4.1. Update Process Summary

The risk assessment provides a factual basis for activities proposed by Dauphin County in their mitigation strategy. Hazards that may affect the County are identified and defined in terms of their location and extent, magnitude of impacts, previous events, and probability of future events.

The 2010 Dauphin County HMP profiled the following natural hazards. Human-made hazards were not included as part of the 2010 HMP with the exception of Dam Incidents.

- Dam Failure
- Drought
- Flooding
- Hurricanes/Tropical Storms
- Land Subsidence
- Landslides
- Severe Storms (thunderstorms, hailstorms, and blizzards)
- Tornadoes
- Wildfires

In order to evaluate hazards in the 2010 plan and identify new hazards that may impact Dauphin County, the HMPSC assessed the change in risk for all hazards identified in the 2010 plan and identified hazards with the potential to impact the County not previously identified but included in PEMA's 2013 SOG. The HMPSC determined that the 2015 HMP update would be an all-hazards plan including both natural and human-made hazards.

It should be noted that a standard list of hazard definitions, Risk Assessment Hazard Descriptions, was included in the 2013 SOG; therefore, hazards identified in the 2010 HMP are referred to in the 2015 HMP using slightly different terminology. Refer to Section 3.1 – Update Process and Participation Summary.

To identify hazards, the Planning Team and stakeholders completed a risk assessment survey (Evaluation of Identified Hazards and Risk) as part of the project kick-off meetings. The survey listed hazards profiled in the 2010 HMP and prompted the Planning Team and stakeholders to identify if the frequency of occurrence, magnitude of impact, and/or geographic extent of each hazard increased, decreased, or did not change since the preparation of the 2010 HMP. The survey also provided the opportunity to assess hazards not profiled in the HMP to determine if those hazards should be included as part of the HMP update. Responses from the survey, in combination with review of hazards profiled in the 2010 HMP, were used by the HMPSC to identify a list of hazards to profile in the 2015 HMP, including seven new hazards as identified in Table 4.1-1. Copies of the surveys completed by the Planning Team (Steering Committee members and municipalities) and stakeholders are included in *Appendix C - Meeting and Other Participation Documentation*.

Table 4.1-1 New hazards added to the 2015 Dauphin County HMP.	
HAZARD NAME	REASON FOR INCLUSION
NATURAL HAZARDS	
Pandemic and Infectious Disease	<ul style="list-style-type: none"> • Recognition of importance and potential future severity of infectious disease, especially pandemic influenza.
Radon Exposure	<ul style="list-style-type: none"> • Dauphin County is located in a Zone 1 county having a predicted average indoor radon screening level exceeding EPA action guidelines.
HUMAN-MADE HAZARDS	
Building or Structure Collapse	<ul style="list-style-type: none"> • Older, unoccupied structures and potential for structure collapse noted as an issue throughout the County, particularly in Harrisburg.
Environmental Hazards	<ul style="list-style-type: none"> • Recognition of impacts due to potential releases from fixed facilities. • Potential environmental impacts associated with pipelines (e.g. proposed Mariner East Pipeline). • Recognition of strong connection between transportation accidents and hazardous material releases. • Air quality impacts associated with the County's transportation infrastructure.
Nuclear Incidents	<ul style="list-style-type: none"> • Location of Three Mile Island in Dauphin County.
Transportation Accidents	<ul style="list-style-type: none"> • Recognition of potential for property damage and injury due to the County's significant transportation infrastructure including road, rail, and aviation. • Recognition of strong connection between transportation accidents and hazardous material releases. • Increased over the road and rail cargo containing hazardous materials and the proximity of rail to highways.
Utility Interruption	<ul style="list-style-type: none"> • Potential for utility interruption to negatively impact citizens or emergency response during a hazard incident. • Replacement of aging infrastructure is warranted. • Vulnerability of power grid noted as a concern. • Address the impact of utility interruption during periods of extreme cold/warm temperature. • Loss of phone service both landline and cell identified as an issue. Loss of fiber network.

Hazard profiles were then developed in order to define the characteristics of each hazard as they apply to Dauphin County. Each municipality and the other stakeholders participating in the planning process evaluated the impact of hazard profiled in their jurisdiction or organization

using the Hazards in Your Community Worksheet. Completed worksheets are included in *Appendix C - Meeting and Other Participation Documentation*. This evaluation, together with the research and analysis of each hazard, allowed for an assessment of jurisdictional risk, discussed in Section 4.4.2.

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

4.2. Hazard Identification

Pennsylvania's disaster history helps provide direction on the identification of hazards and their significance both at the state and local level. An analysis of the past occurrences of each hazard is the first step toward predicting future susceptibility to that hazard. By noting the hazards of the past, Dauphin County and its municipalities will be able to better understand and prepare for future natural and human-made disasters

4.2.1. Table of Presidential Disaster Declarations

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

There is no financial threshold for an Emergency Declaration, but there are two thresholds for Presidential Disaster Declarations established under the Stafford Act: a state and a county threshold. These thresholds are based on a formula that uses the population of the jurisdiction (as recorded in the decennial Census) times a set per capita indicator. As of federal fiscal year 2014-15, these thresholds are \$3.56 per capita for counties and \$1.41 per capita for the state. With a population of 268,100 in 2010, the Dauphin County threshold is approximately \$954,000. State and county thresholds must be simultaneously attained for a Presidential Disaster Declaration to be issued.

Table 4.2.1-1 displays the Presidential Disaster and Emergency Declarations that have affected Dauphin County from 1955-2014 from most recent to oldest event.

Table 4.2.1-1 Presidential Disaster and Emergency Declarations affecting Dauphin County.			
DATE	DECLARATION AND EVENT TYPE	DECLARATION NUMBER	AFFECTED AREAS
January 2013	Presidential Disaster Declaration – Hurricane Sandy	4099	Bedford, Bucks, Cameron, Dauphin, Forest, Franklin, Fulton, Huntingdon, Juniata, Monroe, Montgomery, Northampton, Philadelphia, Pike, Potter, Somerset, Sullivan, Wyoming
October 2012	Emergency Declaration – Hurricane Sandy	3356	All counties
September 2011	Emergency Declaration – Remnants of Tropical Storm Lee	3340	Adams, Bedford, Berks, Blair, Bradford, Bucks, Cambria, Carbon, Centre, Chester, Clinton, Columbia, Cumberland, Dauphin, Delaware, Franklin, Fulton, Huntingdon, Juniata, Lackawanna, Lancaster, Lebanon, Lehigh, Luzerne, Lycoming, Mifflin, Monroe, Montgomery, Montour, Northumberland, Northampton, Perry, Philadelphia, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Wyoming, York
September 2011	Presidential Disaster Declaration - Remnants of Tropical Storm Lee	4030	Adams, Bedford, Berks, Bradford, Bucks, Chester, Columbia, Dauphin, Huntingdon, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Lycoming, Mifflin, Montgomery, Montour, Northampton, Northumberland, Perry, Schuylkill, Snyder, Sullivan, Susquehanna, Tioga, Union, Wayne, Wyoming, and York
April 2010 (Emergency Declaration)	Presidential Disaster Declaration - Severe Winter Storm	1898	Adams, Allegheny, Armstrong, Beaver, Bedford, Blair, Butler, Cambria, Chester, Cumberland, Dauphin, Delaware, Fayette, Franklin, Fulton, Greene, Huntingdon, Indiana, Juniata, Lancaster, Lebanon, Perry, Philadelphia, Somerset, Westmoreland, and York Counties
September 2005 (Emergency)	Emergency Declaration – Hurricane Katrina	3235	All counties: Proclamation of Emergency to Render

Table 4.2.1-1 Presidential Disaster and Emergency Declarations affecting Dauphin County.			
DATE	DECLARATION AND EVENT TYPE	DECLARATION NUMBER	AFFECTED AREAS
Declaration)			Mutual Aid and to Receive and House Evacuees
September 2004	Presidential Disaster Declaration – Pennsylvania Tropical Depression Ivan	1557	All counties
March 2003	Emergency Declaration – Severe Winter Storm	3180	Adams, Bedford, Berks, Blair, Cambria, Carbon, Chester, Clinton, Columbia, Cumberland, Dauphin, Delaware, Fayette, Franklin, Fulton, Greene, Huntingdon, Juniata, Lancaster, Lebanon, Lehigh, Lycoming, Mifflin, Montour, Montgomery, Northampton, Northumberland, Perry, Philadelphia, Schuylkill, Snyder, Somerset, Union, Washington, Westmoreland, and York Counties
September 2003	Presidential Disaster Declaration - Hurricane Isabel/Henri	1497	All counties
September 1999	Presidential Disaster Declaration - Hurricane Floyd	1294	All counties
January 1996	Presidential Disaster Declaration - Severe Winter Storms	1085	Adams, Allegheny, Armstrong, Beaver, Bedford, Berks, Blair, Bradford, Bucks, Cambria, Cameron, Carbon, Centre, Chester, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Delaware, Elk, Fayette, Franklin, Fulton, Greene, Huntingdon, Indiana, Jefferson, Juniata, Lackawanna, Lancaster, Lebanon, Lehigh, Lycoming, Luzerne, McKean, Mifflin, Monroe, Montgomery, Montour, Northampton, Northumberland, Perry, Philadelphia, Pike, Potter, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Wayne, Westmoreland, Wyoming and York Counties - Public Assistance; All 67 counties declared for Individual Assistance

Table 4.2.1-1 Presidential Disaster and Emergency Declarations affecting Dauphin County.			
DATE	DECLARATION AND EVENT TYPE	DECLARATION NUMBER	AFFECTED AREAS
January 1996	Presidential Disaster Declaration - Flooding	1093	All counties
January and February, 1994	Presidential Disaster Declaration - Severe Winter Storms	1015	All counties
March 1993	Emergency Declaration – Blizzard	3105	All counties
October 1976	Presidential Disaster Declaration - Flood	523	Adams, Bradford, Columbia, Cumberland, Dauphin, Franklin, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Mifflin, Northumberland, Perry, Schuylkill, Snyder, Sullivan, Susquehanna, Wayne, Wyoming and York Counties
September 1975	Presidential Disaster Declaration - Flood (Eloise)	485	Adams, Berks, Bradford, Centre, Clinton, Columbia, Cumberland, Dauphin, Franklin, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Lycoming, Mifflin, Montour, Northampton, Perry, Potter, Schuylkill, Snyder, Sullivan, Susquehanna, Tioga, Union, Wayne, Wyoming and York Counties
June 1972	Presidential Disaster Declaration - Flood (Agnes)	340	All counties
August 1965	Presidential Disaster Declaration - Water Shortage	206	Numerous counties statewide (no list available)

4.2.2. Summary of Hazards

As described in Section 4.1, at the initiation of the plan update process, the HMPSC reviewed the Pennsylvania Standard List of Hazards to evaluate new and changing hazards in Dauphin County. Following a review of the hazards considered in the 2010 HMP, the 2013 Standard State All-Hazard Mitigation Plan, and the Standard List of Hazards, the HMPSC decided that the 2015 HMP update should identify, profile, and analyze 16 hazards. The hazards include all hazards profiled in the 2010 HMP and the addition of Pandemic and Infectious Diseases; Radon Exposure; Building or Structure Collapse; Environmental Hazards; Nuclear Incidents; Transportation Accidents; and Utility Interruption. Table 4.2.2-1 contains a complete list of the 16 hazards identified for hazard profiling in Dauphin County’s 2015 HMP update. Hazard profiles are included in Section 4.3 for each of these hazards.

Table 4.2.2-1 Definition of hazards profiled in the 2015 Dauphin County HMP Update.	
PROFILED HAZARDS	DESCRIPTION
NATURAL	
Drought	Drought is a natural climatic condition which occurs in virtually all climates and is 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).
Flood, Flash Flood, Ice Jam	Flooding is the temporary condition of partial or complete inundation on normally dry land, and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period of time. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiography, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas (NOAA, 2009). Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. All forms of flooding can damage infrastructure (USACE, 2007).
Hurricane, Tropical Storm, Nor'easter	Hurricanes, tropical storms, and nor'easters are classified as cyclones, which are any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise (in the Northern Hemisphere) and whose diameter averages 10-30 miles across. While most of Pennsylvania is not directly affected by the devastating impacts cyclonic systems can have on coastal regions, many areas in the state are subject to the primary damaging forces associated with these storms including high-level sustained winds, heavy precipitation, and tornadoes. Areas in southeastern Pennsylvania could be susceptible to storm surge and tidal flooding. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season (June through November). (FEMA, 1997).

Table 4.2.2-1 Definition of hazards profiled in the 2015 Dauphin County HMP Update.	
PROFILED HAZARDS	DESCRIPTION
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).
Radon Exposure	Radon is a cancer-causing natural radioactive gas that you cannot see, smell, or taste. It is a large component of the natural radiation that humans are exposed to and can pose a serious threat to public health when it accumulates in poorly ventilated residential and occupation settings. According to the US EPA, radon is estimated to cause about 21,000 lung cancer deaths per year, second only to smoking as the leading cause of lung cancer (EPA 402-R-03-003: EPA Assessment..., 2003). An estimated 40% of the homes in Pennsylvania are believed to have elevated radon levels (Pennsylvania Department of Environmental Protection, 2009).
Subsidence, Sinkhole	Subsidence is a natural geologic process that commonly occurs in areas with underlying limestone bedrock and other rock types that are soluble in water. Water passing through naturally occurring fractures dissolves these materials leaving underground voids. Eventually, overburden on top of the voids causes a collapse which can damage structures with low strain tolerances. This collapse can take place slowly over time or quickly in a single event, but in either case, Karst topography describes a landscape that contains characteristic structures such as sinkholes, linear depressions, and caves. In addition to natural processes, human activity such as water, natural gas, and oil extraction can cause subsidence and sinkhole formations. (FEMA, 1997).

Table 4.2.2-1 Definition of hazards profiled in the 2015 Dauphin County HMP Update.	
PROFILED HAZARDS	DESCRIPTION
Tornado, Wind Storm	<p>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 are 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; American Meteorological Society, 2009).</p>
Wildfire	<p>A wildfire is a raging, uncontrolled fire that spreads rapidly through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that can be seen for miles. Wildfires can occur at any time of the year, but mostly occur during long, dry hot spells. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in fields, grass, brush, and forests. 98% of wildfires in Pennsylvania are a direct result of people, often caused by debris burns (PA DCNR, 1999).</p>
Winter Storm	<p>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).</p>

Table 4.2.2-1 Definition of hazards profiled in the 2015 Dauphin County HMP Update.	
PROFILED HAZARDS	DESCRIPTION
HUMAN-MADE	
Building or Structure Collapse	Collapse of a building or structure refers to the loss of the load-carrying capacity of a component of the structure or the entire structure itself. The loss of a structure's load-carrying capacity occurs when the loads applied to the structure exceed the structure's load-carrying capacity. This can be a result of improper design, lack of maintenance, events from a structure's load history that have gradually reduced its load-carrying capacity, or sudden and severe hazard events such as severe weather or terrorism. (Ratay, 2000).
Dam Failure	A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Dams provide benefits such as flood protection, power generation, drinking water, irrigation, and recreation. Failure of these structures results in an uncontrolled release of impounded water. Failures are relatively rare, but immense damage and loss of life is possible in downstream communities when such events occur. Aging infrastructure, hydrologic, hydraulic and geologic characteristics, population growth, and design and maintenance practices should be considered when assessing dam failure hazards. The failure of the South Fork Dam, located in Johnstown, PA, was the deadliest dam failure ever experienced in the United States. It took place in 1889 and resulted in the Johnstown Flood which claimed 2,209 lives (FEMA, 1997). Today there are approximately 3,200 dams and reservoirs throughout Pennsylvania (Pennsylvania Department of Environmental Protection, 2009).
Environmental Hazards	Environmental hazards are hazards that pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. For the purpose of the Dauphin County HMP, environmental hazards focus on hazardous material releases at fixed facilities or in transit; including toxic chemicals, infectious substances, biohazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive (PL 1990-165, § 207(e)).
Nuclear Incidents	Nuclear incidents generally refer to events involving the release of significant levels of radioactivity or exposure of workers or the general public to radiation (FEMA, 1997). Nuclear accidents/incidents can be placed into three categories: 1) Criticality accidents which involve loss of control of nuclear assemblies or power reactors, 2) Loss-of-coolant accidents which result whenever a reactor coolant system experiences a break or opening large enough so that the coolant inventory in the system cannot be maintained by the normally operating make-up system, and 3) Loss-of-containment accidents which involve the release of radioactivity. The primary concern following such an incident or accident is the extent of radiation, inhalation, and ingestion of radioactive isotopes which can cause acute health effects (e.g. death, burns, severe impairment), chronic health effects (e.g. cancer), and psychological effects. (FEMA, 1997).

Table 4.2.2-1 Definition of hazards profiled in the 2015 Dauphin County HMP Update.	
PROFILED HAZARDS	DESCRIPTION
Transportation Accidents	<p>Transportation accidents can result from any form of air, rail, water, or road travel. It is unlikely that small accidents would significantly impact the larger community. However, certain accidents could have secondary regional impacts such as a hazardous materials release or disruption in critical supply/access routes, especially if vital transportation corridors or junctions are present. Traffic congestion in certain circumstances can also be hazardous. Traffic congestion is a condition that occurs when traffic demand approaches or exceeds the available capacity of the road network. This hazard should be carefully evaluated during emergency planning since it is a key factor in timely disaster or hazard response, especially in areas with high population density. (Federal Highway Administration, 2009).</p>
Utility Interruption	<p>Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works, and information network sectors. Utility interruption hazards include the following:</p> <ul style="list-style-type: none"> • Geomagnetic Storms; 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 (United States Senate Committee on Environment and Public Works, 2009). • Telecommunications System Failure; Damage to data transfer, communications, and processing equipment, for example (FEMA, 1997) • Transmission Facility or Linear Utility Accident; liquefied natural gas leakages, explosions, facility problems, for example (United States Department of Energy, 2005) • Major Energy, Power, Utility Failure; interruptions of generation and distribution, power outages, for example (United States Department of Energy, 2000).

4.3. Hazard Profiles and Vulnerability Analysis

NATURAL HAZARDS

4.3.1. Drought

4.3.1.1. Location and Extent

Much like the rest of Pennsylvania, Dauphin County is subject to periodic droughts that impact the County's ability to meet all of its water needs. A drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. High temperatures, prolonged winds, and low relative humidity can exacerbate the severity of drought.

Unlike some hazards, droughts are not specific to certain parts of the County. Rather, a drought is likely to impact the County in a relatively uniform fashion with only minor localized variations in rainfall amounts of specific storm events. Droughts also often occur across county boundaries, affecting large areas of Pennsylvania at the same time. The spatial extent for areas of impact can range from localized areas in Pennsylvania to the entire Mid-Atlantic region.

4.3.1.2. Range of Magnitude

The effects of a drought can be far-reaching and typically include reduced productivity of aquatic resources, mandatory water use restrictions, well failures, cutbacks in industrial production, agricultural losses, and limited recreational opportunities. Ultimately, the severity of a drought event is determined by its aerial extent when combined with its intensity, duration, rainfall amounts, vegetation conditions, soil-moisture conditions, water levels in reservoirs, stream flow, agricultural productivity, or economic impacts.

Numerous indices have been developed to define the severity of droughts. The Commonwealth uses five parameters to assess drought conditions:

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

Soil moisture information is provided by the National Oceanic and Atmospheric Administration (NOAA) via the Palmer Drought Severity Index. The Palmer Index is a computed value based on a number of meteorological and hydrological factors; it is compiled weekly for Pennsylvania by the Climate Prediction Center of the National Weather Service. Within Pennsylvania, Palmer values of -2.00 to -2.99 indicate a drought watch status, values of -3.00 to -3.99 indicate warning, and values of -4.00 and less indicate emergency. The Palmer Indices are available for all ten Palmer regions of the state. Northern Dauphin County is located in Palmer Region 5,

while southern Dauphin County is located in Palmer Region 3. These indices, along with several other information sources, are used by the Commonwealth Drought Task Force to monitor drought conditions. During significant drought events, Dauphin County actively monitors and participates in the mitigative recommendations established by the Drought Task Force.

Table 4.3.1-1 Palmer Drought Severity Index (PSDI) classifications (NDMC, 2015).

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

In Pennsylvania, PEMA has primary responsibility for managing droughts with direct support from the Department of Environmental Protection (DEP). According to *Drought Management in Pennsylvania* (2012), PEMA and DEP use the following three stages to describe and manage droughts. They are listed in order of increasing severity:

- **Drought Watch:** A period to alert government agencies, public water suppliers, water users and the public regarding the potential for future drought-related problems, Drought Watches are invoked when three or more drought indicators are present for a county or group of counties. The focus is on increased monitoring, awareness, and preparation for response if conditions worsen. A request for voluntary water conservation is made. The objective of voluntary water conservation measures during a drought watch is to reduce water uses by 5 percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may be asking for more stringent conservation actions.
- **Drought Warning:** This phase involves a coordinated response to imminent drought conditions and potential water supply shortages through concerted voluntary conservation measures to avoid or reduce shortages, relieve stressed sources, develop new sources, and if possible, forestall the need to impose mandatory water use restrictions. The objective of voluntary water conservation measures during a drought warning is to reduce overall water uses by 10-15 percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may be asking for more stringent conservation actions.

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

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

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

Environmental impacts of drought include:

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

4.3.1.3. Past Occurrence

DEP maintains the most comprehensive data on drought occurrences across Pennsylvania. Declared drought status for Dauphin County from 1980 to 2012 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.

DATE	DROUGHT STATUS	DATE	DROUGHT STATUS
Nov 18, 1980 - Apr 20, 1982	Emergency	Jun 10, 1999 – Jul 20, 1999	Warning
Apr 26, 1985 - Jul 29, 1985	Watch	Jul 20, 1999 – Sept 30, 1999	Emergency
Jul 29, 1985 - Oct 22, 1985	Watch	Sept 30, 1999 – Dec 16, 1999	Watch
Oct 22, 1985 - Oct 29, 1985	Watch	Dec 16, 1999 - Feb 25, 2000	Watch
Oct 29, 1985 - Dec 19, 1985	Watch	Feb 25, 2000 - May 5, 2000	Watch
Jul 7, 1988 - Aug 24, 1988	Watch	Aug 8, 2001 - Aug 24, 2001	Watch
Aug 24, 1988 - Dec 12, 1988	Watch	Aug 24, 2001 - Nov 6, 2001	Watch
Jun 28, 1991 - Jul 24, 1991	Warning	Nov 6, 2001 - Dec 5, 2001	Warning
Jul 24, 1991 - Sep 13, 1991	Emergency	Dec 5, 2001 - Feb 12, 2002	Warning
Sep 13, 1991 - Oct 21, 1991	Emergency	Feb 12, 2002 – May 13, 2002	Emergency
Oct 21, 1991 - Jan 16, 1992	Warning	May 13, 2002 - June 14, 2002	Emergency
Jan 17, 1992 - Apr 20, 1992	Emergency	June 14, 2002 - Aug 9, 2002	Watch
Apr 20, 1992 – Jun 23, 1992	Warning	Aug 9, 2002 - Sept 5, 2002	Emergency
Sep 1, 1995 - Nov 8, 1995	Warning	Sept 5, 2002 – Nov 7, 2002	Emergency
Nov 8, 1995 - Dec 18, 1995	Watch	Nov 7, 2002 - Dec 19, 2002	Watch
Jul 17, 1997 - Oct 27, 1997	Watch	April 11, 2006 - June 30, 2006	Watch
Oct 17, 1997 - Nov 13, 1997	Watch	Aug 6, 2007 - Sept 5, 2007	Watch
Nov 13, 1997 – Jan 16, 1998	Watch	Sept 5, 2007 - Oct 5, 2007	Watch
Dec 3, 1998 - Dec 8, 1998	Watch	Oct 5, 2007 - Jan 11, 2008	Watch
Dec 8, 1998 - Dec 14, 1998	Watch	Jan 11, 2008 - Feb 15, 2008	Watch
Dec 14, 1998 – Mar 15, 1999	Warning	Sept 16, 2010 - Nov 10, 2010	Watch
Mar 15, 1999 – Jun 10, 1999	Watch	Aug 5, 2011 – Sept 2, 2011	Watch

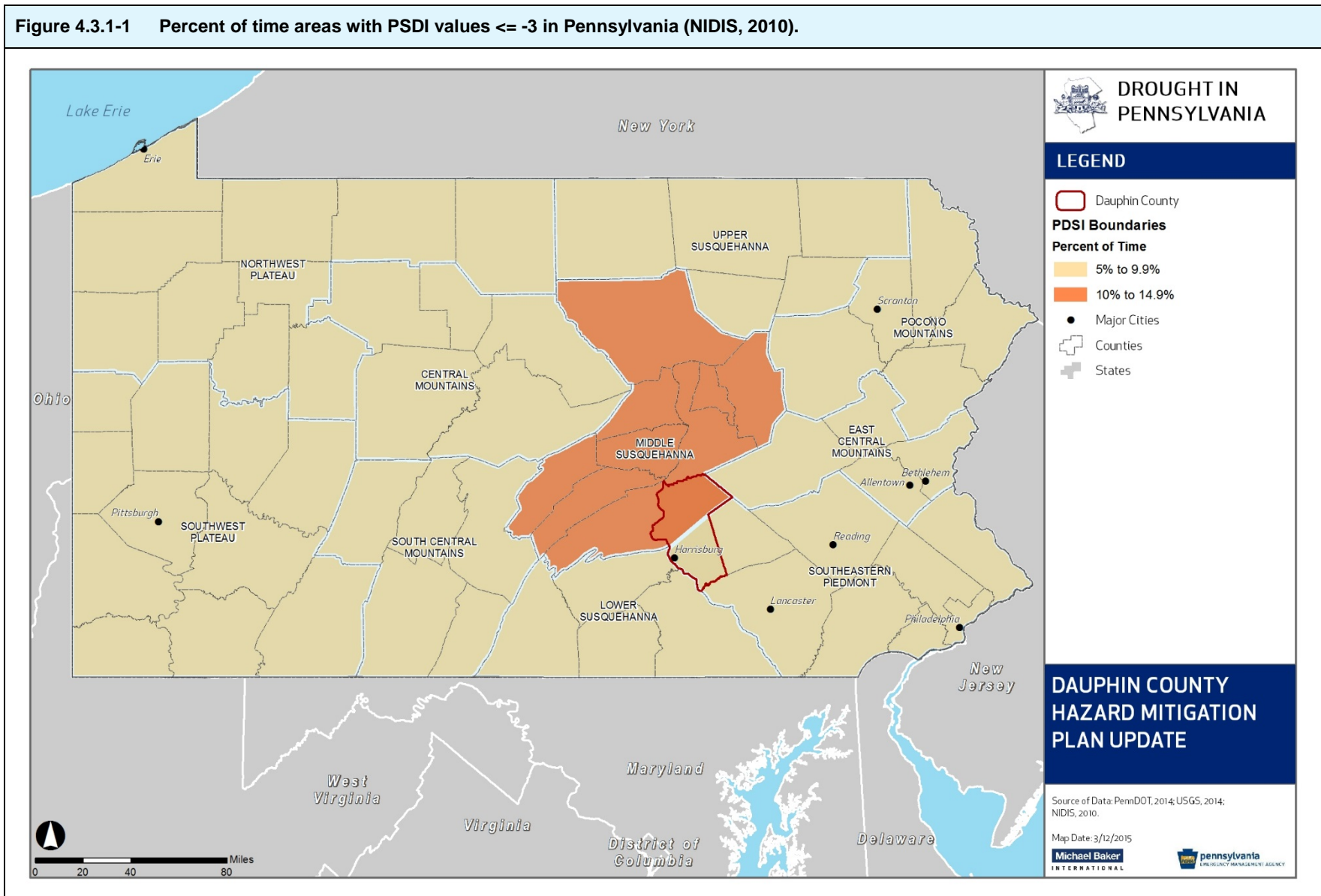
A drought that took place in 2002 (actually initiated in the summer of 2001), had a significant number of days with an above-average temperature and below-average precipitation followed by one of the driest winters on record. Groundwater levels, stream flows, and lake/reservoir levels were already well below normal going into the spring of 2002. An abnormally dry spring, followed by an extremely dry summer with a record number of days above 90 degrees gave rise to one of the worst droughts the lower Susquehanna River basin has ever experienced.

Coordination with the Susquehanna River Basin Commission (SRBC) indicated that the 2002 drought event resulted in record low groundwater levels, record low stream flow levels, record low reservoir/lake levels, and an unprecedented number of private homeowner well failures in the lower Susquehanna River basin. Many local farmers suffered crop losses of 70 to 100 percent. In addition, water-dependent industries, such as nurseries, suffered losses while others had operational concerns due to the record low stream flow conditions. As such, the 2002 drought event was the worst case scenario for a drought in Dauphin County.

4.3.1.4. *Future Occurrence*

It is difficult to forecast the severity and frequency of future drought events. Based on data from 1895 to 1995, Pennsylvania can be divided into ten PDSI areas (see Figure 4.3.1-1). Each of these areas have been assigned percent of time PDSI values of less than or equal to three – a value equivalent to a drought warning or drought emergency in Pennsylvania. Historically, the southern half of Dauphin County is under a drought warning or emergency 5-9.9 percent of the time and the northern half is under a drought warning or emergency 10-14.9 percent of the time. Therefore, the probability of future droughts is considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

Figure 4.3.1-1 Percent of time areas with PSDI values ≤ -3 in Pennsylvania (NIDIS, 2010).



4.3.1.5. Vulnerability Assessment

The most significant losses resulting from drought events are typically found in the agriculture sector of the County’s economy. Dauphin County ranks 16th of the 67 counties in Pennsylvania in terms of the market value of agricultural products sold; in 2012, the market value of agricultural production topped \$122 million. The county ranks third in sheep, goats, wool, mohair, and milk and fourth in cattle and calves in Pennsylvania by sales value (USDA, 2012).

Water supplies are also vulnerable to the effects of drought. Table 4.3.1-3 lists the water suppliers in Dauphin County along with the source of water supplies, many of which are groundwater supplies. In addition, the table indicates the municipalities and number of households served. This data will be updated once Dauphin County’s Comprehensive Plan updated is adopted (anticipated 2016).

Table 4.3.1-3 Dauphin County 2001/2002 Public Water Systems (Dauphin County Planning Commission, 2008).				
SUPPLIER	MUNICIPALITIES SERVED	TYPE OF SERVICE	POPULATION SERVED	WATER SOURCE
United Water	Dauphin Borough Derry Township (portion) Highspire Borough. Hummelstown Borough Lower Allen Township Lower Paxton Township (portion) Lower Swatara Township (portion) Middle Paxton Township Paxtang Borough. Penbrook Borough South Hanover Township (portion) Susquehanna Township Swatara Township West Hanover Township	Residential Commercial Industrial Fire	82,835	Stoney Creek Swatara Creek Susquehanna River
Elizabethville	Elizabethville Borough Washington Township (portion)	Residential	3,000	Well #3 Well #4 Well #5 Lentz Well Loyalton Well
Gratz Borough Water Co.	Gratz Borough	Residential Commercial Industrial	900	Cold Spring Bowers Spring Deep Well
Halifax Area Water Authority	Halifax Borough Halifax Township (portion)	Residential	2,500	Four Springs Three Wells

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SUPPLIER	MUNICIPALITIES SERVED	TYPE OF SERVICE	POPULATION SERVED	WATER SOURCE
Capital Region Water	Harrisburg City Lower Paxton Township (portion) Penbrook Borough Susquehanna Township	Residential	77,000	DeHart Dam Reservoir Susquehanna River
Harrisburg International Airport Water Co.	Lower Swatara Township (immediate area around airport)	Non-Transient Non-Community	2,800	Twelve Wells
PA-American Water Co. - Hershey	Derry Township (portion) Londonderry Township (portion) South Hanover Township (portion) West Hanover Township (portion) Lebanon County Annville N. Annville N. Londonderry Palymra S. Annville S. Londonderry	Residential Commercial Industrial	43,500	Manada Creek Swatara Creek
Loyalton Water Association	Loyalton Village Washington Township	Residential	96	Two Wells One Spring
Lykens Borough Authority	Lykens Borough Wiconisco Township	Residential Commercial Industrial	3,100	East & West Branches of Rattling Creek One Well
Middletown Borough Authority	Middletown Borough Lower Swatara Township (portion) Royalton Borough	Residential Commercial	9,254	Six Wells
Millersburg Borough Authority	Millersburg Borough Upper Paxton Township	Residential Commercial Industrial Public	4,816	Nine Wells Seven Springs
Pillow Borough Authority	Pillow Borough	Residential	300	Two Wells Cold Spring
Steelton Borough Authority	Steelton Borough	Residential	6,250	Susquehanna

Table 4.3.1-3 Dauphin County 2001/2002 Public Water Systems (Dauphin County Planning Commission, 2008).

SUPPLIER	MUNICIPALITIES SERVED	TYPE OF SERVICE	POPULATION SERVED	WATER SOURCE
	Swatara Township (portion)	Commercial Industrial (Bethlehem Steel)		River
Williamstown Borough Authority	Williams Township (portion) Williamstown Borough	Residential	2,400	East Rattling Creek One Well Nine O Clock Creek

The Dauphin County Comprehensive Plan indicates that the three largest water suppliers in the County (United Water, the Harrisburg City Water Authority, and the PA American Water Company-Hershey) serve approximately 85 percent of the total population in the County served by public water. The sources for these three systems are primarily surface water sources; however, the majority of the smaller systems are dependent upon ground water sources or wells.

Dauphin County residents that use private domestic wells are more vulnerable to droughts. Table 4.3.1-4 shows the number of domestic and public water wells per municipality. It is important to note that the well data was obtained from the Pennsylvania Groundwater Information System (PaGWIS). PaGWIS relies on voluntary submissions of well record data by well drillers; as a result, it is not a complete database of all domestic wells in the County. This is the most complete dataset of wells available. Municipalities with a large number of domestic wells such as Lower Paxton Township, East Hanover Township, Steelton Borough, and West Hanover Township would be more vulnerable to droughts.

Table 4.3.1-4 PaGWIS Data for Dauphin County (PaGWIS, 2015).

MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WELLS	NUMBER OF REPORTED PUBLIC WATER USE WELLS	TOTAL WELLS
Berrysburg Borough	6	2	8
Conewago Township	255	3	258
Dauphin Borough	2	0	2
Derry Township	361	12	373
East Hanover Township	472	19	491
Elizabethville Borough	4	0	4
Gratz Borough	3	2	5
Halifax Borough	16	0	16

Table 4.3.1-4 PaGWIS Data for Dauphin County (PaGWIS, 2015).

MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WELLS	NUMBER OF REPORTED PUBLIC WATER USE WELLS	TOTAL WELLS
Halifax Township	124	12	136
Harrisburg, City of	3	0	3
Highspire Borough	3	1	4
Hummelstown Borough	3	0	3
Jackson Township	99	3	102
Jefferson Township	40	1	41
Londonderry Township	350	20	370
Lower Paxton Township	843	23	866
Lower Swatara Township	86	50	136
Lykens Borough	0	0	0
Lykens Township	28	0	28
Middle Paxton Township	363	5	368
Middletown Borough	1	10	11
Mifflin Township	44	4	48
Millersburg Borough	1	0	1
Paxtang Borough	0	0	0
Penbrook Borough	0	0	0
Pillow Borough	2	2	4
Reed Township	35	0	35
Royalton Borough	0	0	0
Rush Township	0	0	0
South Hanover Township	14	0	14
Steelton Borough	438	7	445
Susquehanna Township	213	5	218
Swatara Township	81	10	91
Upper Paxton Township	99	22	121
Washington Township	97	4	101
Wayne Township	73	0	73
West Hanover Township	451	10	461
Wiconisco Township	8	1	9
Williams Township	20	5	25

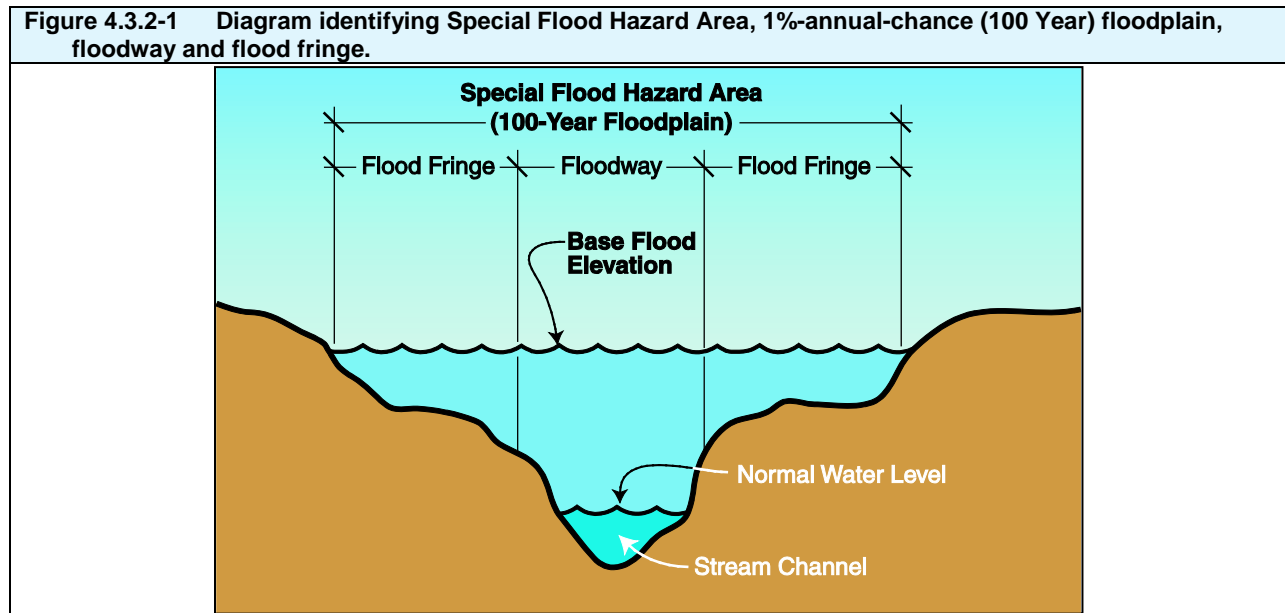
MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WELLS	NUMBER OF REPORTED PUBLIC WATER USE WELLS	TOTAL WELLS
Williamstown Borough	0	0	0
Unknown (No community assigned)	142	1	143
Grand Total	4,780	234	5,014

4.3.2. Flood, Flash Flood, Ice Jam

4.3.2.1. Location and Extent

A flood is a natural event for rivers and streams. 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 4.3.2.4. 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 FIRMs are published, identifies the 1% annual chance flood. This 1% annual chance flood event is used to delineate the special flood hazard area (SFHA) and identify Base Flood Elevations. Figure 4.3.2-1 illustrates these terms. The SFHA serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania, and Dauphin County local governments.



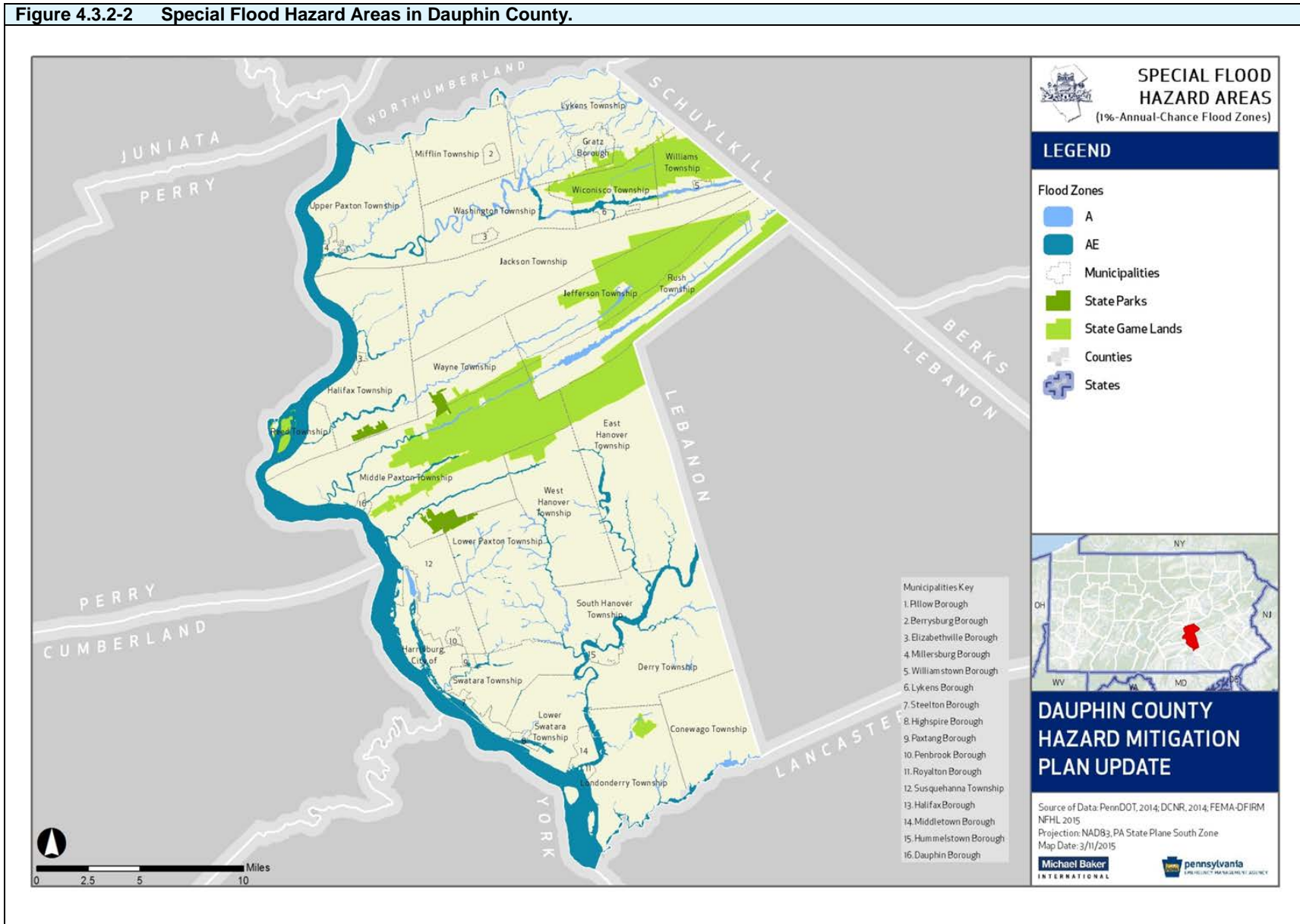
The Effective Countywide DFIRMs were released for Dauphin County and all Dauphin County municipalities on August 2, 2012. All municipalities within the County are now shown on a single set of countywide FIRMs. Prior to the publication of this digital data, flood hazard information from FEMA was available through paper FIRMs and Q3 data. These final FIRMs for Dauphin County can be obtained from the FEMA Map Service Center (<http://www.msc.fema.gov>) and used to identify the expected spatial extent and elevation of flooding from a 1% and 0.2% annual chance event. All municipalities in the County with the exception of Berrysburg Borough and Penbrook Borough have identified SFHAs. Since it has no delineated floodplains, Berrysburg Borough does not participate in the NFIP. Penbrook Borough participates in the NFIP. Figure 4.3.2-2 shows the SFHAs and watercourses of Dauphin County.

Dauphin County is currently being restudied under FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program. RiskMAP Discovery meetings were held in April 2015 and convened by FEMA for the purpose of reviewing flood risk data, discussing the community's flooding history, development plans, flood risk concerns, and stormwater and floodplain management activities. RiskMAP surveys used as part of the outreach were returned by DEMA, DCPC, and six municipalities. This information will be useful in preparing detailed mapping for the watersheds which according to FEMA, should be available in 2018 (FEMA, 2015).

Dauphin County is located in the Chesapeake Bay Watershed and within two sub basins of the Lower Susquehanna drainage basin (PA DEP, 2009). The area north of Peters Mountain is included in the Lower Central Susquehanna River sub basin and is primarily drained by Mahantango Creek, Wiconisco Creek, Armstrong Creek, Powells Creek, Stoney Creek, and Fishing Creek. The region south of Peters Mountain is located in the Lower Susquehanna River sub basin and is drained by Swatara Creek, Clarks Creek, Stoney Creek, Fishing Creek, Paxton Creek, Spring Creek, Laurel Run, Conewago Creek, and Manada Creek having larger floodplains due to flatter topography. All these creeks drain into the Susquehanna River (Dauphin County Planning Commission, 2008). Dauphin County's watersheds are shown in Figure 2.1-3.

The most severe flooding in Central Pennsylvania has been associated with the Susquehanna River Basin, which is the largest on the Atlantic Seaboard of the United States (U.S.) and drains directly into the Chesapeake Bay.

Figure 4.3.2-2 Special Flood Hazard Areas in Dauphin County.



4.3.2.2. *Range of Magnitude*

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

Several factors determine the severity of floods, including rainfall intensity and duration, topography, ground cover, and rate of snowmelt. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover. Also, urbanization typically results in the replacement of vegetative ground cover with asphalt and concrete, increasing the volume of surface runoff and stormwater, particularly in areas with poorly planned stormwater drainage systems. There are numerous locations throughout Dauphin County where homes, businesses, and critical infrastructure have been constructed in a floodplain. Stakeholders, municipalities, and the HMPSC identified urbanization as a key factor influencing the severity of floods in Dauphin County.

In Dauphin County and throughout Central Pennsylvania, there are seasonal differences in the causes for floods. In the winter and early spring (February to April), major flooding has occurred as a result of heavy rainfall on dense snowpack throughout contributing watersheds, although the snowpack is generally moderate during most winters. Winter floods have also resulted from runoff of intense rainfall on frozen ground, and local flooding has been exacerbated by ice jams in rivers, streams, and creeks. Ice jam floods occur on rivers that are totally or partially frozen. A rise in stream stage will break up a totally frozen river and create ice flows that can pile up on channel obstructions such as shallow riffles, log jams, or bridge piers. The jammed ice creates a dam across the channel over which the water and ice mixture continues to flow, allowing for more jamming to occur. Ice jams are not uncommon on the Susquehanna River, with one of the most significant ice jam events occurring in 1996, and have also occurred along Swatara Creek and Mahantango Creek as shown in Figure 4.3.2-3.

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. Reports of flash flood events in the County are shown in Figure 4.3.2-4.

Figure 4.3.2-3 Ice jam reports in Dauphin County (1931 – 2014).

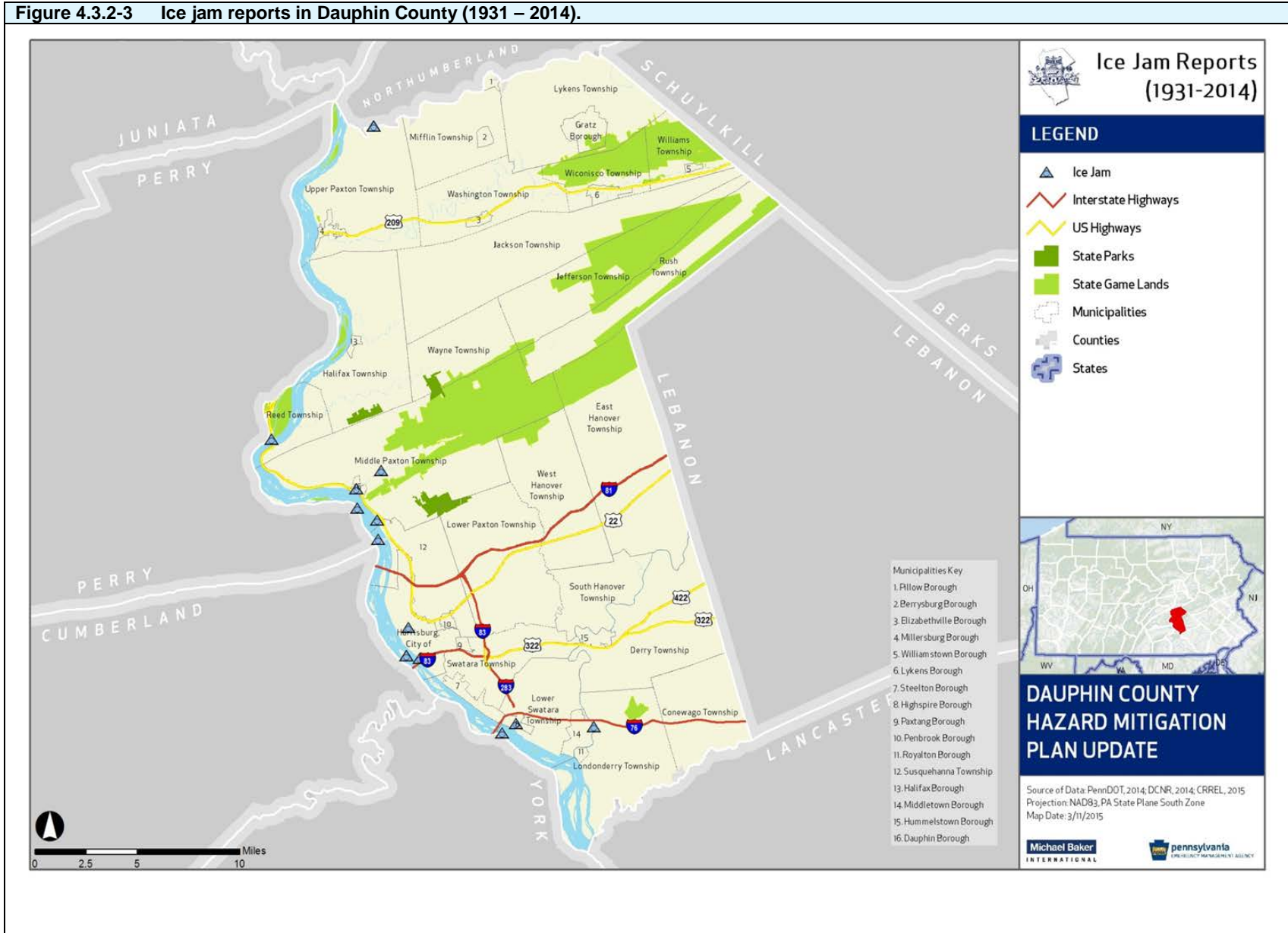
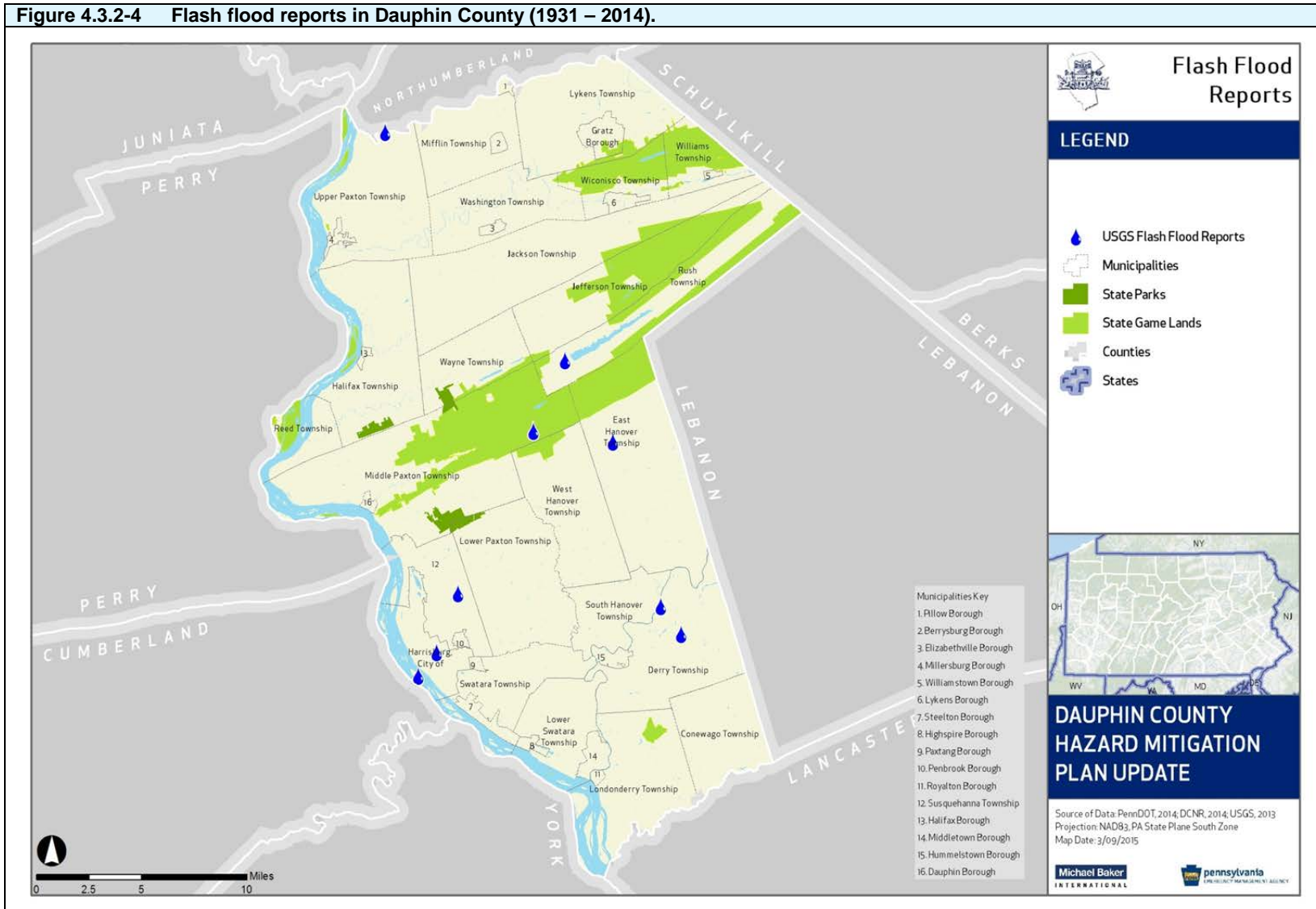


Figure 4.3.2-4 Flash flood reports in Dauphin County (1931 – 2014).



In addition, the County has experienced intense rainfall from tropical storms in late summer and early fall. Most recently in 2011, Dauphin County was significantly impacted by flooding associated with Tropical Storm Lee resulting in deaths and substantial property loss.

Flood effects can be volume or force related. Major floods along the Susquehanna River and larger streams such as Swatara Creek and Mahantango Creek have wide floodplains that tend to result in large-scale inundations. This causes widespread damage through soaking and silt deposits in homes and businesses. In hilly regions where runoff paths are steep, flash floods may be prevalent. Flash floods are short in duration and usually occur in somewhat localized areas. In these floods, the velocity rather than the volume of water causes flood damages. Torrents of water can rush down minor hillside gullies at 30-50 miles per hour, carrying trees, debris, and rocks. These floods are often unpredictable and, particularly if they occur at night, can cause major panic and loss of life. Frozen surfaces can more than double normal runoff velocities, particularly in small drainage areas. This causes flash floods which can be compounded by ice and debris jams in channels and culverts. Also obstructions within the floodplain such as bridges and undersized culverts can also increase flooding. Within Dauphin County, flash floods occur in the northern mountains on such streams as Wiconisco Creek and Rattling Creek and in the more urbanized area surrounding Harrisburg on such streams as Paxton Creek and the Lawnton Branch of Spring Creek.

Although floods can cause damage to property and loss of life, floods are naturally occurring events that benefit riparian systems which have not been disrupted by human actions. Such benefits include groundwater recharge and the introduction of nutrient rich sediment improving soil fertility. However, the destruction of riparian buffers, changes to land use and land cover throughout a watershed, and the introduction of chemical or biological contaminants which often accompany human presence cause environmental harm when floods occur. Hazardous materials facilities are potential sources of contamination during flood events. Other negative environmental impacts of flooding include: water-borne diseases, heavy siltation, damage or loss of crops, and drowning of both humans and animals.

The three worst flooding events experienced in Dauphin County were Tropical Storm Agnes in 1972, the St. Patrick's Day Flood of 1936, and Tropical Storm Lee in 2011. Tropical Storm Agnes is the storm of record for the Susquehanna River in Dauphin County. Tropical Storm Agnes hit in June 1972 just after an earlier rainfall had saturated the ground. The storm brought as much as 18 inches of rain to some places in Pennsylvania, with Harrisburg receiving a reported 15.25 inches, producing severe surface water runoff conditions causing abnormally high flows in local streams and tributaries. Most communities along the River experienced severe flooding. The USGS gage at Harrisburg recorded a peak river stage of 32.57 feet and a peak discharge of 1,020,000 cubic feet per second. Damage estimates indicate that the Susquehanna River basin (from Sunbury to York) incurred approximately \$832,662,000 (1972) in damages, with the Dauphin County area accounting for approximately \$183,787,000 (1972) of that total (DEMA, 2010). The flooding from Tropical Storm Agnes caused \$2.8 billion in economic losses and 48 deaths in Pennsylvania. Figures 4.3.2-5 and 4.3.2-6 show flooding conditions in Harrisburg resulting from Tropical Storm Agnes.

Figure 4.3.2-5 Flooding of the Governor's Mansion along North Front Street in Harrisburg during the 1972 Tropical Storm Agnes Event (SRBC).



Figure 4.3.2-6 Flooding of the Shipoke area of Harrisburg during the 1972 Tropical Storm Agnes Event (SRBC).



4.3.2.3. Past Occurrence

There have been 61 floods and flash floods reported in Dauphin County as listed in Table 4.3.2-1. Ten of the Presidential Disaster and Emergency Declarations affecting Dauphin County have been in response to hazard events related to flooding, including flooding induced by named coastal storms (see Table 4.2.1-1 Table of Presidential Disaster Declarations). The events listed in Table 4.3.2-1 include limited flood occurrences prior to 1995 and data for these events was obtained from the 2010 HMP and knowledge of the HMPSC. Flood event data from 1995 to 2014 was obtained from the National Climatic Data Center (NCDC). Estimated property damage was not available for many flood events, which does not mean there was no damage; rather, none was reported to the NCDC for the specific event.

Table 4.3.2-1 Dauphin County flood and flash flood events.				
DATE	TYPE	DEATH	INJURY	REPORTED PROPERTY DAMAGE (\$) ⁽¹⁾
3/3/1902	Flood	UNK	UNK	UNK
3/19/1936	Flood	UNK	UNK	UNK
3/12/1964	Flood	UNK	UNK	UNK
6/24/1972	Flood	UNK	UNK	\$183,787,000 (est.)
9/27/75	Flood	UNK	UNK	UNK
1/19/1996	Flash Flood	0	0	NR
10/8/1996	Flash Flood	0	0	NR
12/13/1996	Flash Flood	0	0	NR
1/8/1998	Flash Flood	0	0	NR
5/5/1998	Flash Flood	0	0	NR
6/13/1998	Flash Flood	0	0	NR
6/23/1998	Flash Flood	0	0	NR
9/6/1999	Flash Flood	0	0	\$50,000
9/16/1999	Flash Flood	0	0	\$30,000
9/19/2000	Flash Flood	0	0	\$10,000
12/17/2000	Flash Flood	0	0	NR
7/25/2001	Flash Flood	0	0	NR
8/16/2003	Flash Flood	0	0	NR
9/23/2003	Flash Flood	0	0	NR
9/23/2003	Flood	0	0	NR
12/11/2003	Flood	0	0	NR
12/12/2003	Flood	0	0	NR
7/14/2004	Flash Flood	0	0	NR
7/22/2004	Flash Flood	0	0	NR
7/23/2004	Flash Flood	0	0	NR
8/1/2004	Flash Flood	0	0	NR
9/17/2004	Flood	0	0	NR
9/18/2004	Flood	0	0	NR
9/18/2004	Flood	0	0	NR
9/18/2004	Flood	0	0	NR
9/28/2004	Flood	0	0	NR
9/29/2004	Flood	0	0	NR
1/15/2005	Flood	0	0	NR
3/28/2005	Flood	0	0	NR
3/29/2005	Flood	0	0	NR
3/30/2005	Flood	0	0	NR

Table 4.3.2-1 Dauphin County flood and flash flood events.

DATE	TYPE	DEATH	INJURY	REPORTED PROPERTY DAMAGE (\$) ⁽¹⁾
4/2/2005	Flood	0	0	NR
4/3/2005	Flood	0	0	NR
6/25/2006	Flash Flood	0	0	NR
6/26/2006	Flood	0	0	NR
6/27/2006	Flash Flood	0	0	NR
6/28/2006	Flood	0	0	NR
11/16/2006	Flash Flood	0	0	\$0
6/1/2007	Flash Flood	0	0	\$500,000
5/2/2010	Flash Flood	0	0	
8/12/2010	Flash Flood	0	0	\$10,000
3/10/2011	Flood	0	0	\$0
3/11/2011	Flood	0	0	\$0
4/16/2011	Flash Flood	0	0	\$0
4/28/2011	Flash Flood	0	0	\$0
8/6/2011	Flash Flood	0	0	\$0
9/7/2011	Flash Flood	0	0	\$0
9/7/2011	Flood	4	0	\$150,000,000 Property Damage \$700,000 Crop Damage
9/28/2011	Flash Flood	0	0	\$0
9/28/2011	Flash Flood	0	0	\$0
6/22/2012	Flash Flood	0	0	\$0
6/27/2013	Flash Flood	0	0	\$0
10/10/2013	Flood	0	0	\$0
4/30/2014	Flood	0	0	\$0
5/1/2014	Flood	0	0	\$0

Source: Dauphin County 2010 HMP; NCDC, 1950 – May 2014.
⁽¹⁾ Entries marked “NR” indicate “Not Reported” for property damage.

The United States Geological Survey (USGS) operates a gaging station on the Susquehanna River at Harrisburg (Station No. 01570500) on City Island. A total of six major flood stage events greater than 23 feet according to NWS have occurred at the Harrisburg gage. These flood events are listed in Table 4.3.2-2 including peak annual discharge and stage values. The flood stage for the Susquehanna River at this location is 17 feet.

Table 4.3.2-2 Major Susquehanna River flood stage events recorded at the Harrisburg, PA gaging station.

WATER YEAR	DATE	DISCHARGE (CUBIC FEET /SECOND)	STAGE (FEET)	WATER SURFACE ELEVATION (FEET ABOVE NGVD)
1936	03/19/36	740,000	29.23	319.24
1972	06/24/72	1,020,000	32.57	322.58
1975	09/12/75	529,000	23.82	313.83
1996	01/21/96	568,000	24.66	314.67
2004	9/19/04	557,000	24.40	314.41
2011	9/9/11	590,000	25.17	315.18

Source: USGS, Peak Stream Flow for Pennsylvania, USGS 01570500 Susquehanna River at Harrisburg, PA.

USGS also operates a gaging station along the Swatara Creek near Hershey in Derry Township (Station No. 01573560). A total of six major flood stage events greater than 14 feet have occurred at the gage since it was installed in 1975 as listed in Table 4.3.2-3. The flood stage for the Swatara Creek at this location is 7 feet. The gage recorded a record 27.22 feet on September 8, 2011 resulting from Tropical Storm Lee.

Table 4.3.2-3 Major Swatara Creek flood stage events recorded near Hershey, PA (1975 – 2014).

WATER YEAR	DATE	DISCHARGE (CUBIC FEET /SECOND)	STAGE (FEET)	WATER SURFACE ELEVATION (FEET ABOVE NGVD)
1975	9/27/75	29,400	15.36	341.30
1979	1/25/79	26,600	14.43	340.37
1996	1/20/96	26,000	14.30	340.24
2004	9/19/04	26,000	14.27	340.21
2006	6/29/06	31,700	16.12	342.06
2011	9/8/11	96,900	27.22	353.16

Source: USGS, Peak Stream Flow for Pennsylvania, USGS 01573560 Swatara Creek near Hershey, PA.

While Tropical Storm Agnes is the storm of record along the Susquehanna River in Dauphin County, several additional flood events have had significant impacts on the County. The St. Patrick’s Day Flood of March 1936 resulted from a combination of snowmelt and rainfall. The majority of heavy rainfall associated with the flood occurred on March 17 and 18. Two days of heavy rain, combined with surface runoff from that winter’s ice and snow deposits, caused the Susquehanna River to rise well above flood stage to 29.23 on March 19, 1936 and a maximum discharge of 740,000 cubic feet per second. The then National Emergency Council estimated that Pennsylvania incurred approximately \$212,535,010 (1936) in damages as a result of the St. Patrick’s Day Flood. In addition, 80 deaths were reported and 2,800 were injured (Dauphin County Mangan, 1936). Figure 4.3.2-7 shows flood impacts resulting from the St. Patrick’s Day Flood.

In September 1975, just three years after Tropical Storm Agnes, Tropical Storm Eloise brought nearly 8 inches of rain to the Susquehanna River basins. The flood gage at Harrisburg recorded a peak river stage of 23.82 feet on September 27 and floodwaters reached 2nd Street in the downtown area of Harrisburg. Damage estimates indicate that the Susquehanna River basin from Sunbury to York incurred approximately \$26,300,000 (1975) in damages (USACE, 1976).

Figure 4.3.2-7 Flooding along Cameron Street in the City of Harrisburg during the 1936 St. Patrick's Day Flood (SRBC).



According to the SRBC, heavy snowpack, high winds, unseasonably warm temperatures, heavy rainfall, and ice jams resulted in a flash flood event from January 19-21, 1996. Throughout the Susquehanna River Basin there were 14 deaths (none reported in Dauphin County) and more the \$600 million in damages basin-wide. The peak flow in Harrisburg was 568,000 cubic feet per second, 20 times the normal flow. The Susquehanna River rose from 7 feet to peak at 24.66 feet in little over 14 hours (SRBC, 2015). An ice jam resulted in the center section of the Walnut Street Bridge, which connects City Island in Harrisburg to Wormleysburg in Cumberland County, to be swept away. Refer to Figures 4.3.2-8 and 4.3.2-9.

Figure 4.3.2-8 Ice accumulation along the Susquehanna River during the 1996 Ice Jam Event (SRBC).



Figure 4.3.2-9 Impact to the Walnut Street Bridge caused by the 1996 Ice Jam Event (SRBC).



The remnants of Hurricane Ivan (downgraded to a Tropical Depression) impacted Dauphin County on September 17, 2004, only one week after Hurricane Frances traveled through Pennsylvania. Average rainfall amounts for this storm event were between three and six inches, although some areas of Dauphin County recorded as much as eight inches within a 12-hour period. Water elevations in the Susquehanna River at Harrisburg were 24.4 feet at its peak.

In September 2011, Tropical Storm Lee produced near record rainfalls, widespread flooding, and significant damage to homes, businesses, and infrastructure across large portions of Pennsylvania, including Dauphin County. Between September 4 and September 10, 2011, a significant, multi-day rainfall event, totaling over 13 inches of precipitation, produced the fourth-largest flood of record for the Mid-Atlantic region, causing many areas of Dauphin County to approach or exceed flood records set by Hurricane Agnes in June 1972 (NCDC, 2015). The five-day storm rainfall totals for September 5 to 9 were generally in the 5 to 8 inch range over portions of Central Pennsylvania and in the 8 and 12 inch range in the Susquehanna Valley region. East of the Susquehanna River, local rainfall totals exceeded 15 inches. This heavy rainfall and resultant flooding along the Susquehanna River and Swatara Creek were the cause of 4 deaths, \$150,000,000 in property damage, and \$700,000 in crop damage.

The Susquehanna River at Harrisburg crested at 25.17 (flood stage is 17 feet); Swatara Creek near Hershey crested at 27.22 feet (flood stage is 7.0 feet); and Swatara Creek at Middletown crested at 23.29 feet (flood stage is 11.0 feet) (USGS, 2015). According to Hershey Volunteer Fire Department, "Tropical Storm Lee dumped records amounts of rain on the Hershey area, resulting in record setting water marks on the Spring and Swatara Creeks. The Department was alerted for 294 calls for service in a five day window. One township man was killed on Grove Street when his basement wall collapsed on him while he was attempted to pump his basement" (Hershey Volunteer Fire Department, 2015).

Figures 4.3.2-10 through 4.3.2-15 include photographs from communities in Dauphin County showing some of the impacts caused by Tropical Storm Lee in 2011.

Figure 4.3.2-10 Residential flood impacts in Lower Swatara Township due to Tropical Storm Lee (September 2011) (Lower Swatara Township, 2011).



Figure 4.3.2-11 Remnants of flooding from Tropical Storm Lee on the North Union Street Bridge over the Swatara Creek in Lower Swatara Township (September 2011) (Lower Swatara Township, 2011).



Figure 4.3.2-12 Cleaning up from flooding in Londonderry Township after Tropical Storm Lee (September 2011) (Londonderry Township, 2011).



Figure 4.3.2-13 Flooding along Main Street in South Hanover Township due to Tropical Storm Lee (September 2011) (South Hanover Township, 2011).



Figure 4.3.2-14 Flood impacts to Stoudt Road in South Hanover Township due to Tropical Storm Lee (September 2011) (South Hanover Township, 2011).



Figure 4.3.2-15 Flooding in Derry Township (Giant Center in background) due to Tropical Storm Lee (September 2011) (PA American Water, 2011).



Table 4.3.2-4 identifies Dauphin County’s community and economic development needs resulting from Tropical Storm Lee. The table summarizes residential and commercial losses and associated financial impacts. A strategy to meet the needs listed in this table is discussed in detail in Section 4.3.2.5 – Vulnerability Assessment.

Table 4.3.2-4 Dauphin County Community and Economic Development Needs Resulting from Tropical Storm Lee.				
NATIONAL CLIMATIC DATA CENTER				
3,348 Affected Structures			\$150,000,000 in Property Damages	
295 Destroyed Buildings				
1,040 Buildings with Major Damage				
1,273 Buildings with Minor Damage				
368 Acres (\$700,000) of Crops Damaged				
HUD				
Severely Damaged Homes	Severely Damaged Businesses	Severe Housing Unmet Needs	Severe Business Unmet Needs	Total Unmet Needs
211	19	\$8,886,231	\$2,906,177	\$11,792,408
<i>Source: Dauphin County CDBG-DR Action Plan Amended, July 2012; Dauphin County CDBG-DR Action Plan, September 2013.</i>				

Many of the homes impacted from Tropical Storm Lee were repetitive loss properties. The following definition of Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties from the Hazard Mitigation Assistance (HMA) Unified Guidance, dated July 2013, reflects changes made in the Biggert-Waters Flood Insurance Reform Act of 2012 (Biggert-Waters Act). A RL property is a structure covered by a contract for flood insurance made available under the NFIP that:

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

A SRL property is a structure that:

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

According to the 2015 data provided by PEMA, there are 122 repetitive loss properties in Dauphin County, none of which have been mitigated (PEMA, 2015). Over 90 percent of the repetitive loss properties are single family homes and more than half of the repetitive loss

properties are located in Londonderry Township. Table 4.3.2-5 shows the number of repetitive loss properties by municipality.

Table 4.3.2-5 Summary of number and type of Repetitive Loss properties by municipality (PEMA, 2015).					
MUNICIPALITY	TYPE				SUM OF REPETITIVE LOSS PROPERTIES
	Non-Residential	Single Family	2-4 Family	Other Residential	
Derry Township		1			1
Harrisburg City	1	9			10
Highspire Borough		1			1
Hummelstown Borough	1	1			2
Londonderry Township	2	72		1	75
Lower Swatara Township		2			2
Middle Paxton Township		8			8
Middletown Borough		2	1		3
Reed Township	1				1
Royalton Borough		4			4
South Hanover Township		3		1	4
Susquehanna Township		8	1		9
Swatara Township		1			1
Upper Paxton Township		1			1
TOTAL	5	113	2	2	122
<i>Note: Table only lists municipalities with repetitive loss properties.</i>					

There are 50 severe repetitive loss properties in Dauphin County, three of which have been mitigated. Over half of the severe repetitive loss properties are single family homes and nearly 40 percent are located in Londonderry Township. Table 4.3.2-6 shows the number of severe repetitive loss properties by municipality.

Table 4.3.2-6 Summary of number and type of Severe Repetitive Loss properties by municipality (PEMA, 20015).						
MUNICIPALITY	TYPE					SUM OF SEVERE REPETITIVE LOSS PROPERTIES
	Non-Residential	Single Family	2-4 Family	Other Residential	Condo	
Derry Township		1				1
East Hanover Township		1				1
Harrisburg City	5	2		1	1	9
Highspire Borough				1		1
Londonderry Township	1	17		1		19
Lower Swatara Township		2	1	1		4
Middle Paxton Township		6				6
Paxtang Borough		1				1

Table 4.3.2-6 Summary of number and type of Severe Repetitive Loss properties by municipality (PEMA, 20015).

MUNICIPALITY	TYPE					SUM OF
Reed Township	1					1
Royalton Borough		1				1
South Hanover Township		2	1			3
Susquehanna Township		1				1
Swatara Township	1	1				2
TOTAL	8	35	2	4	1	50

Note: Table only lists municipalities with severe repetitive loss properties.

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

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

Since 1983, the chief means of providing flood insurance coverage has been a cooperative venture of FEMA and the private insurance industry known as the Write Your Own (WYO) Program. This partnership allows qualified property and casualty insurance companies to “write” (that is, issue) and service the NFIP’s Standard Flood Insurance Policy (SFIP) under their own names.

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

The NFIP provides flood insurance to individuals in communities that are members of the program. Membership in the program is contingent on the community adopting and enforcing floodplain management and development regulations.

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

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

The Emergency Program is the initial phase of a community’s participation in the NFIP. In return for the local government’s agreeing to adopt basic floodplain management standards, the NFIP allows local property owners to buy modest amounts of flood insurance coverage.

In return for agreeing to adopt more comprehensive floodplain management measures, an Emergency Program community can be “promoted” to the Regular Program. Local policyholders immediately become eligible to buy greater amounts of flood insurance coverage. All Dauphin County municipalities, with the exception of Berrysburg Borough that has no SFHAs, are participating in the Regular Program. Penbrook Borough which also has no SFHAs participates in the NFIP.

The minimum floodplain management requirements include:

- Review and permit all development in the SFHA;
- Elevate new and substantially improved residential structures at or above the Base Flood Elevation;
- Elevate or dry floodproof new and substantially improved non-residential structures;
- Limit development in floodways;
- Locate or construct all public utilities and facilities so as to minimize or eliminate flood damage; and
- Anchor foundation or structure to resist floatation, collapse, or lateral movement.

Table 4.3.2-7 lists Dauphin County municipalities participating in the NFIP, premium and coverage amounts, date of entry into the NFIP, and their current effective map dates. It also identifies which municipalities are participating in Dauphin County’s CRS Program which is discussed following the table. Data on policies-in-force, claims, and substantial damage claims can be found in Section 5.2.1.3.

COMMUNITY	PARTICIPATION STATUS	TOTAL PREMIUM AND COVERAGE	DATE OF ENTRY	CURRENT EFFECTIVE MAP DATE	COUNTY CRS PROGRAM PARTICIPANT
Berrysburg Borough	Not Participating (No SFHAs)	N/A	N/A	N/A	
Conewago Township	Participating	\$805,000	04/30/86	08/02/12	
Dauphin Borough	Participating	\$3,156,500	04/15/77	08/02/12	
Derry Township	Participating	\$34,193,700	09/30/77	08/02/12	X
East Hanover Township	Participating	\$3,740,600	01/16/80	08/02/12	X
Elizabethville Borough	Participating	\$48,300	06/25/76	08/02/12	
Gratz Borough	Participating	\$0	12/14/79	08/02/12	
Halifax Borough	Participating	\$25,510	09/05/79	08/02/12	X
Halifax Township	Participating	\$1,622,700	11/03/82	08/02/12	X
Harrisburg City	Participating, CRS	\$249,457,700	05/02/77	08/02/12	X
Highspire Borough	Participating	\$28,708,300	04/15/77	08/02/12	X

Table 4.3.2-7 Dauphin County Municipal Participation in the National Flood Insurance Program and County CRS Program.

COMMUNITY	PARTICIPATION STATUS	TOTAL PREMIUM AND COVERAGE	DATE OF ENTRY	CURRENT EFFECTIVE MAP DATE	COUNTY CRS PROGRAM PARTICIPANT
Hummelstown Borough	Participating	\$6,974,900	03/15/77	08/02/12	X
Jackson Township	Participating	\$0	10/15/85	08/02/12	
Jefferson Township	Participating	\$280,000	10/15/82	08/02/12	
Londonderry Township	Participating	\$12,901,900	03/18/80	08/02/12	X
Lower Paxton Township	Participating	\$22,874,000	04/15/81	08/02/12	X
Lower Swatara Township	Participating	\$7,234,700	04/15/77	08/02/12	X
Lykens Borough	Participating	\$9,567,200	09/03/80	08/02/12	X
Lykens Township	Participating	\$868,900	10/15/85	08/02/12	
Middle Paxton Township	Participating	\$17,804,500	08/15/79	08/02/12	X
Middletown Borough	Participating	\$21,140,700	12/28/76	08/02/12	X
Mifflin Township	Participating	\$140,000	06/25/76	08/02/12	X
Millersburg Borough	Participating	\$8,161,700	08/15/80	08/02/12	X
Paxtang Borough	Participating	\$6,231,100	03/18/80	08/02/12	X
Penbrook Borough	Participating	\$920,000	07/31/78	08/02/12	
Pillow Borough	Participating	\$0	11/19/87	08/02/12	
Reed Township	Participating	\$2,470,900	11/01/79	08/02/12	
Royalton Borough	Participating	\$9,567,800	04/15/77	08/02/12	X
Rush Township	Participating	\$0	08/19/85	08/02/12	
South Hanover Township	Participating	\$11,380,800	05/02/77	08/02/12	
Steelton Borough	Participating	\$13,139,600	04/15/77	08/02/12	X
Susquehanna Township	Participating	\$62,853,200	04/15/77	08/02/12	X
Swatara Township	Participating	\$39,854,000	02/03/82	08/02/12	X
Upper Paxton Township	Participating	\$2,980,900	09/05/79	08/02/12	X
Washington Township	Participating	\$1,034,200	12/17/87	08/02/12	
Wayne Township	Participating	\$0	08/05/85	08/02/12	
West Hanover Township	Participating	\$4,592,000	03/18/80	08/02/12	X
Wiconisco Township	Participating	\$700,000	04/15/81	08/02/12	
Williams Township	Participating	\$69,200	10/15/85	08/02/12	
Williamstown Borough	Participating	\$0	8/5/95	08/02/12	

Source: FEMA CIS, 2015; Dauphin County Office of Community and Economic Development.

In addition, Regular Program communities are eligible to participate in the NFIP’s Community Rating System (CRS) Program. To increase the resiliency of communities from flooding while at the same time reducing some of the financial costs associated with being prepared for a flood

event, FEMA developed the CRS which recognizes community efforts beyond minimum standards for floodplain management established under the NFIP by reducing flood insurance premiums for the community's property owners. Under the CRS, policyholders can receive premium discounts of 5 percent to 45 percent as their municipalities adopt more comprehensive flood mitigation measures. The discounts provide an incentive for new flood protection activities that can save lives and prevent or reduce property damage from a flood event. To participate in the CRS, a community can choose to accomplish some or all of 18 public information and floodplain management activities identified through the CRS program. The CRS assigns credit points for each activity conducted by the municipality and assigns municipalities to one of ten classes based on the total number of points each municipality earns by conducting activities. Property owners in the floodplain in a Class 1 municipality receive a 45 percent flood insurance discount; while property owners in the floodplain in a Class 9 municipality receive a 5 percent flood insurance discount. Communities can earn extra credit points if activities are coordinated through a comprehensive floodplain management plan. As of October 2014, only 31 of Pennsylvania's 2,561 municipalities participated in the CRS. Currently, Harrisburg is the only participating municipality in Dauphin County.

In an effort to increase municipal participation in the CRS with the ultimate goal of reducing flood insurance premiums for Dauphin County residents and businesses, the Dauphin County Commissioners began a Dauphin County CRS Program in 2014. Through this program, Dauphin County Office of Community and Economic Development (DCDCED) has retained consultant services to work one-on-one with municipalities interested in pursuing CRS designation. In Fall 2014, all municipalities were invited to an outreach session to learn more about the Biggert-Waters Act, the NFIP, and the CRS.

Municipalities interested in pursuing CRS designation signed a letter of intent with the County and consultant Tetra Tech to establish their commitment to provide resources necessary for the consultant team to catalogue and assess flood plain management activities and prepare an assessment of the municipality's strengths and areas of improvement prior to preparing a CRS application. The County will then assist municipalities in preparing a CRS application for submission to FEMA. As of May 2015, twenty-two municipalities signed a letter of intent to participate in the County's CRS Program as shown in the 'County CRS Program Participant' column in Table 4.3.2-7. It is the County's intent that augmenting municipal resources to help develop and prepare a CRS application will eventually result in reduced insurance premiums for Dauphin County residents and businesses.

The HMPSC identified increased participation in the CRS as a key item to address in the 2015 HMP. As such, a representative from FEMA Region 3 participated in the Draft Plan Review Meeting on June 1, 2015 and provided an overview of the CRS Program for municipalities attending. The presentation used was posted to the project website for those municipalities not able to attend.

4.3.2.4. Future Occurrence

In Dauphin County, flooding occurs commonly and can occur during any season of the year. Within the flood susceptible areas of Dauphin County, it is expected that the character of

flooding will remain essentially unchanged from what has been experienced for many years. The future occurrence of floods in Dauphin County can be characterized as *highly likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. The NFIP uses historical records to determine the probability of occurrence for different extents of flooding. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year. A specific flood that is used for a number of purposes is called the base flood, which has a one percent chance of occurring in any particular year. The base flood is often referred to as the “100-year flood” since its probability of occurrence suggests it should reoccur once every 100 years, although this is not the case in practice. Experiencing a 100-year flood does not mean a similar flood cannot happen for the next 99 years; rather, it reflects the probability that over a long period of time, a flood of that magnitude has a one percent chance of occurring in any given year. It is therefore referred to in this document as the 1%-chance flood. Table 4.3.2-8 shows a range of flood recurrence intervals and associated probabilities of occurrence.

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

The NFIP recognizes the 1%-annual-chance flood as the base flood, the standard for identifying properties subject to federal flood insurance purchase requirements. A 1%-annual-chance flood is a flood which has a 1% chance of occurring over a given year. DFIRMS and FIRMS published by FEMA can be used to identify areas subject to the 1%- and 0.2%-annual-chance flooding. Areas subject to 2%- and 10%-annual-chance events are not shown on maps; however, water surface elevations associated with these events are included in the flood source profiles contained in associated Flood Insurance Study Reports. The most recent Flood Insurance Study for each county in Pennsylvania is available from the FEMA Map Service Center (<http://www.msc.fema.gov>). As noted in Section 4.3.2.1, Dauphin County’s effective DFIRMS are dated August 2, 2012.

4.3.2.5. Vulnerability Assessment

Dauphin County is vulnerable to flooding that causes loss of lives, property damage, and road closures. All of the municipalities in Dauphin County are flood prone, with the exception of Berrysburg Borough. For purposes of assessing vulnerability, the County focused on populations, structures, and critical facilities that are located in the 1%-annual-chance flood zone. While greater and smaller floods are possible, information about the extent and depths for this flood zone is available for all municipalities countywide, thus providing a consistent basis for analysis. Flood vulnerability maps for each applicable local municipality, showing the 1%-

annual-chance flood hazard area and addressable structures, critical facilities and transportation routes within it, are included in *Appendix D*. These maps were created using Dauphin County's effective DFIRM data.

An important component of the vulnerability of Dauphin County communities is its participation in the NFIP. Table 4.3.2-9 includes the number of NFIP policies, claims, and substantial damage claims per municipality. Harrisburg has the highest number of policies as well as the greatest number of substantial damage claims. Gratz Borough, Jackson Township, and Rush Township have no effective policies and subsequently had no claims or substantial damage claims.

Table 4.3.2-9 NFIP policies and claims according to CIS.			
MUNICIPALITY	# POLICIES	# CLAIMS PAID	# SUBSTANTIAL DAMAGE CLAIMS
Berrysburg Borough	N/A	N/A	N/A
Conewago Township	3	2	1
Dauphin Borough	15	66	7
Derry Township	138	54	10
East Hanover Township	19	20	1
Elizabethville Borough	1	0	0
Gratz Borough	0	0	0
Halifax Borough	4	16	0
Halifax Township	11	21	2
Harrisburg City	1,079	1,530	47
Highspire Borough	187	200	2
Hummelstown Borough	27	58	12
Jackson Township	0	0	0
Jefferson Township	1	1	0
Londonderry Township	144	531	246
Lower Paxton Township	106	34	0
Lower Swatara Township	39	80	10
Lykens Borough	122	53	1
Lykens Township	5	6	0
Middle Paxton Township	111	251	23
Middletown Borough	147	334	51
Mifflin Township	1	0	0
Millersburg Borough	44	33	1
Paxtang Borough	41	31	2
Penbrook Borough	2	0	0
Pillow Borough	0	2	0

Table 4.3.2-9 NFIP policies and claims according to CIS.			
MUNICIPALITY	# POLICIES	# CLAIMS PAID	# SUBSTANTIAL DAMAGE CLAIMS
Reed Township	13	26	1
Royalton Borough	59	76	8
Rush Township	0	0	0
South Hanover Township	52	98	25
Steelton Borough	87	138	0
Susquehanna Township	280	434	17
Swatara Township	221	237	14
Upper Paxton Township	34	60	7
Washington Township	4	7	0
Wayne Township	0	1	0
West Hanover Township	25	20	1
Wiconisco Township	2	1	0
Williams Township	1	0	0
TOTAL	3,025	4,421	489

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

Table 4.3.2-10 displays the number of structures, critical facilities, and population intersecting the SFHA. The number of vulnerable structures was calculated by overlaying the structures with the SFHA. Similarly, the estimated population in the SFHA was calculated by overlaying the centroids of the 2010 Census blocks with the SFHA; while clearly an estimate, using the block centroid helps to minimize overestimation of flood prone populations. Table 4.3.2-11 shows the number of structures in the SFHA by generalized land use type and demonstrates most vulnerable structures are residential properties.

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Table 4.3.2-10 Municipal Flood Vulnerability for Dauphin County.									
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SFHA	% STRUCTURES IN SFHA	CRITICAL FACILITIES	CRITICAL FACILITIES IN SFHA	% CRITICAL FACILITIES IN SFHA	TOTAL POPULATION	POPULATION IN SFHA	% POPULATION IN SFHA
Berrysburg Borough	347	0	0.00%	3	0	0.00%	368	0	0.00%
Conewago Township	2,266	5	0.22%	4	0	0.00%	3,004	7	0.23%
Dauphin Borough	490	11	2.24%	4	0	0.00%	791	9	1.14%
Derry Township	10,690	201	1.88%	32	0	0.00%	24,651	25	0.10%
East Hanover Township	4,721	91	1.93%	8	0	0.00%	5,718	125	2.19%
Elizabethville Borough	1,000	7	0.70%	6	0	0.00%	1,510	0	0.00%
Gratz Borough	752	2	0.27%	2	0	0.00%	765	59	7.71%
Halifax Borough	476	0	0.00%	5	0	0.00%	836	57	6.82%
Halifax Township	3,409	96	2.82%	11	1	9.09%	3,488	0	0.00%
Harrisburg City	19,164	1,638	8.55%	61	3	4.92%	49,528	3,135	6.33%
Highspire Borough	1,314	341	25.95%	5	3	60.00%	2,399	756	31.51%
Hummelstown Borough	2,560	33	1.29%	8	0	0.00%	4,532	25	0.55%
Jackson Township	2,163	7	0.32%	7	0	0.00%	1,941	2	0.10%
Jefferson Township	618	21	3.40%	3	0	0.00%	365	0	0.00%
Londonderry Township	5,205	743	14.27%	11	0	0.00%	5,245	164	3.13%
Lower Paxton Township	20,333	177	0.87%	25	0	0.00%	47,360	1,241	2.62%
Lower Swatara Twp.	4,738	223	4.71%	17	0	0.00%	8,307	222	2.67%
Lykens Borough	1,323	539	40.74%	5	1	20.00%	1,780	698	39.21%
Lykens Township	2,036	110	5.40%	1	0	0.00%	1,616	59	3.65%

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Table 4.3.2-10 Municipal Flood Vulnerability for Dauphin County.									
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SFHA	% STRUCTURES IN SFHA	CRITICAL FACILITIES	CRITICAL FACILITIES IN SFHA	% CRITICAL FACILITIES IN SFHA	TOTAL POPULATION	POPULATION IN SFHA	% POPULATION IN SFHA
Middle Paxton Twp.	3,862	313	8.10%	13	0	0.00%	5,028	424	8.43%
Middletown Borough	3,732	471	12.62%	16	0	0.00%	8,890	851	9.57%
Mifflin Township	1,047	6	0.57%	1	0	0.00%	784	6	0.77%
Millersburg Borough	1,316	44	3.34%	7	0	0.00%	2,555	68	2.66%
Paxtang Borough	898	97	10.80%	3	2	66.67%	1,561	224	14.35%
Penbrook Borough	1,338	0	0.00%	4	0	0.00%	3,008	0	0.00%
Pillow Borough	300	7	2.33%	2	0	0.00%	298	0	0.00%
Reed Township	266	52	19.55%	1	0	0.00%	244	33	13.52%
Royalton Borough	694	117	16.86%	1	0	0.00%	907	169	18.63%
Rush Township	314	19	6.05%	1	0	0.00%	231	0	0.00%
South Hanover Twp.	3,755	88	2.34%	8	0	0.00%	6,254	194	3.10%
Steelton Borough	2,070	166	8.02%	5	0	0.00%	5,990	121	2.02%
Susquehanna Township	10,301	338	3.28%	35	1	2.86%	24,036	604	2.51%
Swatara Township	10,838	283	2.61%	39	1	2.56%	23,362	557	2.38%
Upper Paxton Township	3,392	129	3.80%	10	0	0.00%	4,154	122	2.94%

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Table 4.3.2-10 Municipal Flood Vulnerability for Dauphin County.									
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SFHA	% STRUCTURES IN SFHA	CRITICAL FACILITIES	CRITICAL FACILITIES IN SFHA	% CRITICAL FACILITIES IN SFHA	TOTAL POPULATION	POPULATION IN SFHA	% POPULATION IN SFHA
Washington Township	2,302	40	1.74%	11	1	9.09%	2,268	150	6.61%
Wayne Township	1,233	1	0.08%	1	0	0.00%	1,338	10	0.75%
West Hanover Twp.	5,767	37	0.64%	11	0	0.00%	9,343	0	0.00%
Wiconisco Township	1,094	32	2.93%	3	0	0.00%	1,209	0	0.00%
Williams Township	950	37	3.89%	1	0	0.00%	1,112	0	0.00%
Williamstown Borough	923	4	0.43%	4	0	0.00%	1,387	0	0.00%
TOTAL	139,997	6,526	4.66%	395	13	3.29%	268,163	10,117	3.77%

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Table 4.3.2-11 Structures in SFHAs by Generalized Land Use Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	GRAND TOTAL
Berrysburg Borough	347	0	0	0	0	0	0	0	0
Conewago Township	2,266	3	0	0	0	1	0	1	5
Dauphin Borough	490	0	0	0	0	10	0	1	11
Derry Township	10,690	22	2	0	48	99	21	9	201
East Hanover Township	4,721	16	0	0	2	73	0	0	91
Elizabethville Borough	1,000	0	0	1	0	6	0	0	7
Gratz Borough	752	1	0	0	1	0	0	0	2
Halifax Borough	476	0	0	0	0	0	0	0	0
Halifax Township	3,409	8	0	0	52	34	0	2	96
Harrisburg City	19,164	341	23	15	134	1,101	23	1	1,638
Highspire Borough	1,314	32	0	1	14	279	12	3	341
Hummelstown Borough	2,560	4	0	0	3	25	1	0	33
Jackson Township	2,163	5	0	0	0	2	0	0	7
Jefferson Township	618	4	0	0	4	13	0	0	21
Londonderry Township	5,205	126	0	5	408	198	0	6	743

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Table 4.3.2-11 Structures in SFHAs by Generalized Land Use Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	GRAND TOTAL
Lower Paxton Township	20,333	10	0	0	5	161	1	0	177
Lower Swatara Twp.	4,738	46	0	0	34	140	0	3	223
Lykens Borough	1,323	20	0	1	41	472	3	2	539
Lykens Township	2,036	48	0	0	23	39	0	0	110
Middle Paxton Twp.	3,862	18	0	2	40	249	0	4	313
Middletown Borough	3,732	19	0	7	56	372	9	8	471
Mifflin Township	1,047	1	0	0	0	3	0	2	6
Millersburg Borough	1,316	2	0	4	4	34	0	0	44
Paxtang Borough	898	20	0	1	1	75	0	0	97
Penbrook Borough	1,338	0	0	0	0	0	0	0	0
Pillow Borough	300	6	0	0	0	1	0	0	7
Reed Township	266	25	0	0	5	21	0	1	52
Royalton Borough	694	0	0	0	4	112	1	0	117
Rush Township	314	4	0	0	5	3	7	0	19
South Hanover Twp.	3,755	6	0	1	16	62	3	0	88

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Table 4.3.2-11 Structures in SFHAs by Generalized Land Use Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	GRAND TOTAL
Steelton Borough	2,070	45	0	0	96	22	3	0	166
Susquehanna Township	10,301	48	0	0	21	261	8	0	338
Swatara Township	10,838	27	0	4	31	210	7	4	283
Upper Paxton Township	3,392	39	0	5	14	61	0	10	129
Washington Township	2,302	22	0	0	10	8	0	0	40
Wayne Township	1,233	1	0	0	0	0	0	0	1
West Hanover Twp.	5,767	3	1	0	4	29	0	0	37
Wiconisco Township	1,094	6	0	3	17	4	0	2	32
Williams Township	950	12	0	0	1	22	2	0	37
Williamstown Borough	923	0	0	4	0	0	0	0	4
TOTAL	139,997	990	26	54	1,094	4,202	101	59	6,526

Other concerns during a flood include hazardous material facilities and the safety of mobile homes, as they are typically lightweight and unanchored. Table 4.3.2-12 lists the number of mobile homes by municipalities and number and percentage of these homes located in the SFHA.

Table 4.3.2-12 Number of mobile homes in SFHAs by municipality.				
MUNICIPALITY	TOTAL STRUCTURES	TOTAL MOBILE HOMES	MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA
Berrysburg Borough	347	11	0	0.00%
Conewago Township	2,266	145	0	0.00%
Dauphin Borough	490	3	0	0.00%
Derry Township	10,690	87	26	29.89%
East Hanover Township	4,721	622	22	3.54%
Elizabethville Borough	1,000	12	0	0.00%
Gratz Borough	752	30	0	0.00%
Halifax Borough	476	8	0	0.00%
Halifax Township	3,409	240	0	0.00%
Harrisburg City	19,164	0	0	0.00%
Highspire Borough	1,314	93	49	52.69%
Hummelstown Borough	2,560	17	1	5.88%
Jackson Township	2,163	89	2	2.25%
Jefferson Township	618	23	2	8.70%
Londonderry Township	5,205	1,068	47	4.40%
Lower Paxton Township	20,333	108	1	0.93%
Lower Swatara Township	4,738	796	87	10.93%
Lykens Borough	1,323	42	25	59.52%
Lykens Township	2,036	49	5	10.20%
Middle Paxton Township	3,862	99	8	8.08%
Middletown Borough	3,732	253	204	80.63%
Mifflin Township	1,047	28	0	0.00%
Millersburg Borough	1,316	4	0	0.00%
Paxtang Borough	898	0	0	0.00%
Penbrook Borough	1,338	8	0	0.00%
Pillow Borough	300	8	0	0.00%
Reed Township	266	3	0	0.00%
Royalton Borough	694	52	7	13.46%

Table 4.3.2-12 Number of mobile homes in SFHAs by municipality.				
MUNICIPALITY	TOTAL STRUCTURES	TOTAL MOBILE HOMES	MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA
Rush Township	314	13	1	7.69%
South Hanover Township	3,755	92	7	7.61%
Steelton Borough	2,070	3	0	0.00%
Susquehanna Township	10,301	66	0	0.00%
Swatara Township	10,838	4	0	0.00%
Upper Paxton Township	3,392	309	7	2.27%
Washington Township	2,302	89	0	0.00%
Wayne Township	1,233	73	0	0.00%
West Hanover Township	5,767	236	4	1.69%
Wiconisco Township	1,094	53	0	0.00%
Williams Township	950	38	4	10.53%
Williamstown Borough	923	19	0	0.00%
TOTAL	139,997	4,893	509	10.40%

As noted previously, the location of hazardous materials facilities in a SFHA is of concern due to the potential for a hazardous materials release during a flood incident. There are thirteen EPA Toxics Release Inventory (TRI) hazardous materials facilities in the SFHA as shown in Table 4.3.2-13.

Table 4.3.2-13 EPA TRI hazardous materials facilities in the SFHA.	
MUNICIPALITY	NAME OF FACILITY
Derry Township	Hershey Chocolate USA Pretreatment Plant
Derry Township	Hershey Company Hershey Plant
Harrisburg City	Charles D Snyder & Son Inc
Harrisburg City	Dayton Parts LLC
Harrisburg City	Hershey Creamery Co. Harrisburg Facility
Harrisburg City	Taylor-Wharton Gas Equipment Division Harrisburg Plant
Harrisburg City	Turbine Airfoil Designs Inc.
Lykens Borough	Alfa Laval Heat Plant
Middletown Borough	Univar USA Inc. Middletown Branch
Steelton Borough	Arcelormittal Steelton LLC
Steelton Borough	Dura-Bond Pipe LLC
Steelton Borough	Dura-Bond Pipe LLC
Washington Township	Moyer Packing Co. Elizabethville Rendering Div.

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

4.3.3. Hurricane, Tropical Storm, Nor'easter

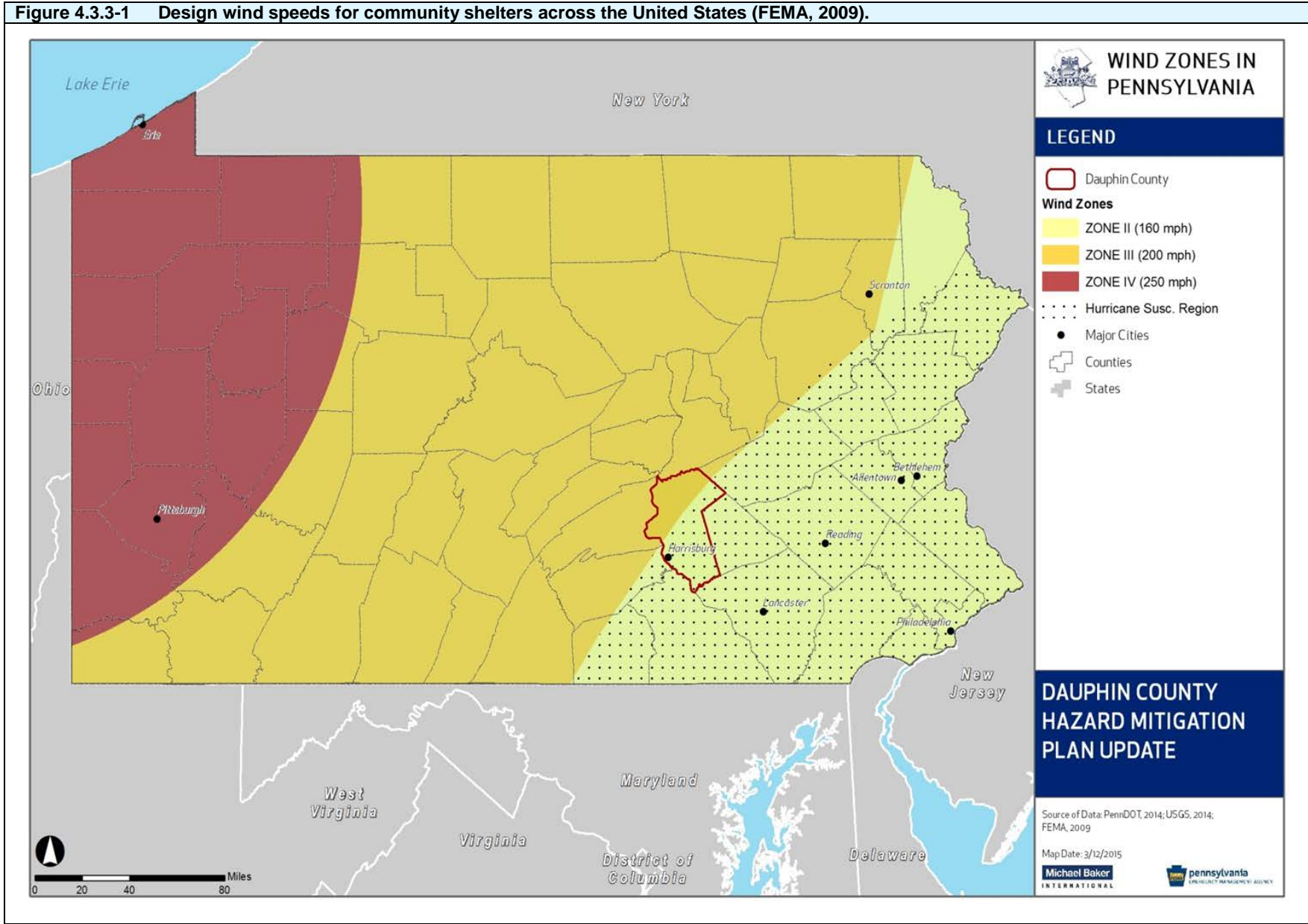
4.3.3.1. Location and Extent

Tropical storms impacting Dauphin County develop in tropical or sub-tropical waters found in the Atlantic Ocean, Gulf of Mexico, or Caribbean Sea. While Dauphin County is located over 130 miles from open coastline, tropical storms can track inland causing heavy rainfall and strong winds. These storms are regional events that can impact very large areas hundreds to thousands of miles across over the life the storm. Therefore, all communities within Dauphin County are equally subject to the impacts of hurricanes, tropical storms, and Nor'easters that track through or near the County. Areas in the County which are subject to flooding, wind, and winter storm damage are particularly vulnerable.

Figure 4.3.3-1 shows wind speed zones developed by the American Society of Civil Engineers based on information including 40 years of tornado history and over 100 years of hurricane history. It identifies wind speeds that could occur across the United States to be used as the basis for design and evaluation of the structural integrity of shelters and critical facilities.

Dauphin County falls within Zone II and Zone III. Design wind speeds for shelters and critical facilities in Zone II should be able to withstand a 3-second gust of up to 160 mph, regardless of whether the gust is the result of a tornado, hurricane, tropical storm, or windstorm event. The design wind speed for Zone III is 200 mph. Over half of Dauphin County falls within the Hurricane Susceptible Region.

Figure 4.3.3-1 Design wind speeds for community shelters across the United States (FEMA, 2009).



4.3.3.2. *Range of Magnitude*

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

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

The impact tropical storm or hurricane events have on an area is typically measured in terms of wind speed. Expected damage from hurricane force winds is measured using the Saffir-Simpson Scale. The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure, and storm surge potential (characteristic of tropical storms and hurricanes, but not a threat to inland locations like Dauphin County), which are combined to estimate potential damage. Table 4.3.3-1 lists Saffir-Simpson Scale categories with associated wind speeds and expected damages. Categories 3, 4, and 5 are classified as "major" hurricanes. While major hurricanes comprise only 20 of all tropical cyclones making landfall, they account for over 70 percent of the damage in the United States. The likelihood of these damages occurring in Dauphin County is assessed in Section 4.3.3.4 - Future Occurrence.

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

Table 4.3.3-1 Saffir-Simpson Scale categories with associated wind speeds and damages (NHC, 2013).

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

4.3.3.3. Past Occurrence

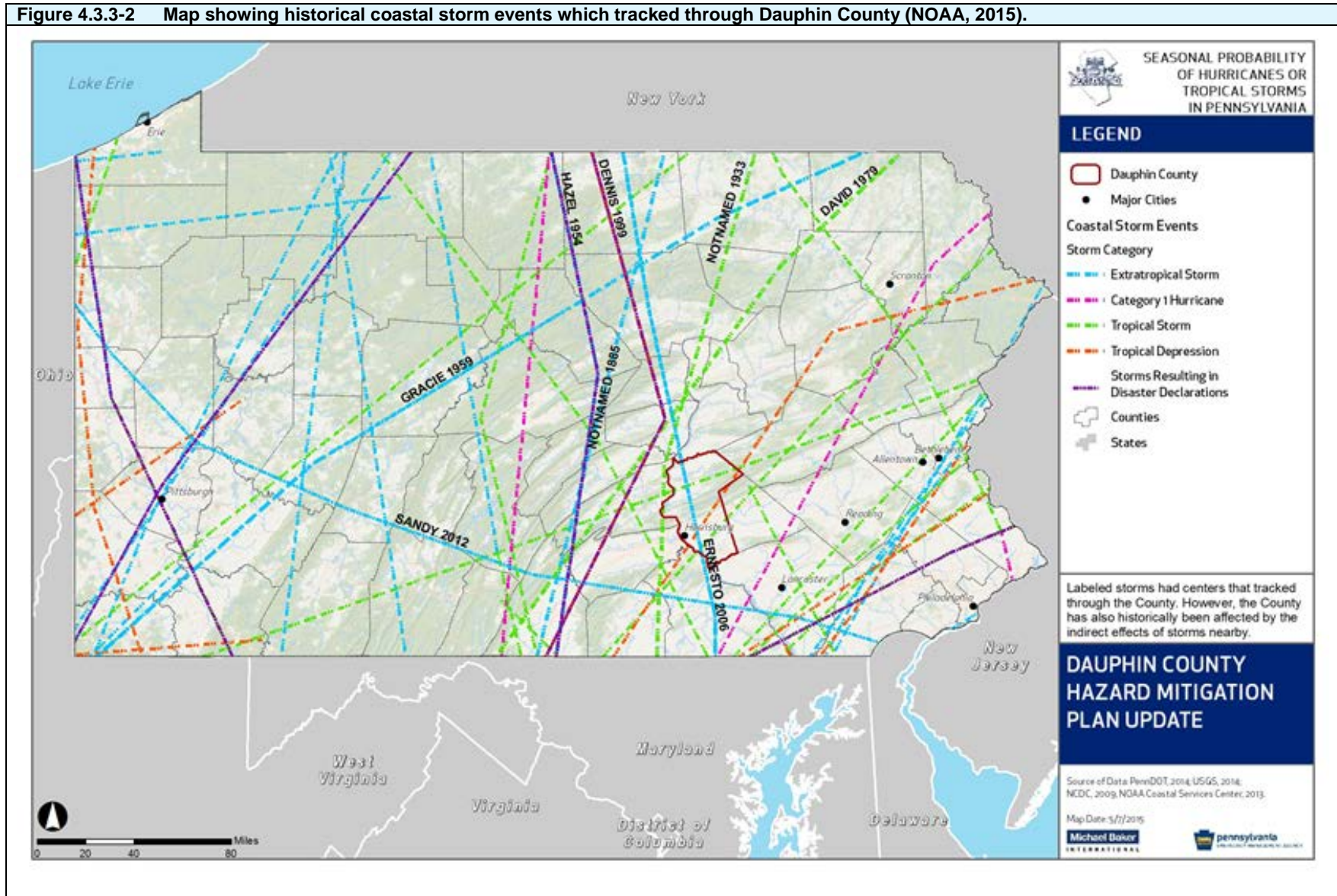
The National Oceanic and Atmospheric Administration’s Office for Coastal Management maintains records of all coastal storms occurring in the United States since the 1850s. Table 4.3.3-2 lists all coastal storms having centers of circulation to pass through or within 30 miles of Dauphin County.

Table 4.3.3-2 Previous coastal storms tracking through or near Dauphin County.

YEAR	EVENT	STRENGTH IN/NEAR DAUPHIN COUNTY
1878	Not named	Tropical Storm
1888	Not named	Tropical Storm
1933	Not named	Tropical Storm
1943	Not named	Tropical Storm
1949	Not named	Tropical Storm
1955	Connie	Tropical Storm
1992	Danielle	Tropical Storm
1994	Beryl	Tropical Depression
2006	Ernesto	Tropical Depression
2012	Sandy	Tropical Depression

Figure 4.3.3-2 shows the historical coastal storms in/near Dauphin County. None of the significant hurricane, tropical storm, and Nor’easter events that have impacted Dauphin County have tracked through the County. These storm events include the remnants of Hurricane Sandy (2013), Tropical Storm Lee (2011), Tropical Depression Ivan (2004), Tropical Storm Eloise (1975,) and Tropical Storm Agnes (1972) and each resulted in a Presidential Disaster Declaration. Perhaps the best example of this is Hurricane Agnes (1972). While it was the most significant tropical storm event to impact the Commonwealth, the storm track for Agnes remained to the east of Pennsylvania and New Jersey until making landfall near New York City

Figure 4.3.3-2 Map showing historical coastal storm events which tracked through Dauphin County (NOAA, 2015).



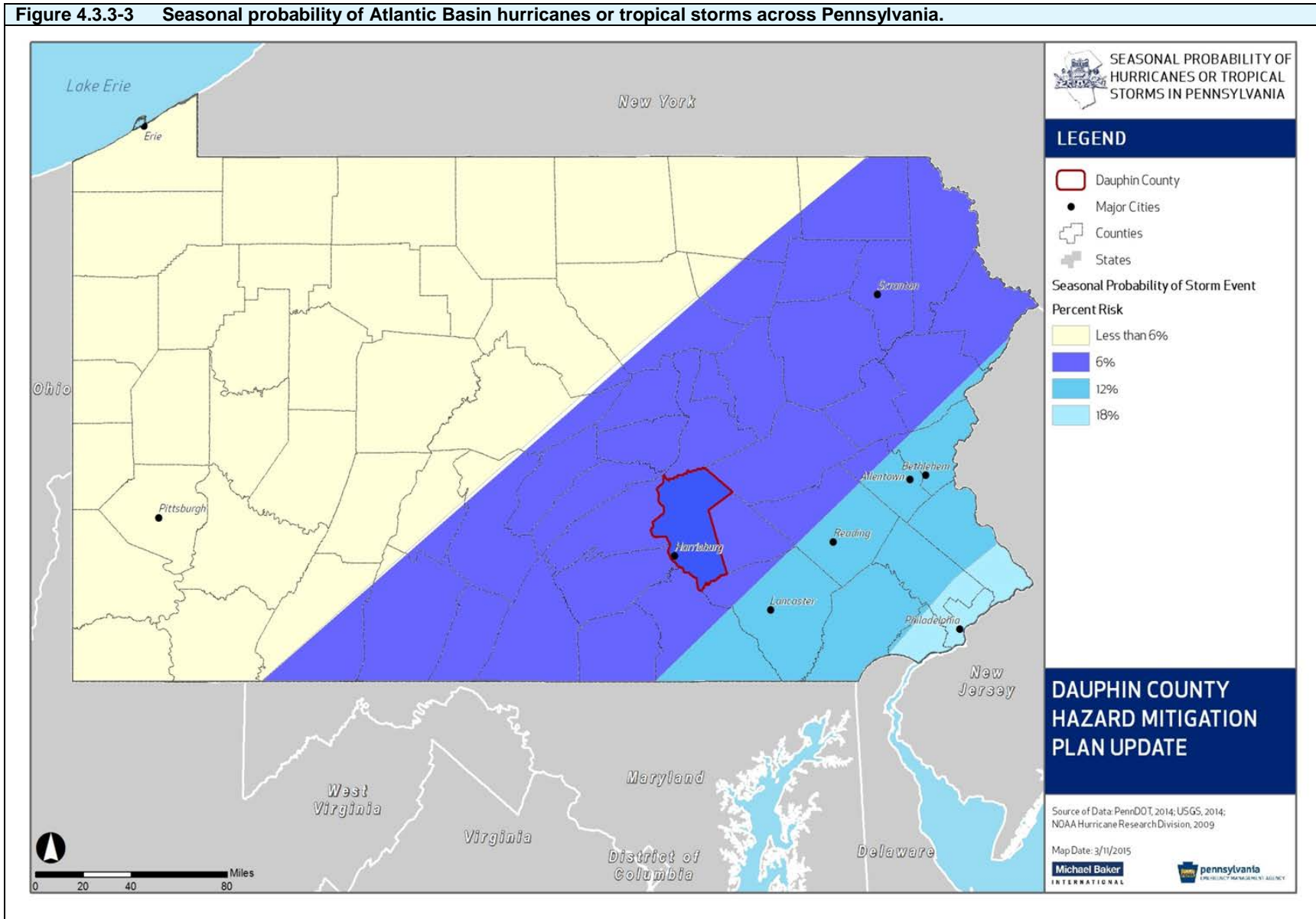
and traveling into upstate New York. After making first landfall as a minimal hurricane near Panama City, Florida, Agnes weakened and exited back into the Atlantic off the North Carolina coast. However, the storm skirted along the coast, made a second landfall near New York City as a tropical storm and merged with an extra-tropical low pressure system over northern Pennsylvania. This brought extremely heavy rains to Pennsylvania, with particular concentrations of rain in the Susquehanna River Basin. Refer to further details pertaining to Tropical Storm Agnes and Tropical Storm Lee in Section 4.3.2.

While there is not a comprehensive data source that compiles Nor'easter events, a few Nor'easters were reported to impact Dauphin County in recent years. Recent events were recorded on March 13, 2010 (National Weather Service); November 6, 2012 (American Red Cross); January 2, 2014 (Pennlive); February 13, 2014 (AccuWeather); November 26-27, 2014 (National Weather Service); and January 26, 2015 (Pennlive).

4.3.3.4. *Future Occurrence*

The National Oceanic and Atmospheric Administration Hurricane Research Division published the map included as Figure 4.3.3-3 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 shows there is approximately a 6 percent chance of the County experiencing a tropical storm or hurricane event between June and November of any given year as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1). A hurricane, tropical storm, or Nor'easter is *possible* in any given year. Note that these probabilities are the result of only a single study and may differ from other seasonal probability estimates not identified in this report. Outlier storms may also have a large impact on Pennsylvania even though their probability is low.

Figure 4.3.3-3 Seasonal probability of Atlantic Basin hurricanes or tropical storms across Pennsylvania.



4.3.3.5. Vulnerability Assessment

A vulnerability assessment for hurricanes, tropical storms focuses on the impacts of flooding and severe wind. Therefore, the assessment for flood-related vulnerability is addressed in Section 4.3.2.5 and vulnerability to wind damage is addressed in Section 4.3.8.5. Dauphin County is also vulnerable to severe winter weather impacts caused by Nor'easters which are evaluated in 4.3.10.5.

4.3.4. Landslide

4.3.4.1. Location and Extent

A landslide is the downward and outward movement of earth materials reacting under the force of gravity. As such, "landslide" can be used to describe a number of different types of events displaying different movement characteristics and involving different materials. Rockslides, rock falls, mudflows, mudslides, debris flows, and debris avalanches are all types of landslide events that involve different materials moving in a different manner. Landslides typically occur when some factor (e.g., increased water content or change in load) causes the force of gravity to outweigh the forces working to hold material in place, resulting in the downslope movement of the subject material. Several natural and human factors may contribute to or influence landslides. These factors include topography, geology, precipitation, steepness of cut and fill slopes, and cut-slope stability.

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

Figure 4.3.4-1 shows landslide susceptibility and incidence for Pennsylvania. According to the figure the northern portion of Dauphin County is in a *Combo-High* zone of landslide susceptibility and incidence. This means that these areas have a high susceptibility to landslides with a moderate incidence of occurrence (1.5 to 15 percent of the area is involved in landsliding). The southern portion of Dauphin County is in the low landslide incidence zone, meaning that less than 1.5 percent of the area is involved in landsliding.

A slope greater than 7 percent (approximately around 15 degrees) needs special considerations for building roads according to common engineering practice, and a slope of 15 percent (approximately around 25 degrees) is generally unstable and highly sensitive to surface changes. Slopes greater than 25 percent are very unstable. Figure 4.3.4-2 shows steep slope locations in Dauphin County. The majority of these potential landslide hazard areas are located in the northern mountainous part of the County.

Figure 4.3.4-1 Landslide Susceptibility and Incidence for Dauphin County (National Atlas, 2001).

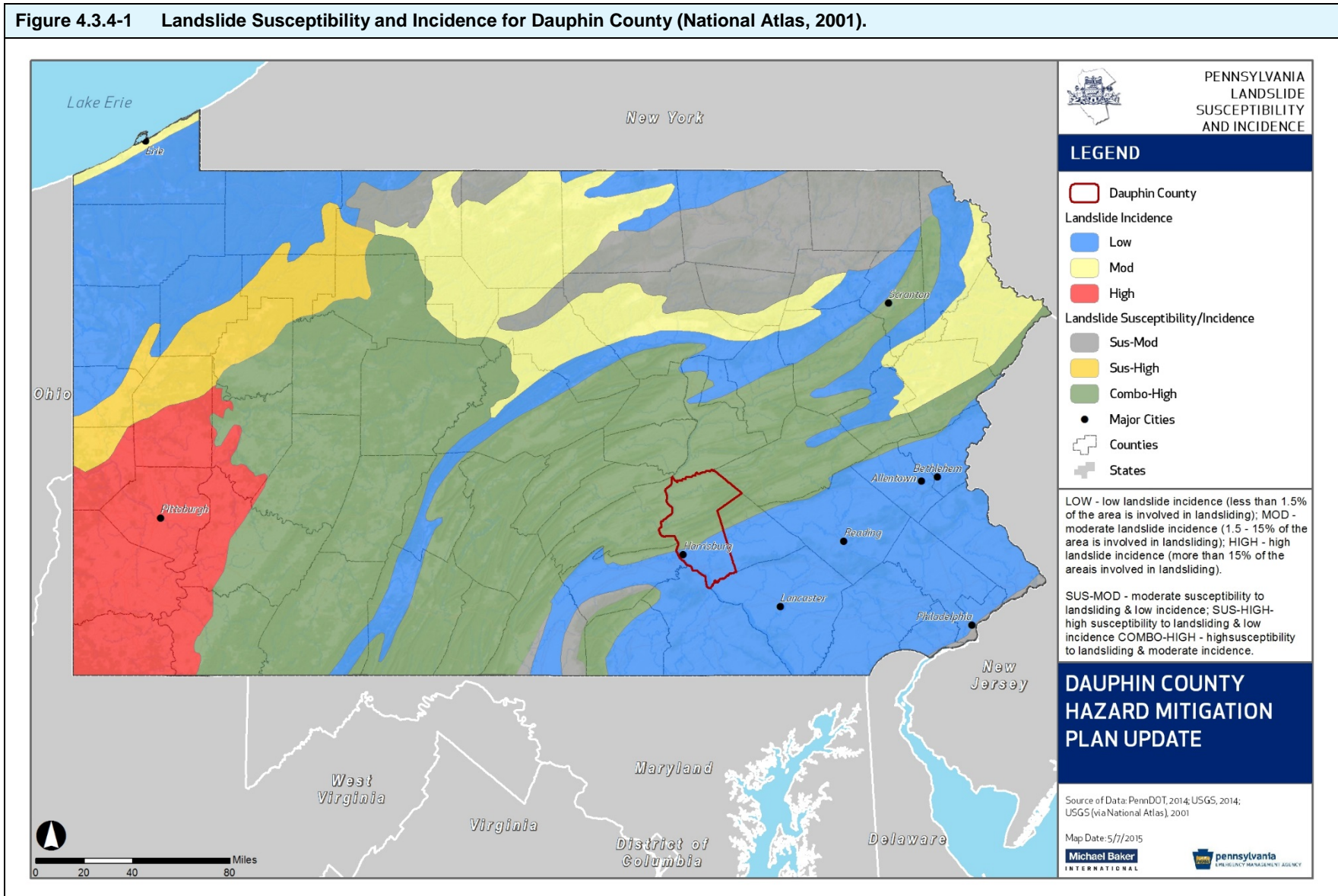
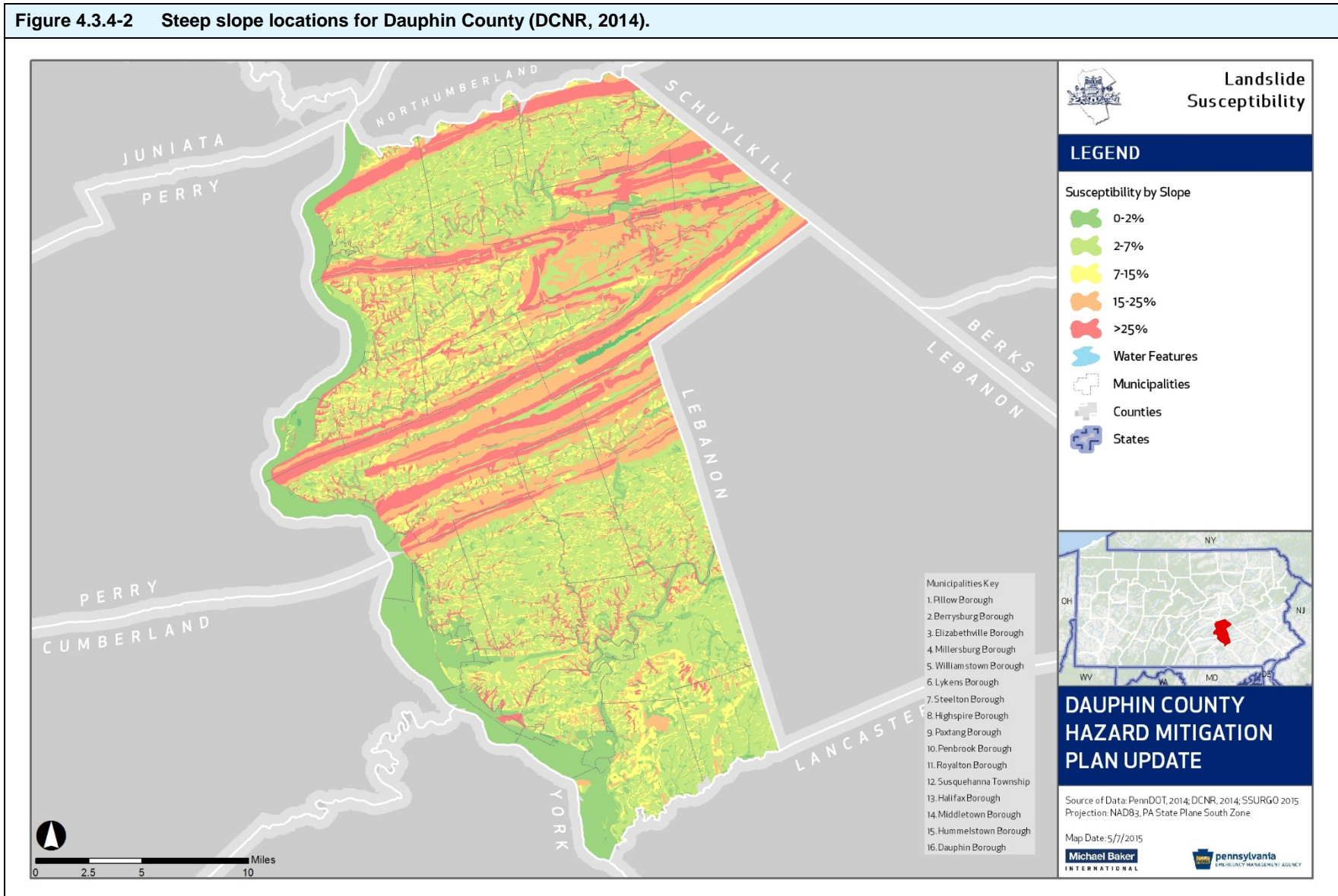


Figure 4.3.4-2 Steep slope locations for Dauphin County (DCNR, 2014).



4.3.4.2. *Range of Magnitude*

Landslides can have potentially devastating consequences in localized areas. According to DCNR (2001), “landslides cause damage to transportation routes, utilities, and buildings and create travel delays and other side effects. Fortunately, deaths and injuries due to landslides are rare in Pennsylvania. Almost all of the known deaths due to landslides have occurred when rock falls or other slides along highways have involved vehicles.” According to DCNR, storm induced debris flows are the only other type of landslide likely to cause death and injuries in Dauphin County. Property losses due to landslides and associated effects are more common than injuries and deaths.

Most landslide events in Pennsylvania tend to be human-induced. Cut and fill slopes for roadways, septic fields on sloped areas, seeps from detention areas/reservoirs, and clearing of vegetation in sloped areas are all human-induced causes of landslide events. If residential and recreational development increases on and near steep mountain slopes, the hazard from these rapid events will also increase.

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.

A possible worst-case scenario could occur in Dauphin County if a landslide occurred along one of the major interstates. The landslide could cause damage to vehicles and the roadway and injuries to people. In addition, the landslide would have secondary effects caused by shutting down the roadway.

4.3.4.3. *Past Occurrence*

A comprehensive inventory of landslides events in Pennsylvania does not exist. The NCDC database captures landslides as they occur in conjunction with severe storms; the NCDC database does not report any landslides in Dauphin County. Within Dauphin County, the local maintenance district of the Pennsylvania Department of Transportation identified one known location of previous landslide events. This known landslide hazard area is located in a steep roadway cut along Route 147 north of Millersburg in Upper Paxton Township (see Figure 4.3.4-3). A fence was installed to stabilize this area and to prevent sliding on the roadway. No other known landslide event locations have been reported in Dauphin County.

Figure 4.3.4-3 Known landslide hazard area along Route 147 north of Millersburg in Upper Paxton Township.



4.3.4.4. Future Occurrence

Given that no damage due to landslide has been recorded in Dauphin County, the future occurrence of landslides can be considered *unlikely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1). However, given the presence of steep slopes in the County there is the possibility of some small rock fall or landslide events but they are expected to cause little to no damage.

4.3.4.5. Vulnerability Assessment

A landslide might cause a structure to collapse or might cause minor damages such as broken windows. A landslide might cause a roadway to be temporarily blocked. On average, less than 7 percent of structures in Dauphin County are located on steep slopes that pose a risk of damage due to landslide. There are fifteen critical facilities in Dauphin County located in steep slope areas.

Table 4.3.4-1 summarizes the number of existing buildings and critical facilities in the County that are located in areas with steep slopes and may, therefore, experience damages should a landslide occur.

Dauphin County 2015 All-Hazard Mitigation Plan Update

Table 4.3.4-1 Landslide Vulnerability for Dauphin County (DCNR, 2014).						
MUNICIPALITY	TOTAL STRUCTURES IN MUNICIPALITY	STRUCTURES IN LANDSLIDE ZONE*	PERCENT OF STRUCTURES IN LANDSLIDE ZONE	TOTAL CRITICAL FACILITIES IN MUNICIPALITY	TOTAL CRITICAL FACILITIES IN LANDSLIDE ZONE	PERCENT CRITICAL FACILITIES IN LANDSLIDE ZONE
Berrysburg Borough	347	0	0.00%	3	0	0.00%
Conewago Township	2,266	125	5.47%	4	0	0.00%
Dauphin Borough	490	94	19.18%	4	0	0.00%
Derry Township	10,690	374	3.50%	32	2	6.25%
East Hanover Township	4,721	277	5.87%	8	0	0.00%
Elizabethville Borough	1,000	300	30.00%	6	1	16.67%
Gratz Borough	752	18	2.39%	2	0	0.00%
Halifax Borough	476	21	4.41%	5	0	0.00%
Halifax Township	3,409	382	11.21%	11	1	9.09%
Harrisburg	19,164	59	0.31%	61	0	0.00%
Highspire Borough	1,314	66	5.02%	5	0	0.00%
Hummelstown Borough	2,560	51	1.99%	8	0	0.00%
Jackson Township	2,163	325	15.03%	7	0	0.00%
Jefferson Township	618	182	29.45%	3	0	0.00%
Londonderry Township	5,205	216	4.15%	11	0	0.00%
Lower Paxton Township	20,333	1,195	5.88%	25	0	0.00%
Lower Swatara Township	4,738	213	4.50%	17	0	0.00%
Lykens Borough	1,323	122	9.22%	65	0	0.00%
Lykens Township	2,036	195	9.58%	1	0	0.00%
Middle Paxton Township	3,862	768	19.89%	13	2	15.38%
Middletown Borough	3,732	0	0.00%	16	0	0.00%
Mifflin Township	1,047	148	14.14%	1	1	100.00%
Millersburg Borough	1,316	83	6.31%	7	0	0.00%
Paxtang Borough	898	0	0.00%	3	0	0.00%

Dauphin County 2015 All-Hazard Mitigation Plan Update

Table 4.3.4-1 Landslide Vulnerability for Dauphin County (DCNR, 2014).						
MUNICIPALITY	TOTAL STRUCTURES IN MUNICIPALITY	STRUCTURES IN LANDSLIDE ZONE*	PERCENT OF STRUCTURES IN LANDSLIDE ZONE	TOTAL CRITICAL FACILITIES IN MUNICIPALITY	TOTAL CRITICAL FACILITIES IN LANDSLIDE ZONE	PERCENT CRITICAL FACILITIES IN LANDSLIDE ZONE
Penbrook Borough	1,338	2	0.15%	4	0	0.00%
Pillow Borough	300	22	7.33%	2	0	0.00%
Reed Township	266	52	19.55%	1	1	100.00%
Royalton Borough	694	0	0.00%	1	0	0.00%
Rush Township	314	146	46.50%	1	0	0.00%
South Hanover Township	3,755	296	7.88%	8	0	0.00%
Steelton Borough	2,070	291	14.06%	5	0	0.00%
Susquehanna Township	10,301	889	8.63%	35	0	0.00%
Swatara Township	10,838	974	8.99%	39	4	10.26%
Upper Paxton Township	3,392	377	11.11%	10	1	10.00%
Washington Township	2,302	164	7.12%	11	0	0.00%
Wayne Township	1,233	157	12.73%	1	0	0.00%
West Hanover Township	5,767	466	8.08%	11	0	0.00%
Wiconisco Township	1,094	264	24.13%	3	1	33.33%
Williams Township	950	303	31.89%	1	1	100.00%
Williamstown Borough	923	6	0.65%	4	0	0.00%
TOTAL	139,997	9,623	6.87%	395	15	3.80%
*Note: landslide zone = areas with a slope of >15%.						

Table 4.3.4-2 shows the number of structures in each municipality located in areas susceptible to landslide by land use type. The land use type displaying the greatest vulnerability to landslide hazards is residential.

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Table 4.3.4-2 Structures in Steep Slope Areas by Generalized Land Use Type (Dauphin County GIS Department, 2015)*								
Municipality	Commercial/ Agricultural	Educational	Government	Miscellaneous	Residential	Transportation/ Utility	Unknown	TOTAL
Berrysburg Borough	0	0	0	0	0	0	0	0
Conewago Township	11	0	0	4	110	0	0	125
Dauphin Borough	2	0	1	4	85	1	1	94
Derry Township	40	1	2	11	295	0	25	374
East Hanover Township	50	0	0	47	180	0	0	277
Elizabethville Borough	31	0	2	44	221	0	2	300
Gratz Borough	7	0	0	7	4	0	0	18
Halifax Borough	4	0	0	8	9	0	0	21
Halifax Township	151	0	0	22	208	0	1	382
Harrisburg, City of	4	0	0	7	47	0	1	59
Highspire Borough	1	0	0	1	64	0	0	66
Hummelstown Borough	0	0	0	2	49	0	0	51
Jackson Township	141	0	0	27	157	0	0	325
Jefferson Township	38	0	0	45	98	0	1	182
Londonderry Township	22	0	1	15	178	0	0	216
Lower Paxton Township	19	0	0	41	1,131	3	1	1,195
Lower Swatara Township	17	0	0	5	191	0	0	213
Lykens Borough	10	0	0	11	101	0	0	122
Lykens Township	127	0	0	16	50	0	2	195
Middle Paxton Township	152	0	0	54	560	0	2	768
Middletown Borough	0	0	0	0	0	0	0	0
Mifflin Township	60	0	0	14	68	0	6	148
Millersburg Borough	11	0	2	5	64	1	0	83
Paxtang Borough	0	0	0	0	0	0	0	0
Penbrook Borough	0	0	0	2	0	0	0	2
Pillow Borough	8	0	0	6	8	0	0	22
Reed Township	9	0	2	3	38	0	0	52
Royalton Borough	0	0	0	0	0	0	0	0
Rush Township	5	0	0	12	120	6	3	146

Dauphin County 2015 All-Hazard Mitigation Plan Update

Table 4.3.4-2 Structures in Steep Slope Areas by Generalized Land Use Type (Dauphin County GIS Department, 2015)*								
Municipality	Commercial/ Agricultural	Educational	Government	Miscellaneous	Residential	Transportation/ Utility	Unknown	TOTAL
South Hanover Township	37	0	1	6	251	1	0	296
Steelton Borough	17	0	1	15	255	0	3	291
Susquehanna Township	27	3	11	32	811	0	5	889
Swatara Township	58	3	2	32	869	7	3	974
Upper Paxton Township	67	0	1	41	268	0	0	377
Washington Township	64	0	0	12	85	0	3	164
Wayne Township	39	0	0	15	103	0	0	157
West Hanover Township	72	0	0	52	336	0	6	466
Wiconisco Township	28	0	2	28	195	5	6	264
Williams Township	29	5	0	63	198	5	3	303
Williamstown Borough	0	0	0	0	6	0	0	6
TOTAL	1,358	12	28	709	7,413	29	74	9,623
<i>*Generalized land use type derived from detailed structure categories in County GIS data. Aggregated by generalized category for ease of discussion in report.</i>								

4.3.5. Pandemic and Infectious Disease

4.3.5.1. Location and Extent

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

Dauphin County is primarily concerned with pandemic influenza. Pandemic influenza planning began in response to the H5N1 (avian) flu outbreak in Asia, Africa, Europe, the Pacific, and the Near East in the late 1990s and early 2000s. H5N1 did not reach pandemic proportions in the United States, but Pennsylvania and local departments of health began actively planning for an occurrence of an influenza pandemic. As stated in the Pennsylvania Department of Health (DOH) Influenza Pandemic Response Plan, “an influenza pandemic is inevitable and will probably give little warning” (PA DOH, 2005). Influenza, also known as “the flu”, is a contagious disease that is caused by the influenza virus and most commonly attacks the respiratory tract in humans. Influenza is considered to have pandemic potential if it is novel, meaning that people have no immunity to it, virulent, meaning that it causes deaths in normally healthy individuals, and easily transmittable from person-to-person.

4.3.5.2. Range of Magnitude

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

4.3.5.3. Past Occurrence

The U.S. 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 4.3.5-1.

Table 4.3.5-1 List of previous significant outbreaks of influenza over the past century (Global Security, 2009; WHO, 2009).		
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 619 confirmed flu cases in Dauphin County (PA DOH, 2015a).

4.3.5.4. 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).

4.3.5.5. *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 Dauphin County has some vulnerability to pandemic and infectious disease threats. Certain population groups are at higher risk of pandemic flu infection. This population group includes people 65 years and older, children younger than 5 years old, pregnant women and people of any age with certain chronic medical conditions. Schools, colleges, convalescent centers, and other institutions serving those younger than 5 years old and older than 65 years old, are locations conducive to faster transmission of pandemic influenza since populations identified as being at high risk are concentrated at these facilities or because of a large number of people living in close quarters. The highest concentration of these institutions is found in the Harrisburg area.

4.3.6. **Radon Exposure**

4.3.6.1. *Location and Extent*

Radioactivity caused by airborne radon has been recognized for many years as an important component in the natural background radioactivity exposure of humans, but it was not until the 1980s that the wide geographic distribution of elevated values in houses and the possibility of extremely high radon values in houses were recognized. In 1984, routine monitoring of employees leaving the Limerick nuclear power plant near Reading, Pennsylvania, showed that readings on Mr. Stanley Watras frequently exceeded expected radiation levels, yet only natural, nonfission-product radioactivity was detected on him. Radon levels in his home were detected around 2,500 pCi/L (pico Curies per Liter), much higher than the 4 pCi/L guideline of the U.S. Environmental Protection Agency (EPA) or even the 67 pCi/L limit for uranium miners. As a result of this event, the Reading Prong geologic formation in Pennsylvania where Watras lived became the focus of the first large-scale radon scare in the world.

Radon is a noble gas that originates by the natural radioactive decay of uranium and thorium. Like other noble gases (e.g., helium, neon, and argon), radon forms essentially no chemical compounds and tends to exist as a gas or as a dissolved atomic constituent in groundwater. Two isotopes of radon are significant in nature, ^{222}Rn and ^{220}Rn , formed in the radioactive decay series of ^{238}U and ^{232}Th , respectively. The isotope thoron (i.e. ^{220}Rn) has a half-life (time for decay of half of a given group of atoms) of 55 seconds, barely long enough for it to migrate from its source to the air inside a house and pose a health risk. However, radon (i.e. ^{222}Rn), which has a half-life of 3.8 days, is a widespread hazard. The distribution of radon is correlated with the distribution of radium (i.e. ^{226}Ra), its immediate radioactive parent, and with uranium, its original ancestor. Due to the short half-life of radon, the distance that radon atoms can travel from their parent before decay is generally limited to distances of feet or tens of feet.

Three sources of radon in houses and buildings are now recognized:

- Radon in soil air that flows into the structure;

- Radon dissolved in water from private wells and exsolved during water usage which is rarely a problem in Pennsylvania; and
- Radon emanating from uranium-rich building materials (e.g. concrete blocks or gypsum wallboard) which is not known to be a problem in Pennsylvania.

High radon levels were initially thought to be exacerbated in buildings that are tightly sealed, but it is now recognized that rates of air flow into and out of buildings, plus the location of air inflow and the radon content of air in the surrounding soil, are key factors in radon concentrations. Outflows of air from a building or house, caused by a furnace, fan, thermal “chimney” effect, or wind effects, require that air be drawn into the structure to compensate. If the upper part of the structure is tight enough to impede influx of outdoor air (radon concentration generally <0.1 pCi/L), then an appreciable fraction of the air may be drawn in from the soil or fractured bedrock through the foundation and slab beneath the structure, or through cracks and openings for pipes, sumps, and similar features. Soil gas typically contains from a few hundred to a few thousand pCi/L of radon; therefore, even a small rate of soil gas inflow can lead to elevated radon concentrations in a structure.

The radon concentration of soil gas depends upon a number of soil properties, the importance of which is still being evaluated. In general, ten to fifty percent of newly formed radon atoms escape the host mineral of their parent radium and gain access to the air-filled pore space. The radon content of soil gas clearly tends to be higher in soils containing higher levels of radium and uranium, especially if the radium occupies a site on or near the surface of a grain from which the radon can easily escape. The amount of pore space in the soil and its permeability for air flow, including cracks and channels, are important factors determining radon concentration in soil gas and its rate of flow into a structure. Soil depth and moisture content, mineral host and form for radium, and other soil properties may also be important. For buildings constructed on bedrock, fractured zones may supply air having radon concentrations similar to those in deep soil.

Areas where structures have high levels of radon can be divided into three groups in terms of uranium content in rock and soil:

- Areas of very elevated uranium content which are greater than 50 parts per million (ppm) around uranium deposits and prospects. Although very high levels of radon can occur in such areas, the hazard is normally restricted to within a few hundred feet of the deposit. In Pennsylvania, such localities occupy an insignificant area.
- Areas of common rocks having higher than average uranium content (5 to 50 ppm). In Pennsylvania, such rock types include granitic and felsic alkali igneous rocks and black shales. In the Reading Prong, high uranium values in rock or soil and high radon levels in structures are associated with Precambrian granitic gneisses commonly containing 10 to 20 ppm uranium, but locally containing more than 500 ppm uranium. In Pennsylvania, elevated uranium occurs in black shales of the Devonian Marcellus Formation and possibly the Ordovician Martinsburg Formation. High radon values are locally present in areas underlain by these formations.

- Areas of soil or bedrock have normal uranium content but properties that promote high radon levels in houses or buildings. This group is not completely understood at present. Relatively high soil permeability can lead to high radon, the clearest example being structures built on glacial eskers. Limestone-dolomite soils also appear to be predisposed for high radon levels in structures, perhaps because of the deep clay-rich residuum in which radium is concentrated by weathering on iron oxide or clay surfaces, coupled with moderate porosity and permeability.

Dauphin County includes occurrences of both the Ordovician Martinsburg Formation and limestone-dolomite soils.

4.3.6.2. *Range of Magnitude*

Exposure to radon is the second leading cause of lung cancer after smoking and the number one cause of lung cancer among non-smokers. Radon is responsible for about 21,000 lung cancer deaths every year, approximately 2,900 of which occur among people who have never smoked. Lung cancer is the only known effect on human health from exposure to radon in air and thus far, there is no evidence that children are at greater risk of lung cancer than adults (EPA, March 2010).

The average radon concentration in the indoor air of homes nationwide is approximately 1.3 pCi/L. The EPA recommends homes be mitigated if the radon level is 4 pCi/L or greater. However, because there is no known safe level of exposure to radon, the EPA also recommends that Americans consider fixing structures for radon levels between 2 pCi/L and 4 pCi/L. Table 4.3.6-1 shows the relationship between various radon levels, probability of lung cancer, comparable risks from other hazards, and action thresholds. This risk is much higher for smokers.

RADON LEVEL (CCi/L)	CANCER RATE PER 1,000 PEOPLE WITH LIFETIME EXPOSURE	COMPARATIVE CANCER RISK OF RADON EXPOSURE	ACTION THRESHOLD
20	About 36 people could get lung cancer	35 times the risk of drowning	Radon mitigation
10	About 18 people could get lung cancer	20 times the risk of dying in a home fire	
8	About 15 people could get lung cancer	4 times the risk of dying in a fall	
4	About 7 people could get lung cancer	The risk of dying in a car crash	
2	About 4 people could get lung cancer	The risk of dying from poison	Consider radon mitigation between 2 and 4 pCi/L
1.3	About 2 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2pCi/L is difficult
0.4	-	(Average outdoor radon level)	

Notes: ⁽¹⁾ Smokers or former smokers have higher risk.
⁽²⁾ Lifetime risk of lung cancer deaths from EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003).
⁽³⁾ Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.

According to DEP, there are an estimated 860 to 3,800 lung cancer deaths per year in Pennsylvania due to residential radon exposure. An estimated 40 percent of Pennsylvania homes have radon levels above EPA's action guideline of 4 pCi/l. The worst-case scenario for would be long-term radon exposure for homeowners in Dauphin County potentially causing cancer.

4.3.6.3. Past Occurrence

Current data on abundance and distribution of radon, both as it affects individual houses in Pennsylvania and in Dauphin County is considered incomplete. The PA DEP Bureau of Radiation Protection provides information for homeowners on how to test for radon in their homes. If a test is reported to the Bureau greater than 4 pCi/L, then the Bureau works to help the homeowner make repairs to their house to mitigate against high radon levels. The total number of tests reported to the Bureau since 1990 and test results are provided by zip code on the Bureau's website. This information is only provided if over 30 tests were reported in order to best approximate the average for the area. Results are reported relative to location in the home; either basement or first floor. Figures 4.3.6-1 and 4.3.6-2 present DEP test results from zip codes on first floor and basements in Dauphin County. The majority of municipalities in which results were submitted had first floor and basement radon readings above EPA's action threshold of 4 PCi/L.

Figure 4.3.6-1 First floor average radon concentration levels in Dauphin County.

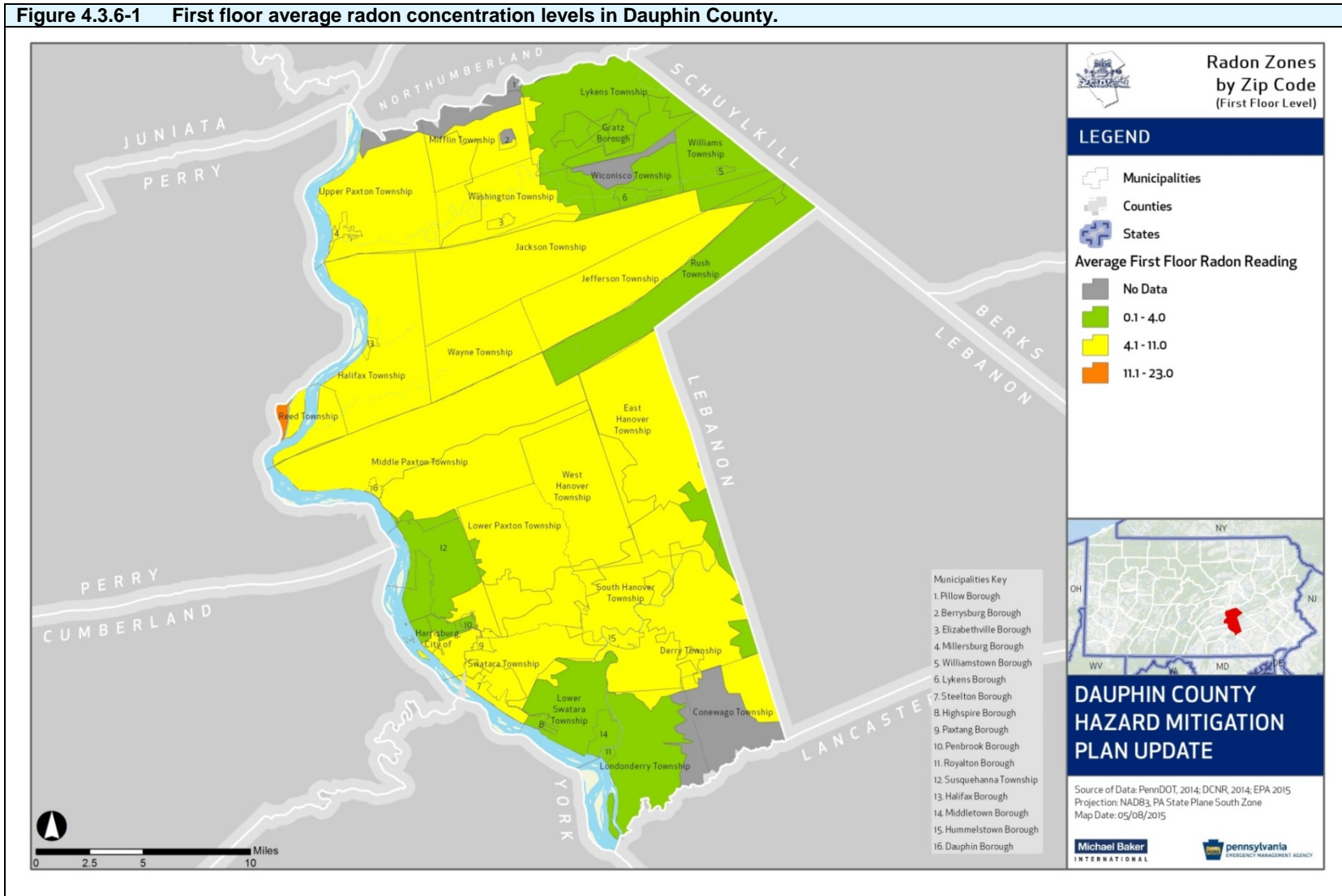
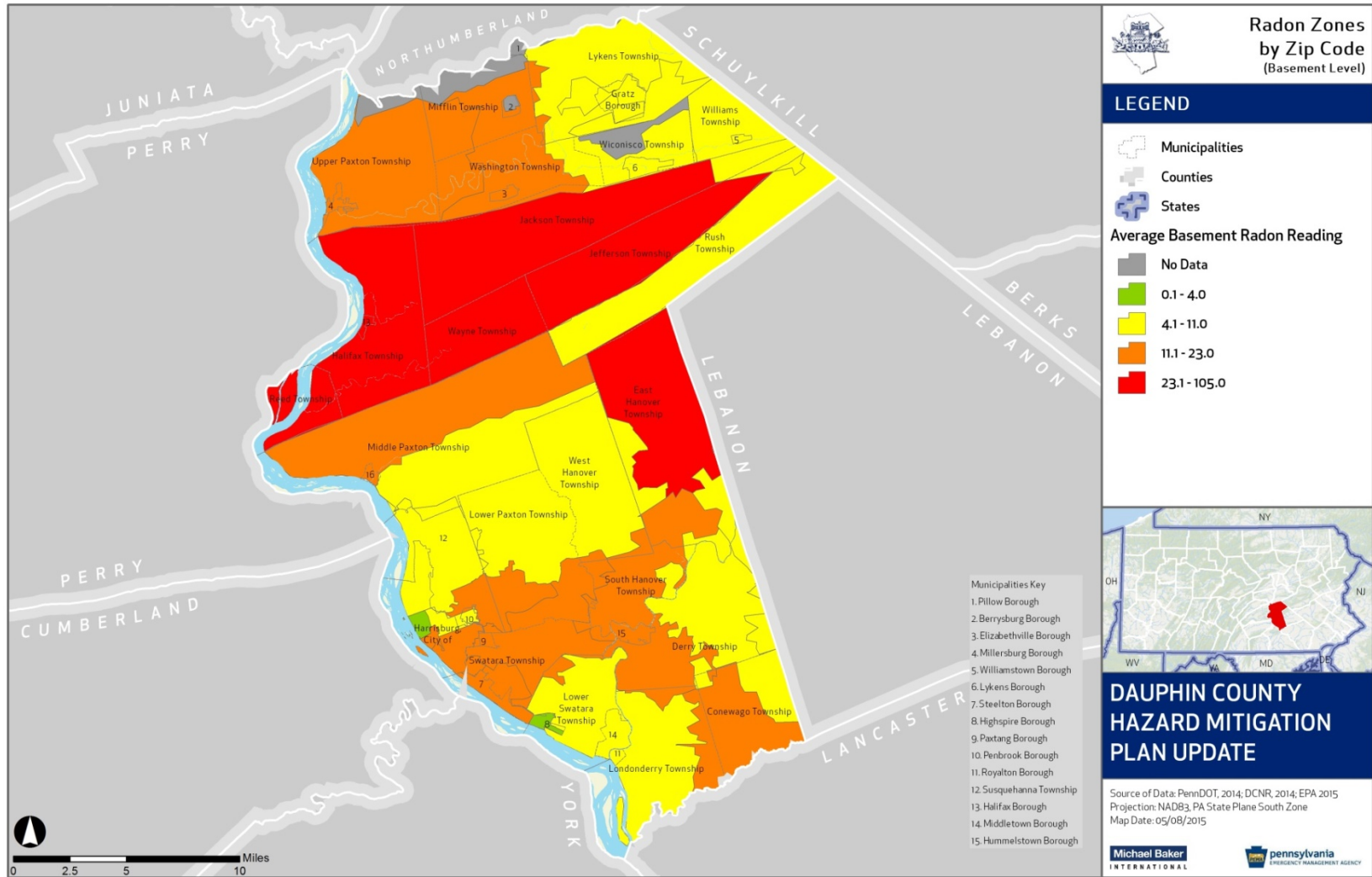


Figure 4.3.6-2 Basement average radon concentration levels in Dauphin County.



Test results reported by zip code and community associated with the zip code are included in Table 4.3.6-2. Average basement first floor readings by zip code submitted to DEP range from 2.0 pCi/L to 27.4 pCi/L. Average first floor readings are lower, as would be expected, ranging between 0.8 pCi/L and 9.7 pCi/L.

ZIP CODE	COMMUNITY	BASEMENT SAMPLE SIZE	BASEMENT MAXIMUM READING (PCi/L)	BASEMENT AVERAGE READING (PCi/L)	1ST FLOOR SAMPLE SIZE	1ST FLOOR AVERAGE READING (PCi/L)
17005	Berrysburg	ID	ID	ID	ID	ID
17018	Dauphin	124	84.7	11.5	17	4.5
17023	Elizabethville	54	90.4	12.2	7	8.7
17028	Grantville	38	565.3	24.5	15	5.2
17030	Gratz	4	16.4	9.9	2	3.0
17032	Halifax	200	416.3	27.4	27	9.7
17033	Hershey	929	97.7	9.4	165	4.7
17034	Highspire	47	12.4	3.4	6	2.3
17036	Hummelstown	1,221	435.5	14.1	200	7.5
17048	Lykens	24	60.3	9.4	6	2.4
17057	Middletown	471	231.0	8.0	67	2.2
17061	Millersburg	138	66.7	11.0	25	4.4
17080	Pillow	ID	ID	ID	ID	ID
17097	Wiconisco	ID	ID	ID	ID	ID
17098	Williamstown	17	14.7	5.1	1	0.8
17101	Harrisburg	63	58.0	11.9	5	4.1
17102	Harrisburg	98	21.7	2.0	27	1.3
17103	Harrisburg	139	102.8	6.0	22	2.5
17104	Harrisburg	203	111.0	11.9	37	4.9
17109	Harrisburg	825	127.1	13.1	76	8.8
17110	Harrisburg	954	141.2	7.1	119	3.6
17111	Harrisburg	1,284	918.2	17.0	170	9.3
17112	Harrisburg	1,512	262.7	9.7	201	4.9
17113	Harrisburg	208	127.3	14.6	27	4.5
<i>ID – Insufficient data.</i>						

4.3.6.4. *Future Occurrence*

Radon exposure is inevitable given present soil, geologic, and geomorphic factors in Dauphin County; however, large-scale health impacts are less likely. Dauphin County is located within an area underlain by geologic formations producing high radon levels. With proper testing and mitigation, future radon exposure can be considered *possible* as defined by the Risk Factor Methodology probability criteria shown in Table 4.4.1-1.

4.3.6.5. *Vulnerability Assessment*

Structures in Dauphin County are susceptible to moderate levels of radon as shown in Figures 4.3.6-1 and 4.3.6-2. Older buildings that have crawl spaces or unfinished basements are more vulnerable because of the increased exposure to soils that could be releasing higher levels of radon gas. Additionally, buildings that rely on wells for their water supply may face an additional risk, although this type of exposure is low and rare in Pennsylvania.

Installing a radon mitigation technique is an effective way to minimize radon exposure. Table 4.3.6-3 lists radon mitigation techniques identified by EPA.

TECHNIQUE	TYPICAL RADON REDUCTION (%)	COMMENTS
Subslab Suction (Subslab depressurization)	50 to 99 %	Works best if air can move easily in material under slab.
Passive Subslab Suction	30 to 70 %	May be more effective in cold climates; not as effective as active subslab suction.
Drain Tile Suction	50 to 99 %	Can work with either partial or complete drain tile loops.
Block-Wall Suction	50 to 99 %	Only in homes with hollow block-walls; requires sealing of major openings.
Sump-Hole Suction	50 to 99 %	Works best if air moves easily to sump from under the slab.
Submembrane depressurization in a crawlspace	50 to 99 %	Less heat loss than natural ventilation in cold winter climates.
Natural ventilation in a Crawlspace	0 to 50 %	Costs variable.
Sealing of Radon Entry Routes	See Comments	Normally only used with other techniques; proper materials and installation required.
House (Basement) Pressurization	50 to 99 %	Works best with tight basement isolated from outdoors and upper floors.
Natural ventilation	Variable/Temporary	Significant heated or cooled air loss; operating costs depend on utility rates and amount of ventilation.
Heat Recovery ventilation (HRv)	Variable/ See comments	Limited use; effectiveness limited by radon concentration or the amount of ventilation air

TECHNIQUE	TYPICAL RADON REDUCTION (%)	COMMENTS
		available for dilution by the HRV. Best Applied in limited-space areas like basements.
Private well water Systems: Aeration	95 to 99 %	Generally more efficient than GAC; requires annual cleaning to maintain effectiveness and to prevent contamination; requires venting radon to outdoors.
Private well water Systems: Granular Activated Carbon, or GAC	85 to 95%	Less efficient for higher levels than aeration; use for moderate levels, around 50,000 pCi/L or less in water: radioactive radon by-products can build on carbon; may need radiation shield around tank and care in disposal.

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

The 2015 HMP includes mitigation actions that address radon. One of the actions will be to address radon in new construction by encouraging municipalities to adopt the Radon Control Methods Appendix of the current, adopted edition of the International Residential Code.

4.3.7. Subsidence, Sinkhole

4.3.7.1. Location and Extent

Subsidence is defined as the downward movement of surface material with little or no horizontal movement. Subsidence can occur naturally due to the physical and chemical weathering of certain types of bedrock or can be human-induced due to underground mining or excessive pumping of groundwater. Regardless of the reason for occurrence, the overall effect of a subsidence event is the same. That is, the development and eventual failure of a sinkhole, which can cause significant structural damage if buildings and/or infrastructure are present.

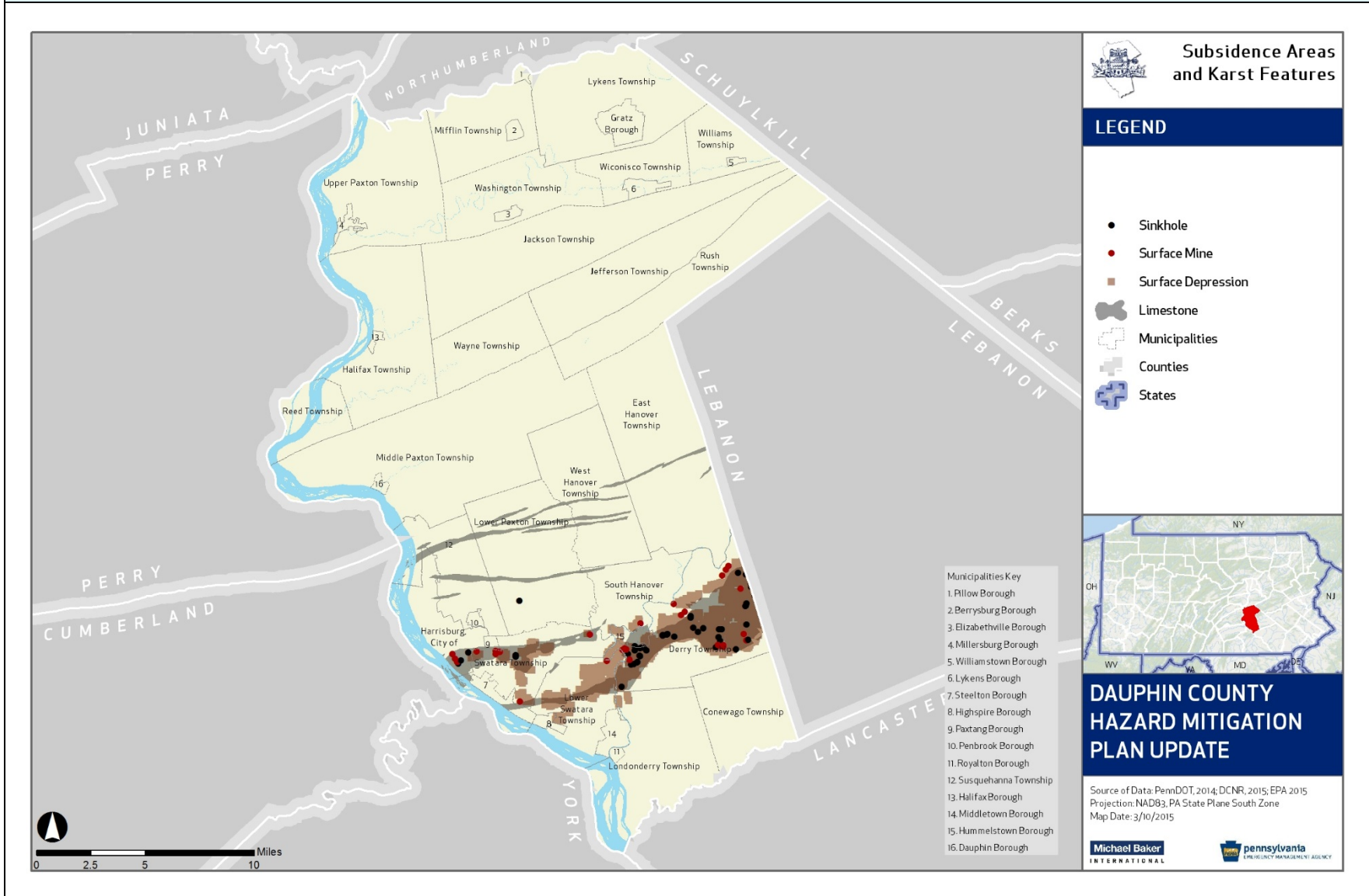
Dauphin County is susceptible to land subsidence in two distinct regions but for two very different reasons. The northeastern part of Dauphin County in Williams and Wiconisco Townships periodically experiences land subsidence events as a result of past subsurface coal mining operations. Fortunately, the area of past subsurface coal mining operations in Williams and Wiconisco Townships consists primarily of State Game Land No. 264 and represents little to no subsidence hazard to personal property.

However, the limestone belt area of Dauphin County in Paxtang Borough, Swatara Township, Lower Swatara Township, Derry Township, and Hummelstown Borough periodically experiences land subsidence events as a result of the underlying carbonate geology. Subsidence potential in this southern portion of Dauphin County is primarily associated with the solution of carbonate bedrock, such as limestone and dolomite, by water. Water passing

through naturally occurring fractures and bedding planes dissolves the bedrock, leaving voids below the surface (DCNR, 2009). Eventually, overburden on top of the voids collapses, leaving surface depressions resulting in karst topography. Characteristic structures associated with karst topography include sinkholes, linear depressions, and caves. Often, sub-surface solution of limestone will not result in the immediate formation of karst features. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material. Abrupt or long-term changes in the ground surface may also occur following sub-surface fluid extraction (e.g. water). Figure 4.3.7-1 shows that a small portion of Dauphin County lies in an area of Pennsylvania where limestone/dolomite bedrock is present near ground surface, thus making those areas more susceptible to natural sinkhole development. The map also illustrates DCNR's partial inventory of sinkholes and surface depressions.

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

Figure 4.3.7-1 Map showing areas of Dauphin County subject to natural subsidence due to the presence of limestone bedrock. Inventoried surface depression and sinkhole locations are also shown (DCNR, 2015).



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 determine the magnitude of damage incurred. Based on the geologic formations underlying parts of Dauphin County, subsidence and sinkhole events may occur gradually or abruptly. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs. Primarily, problems related to subsidence include the disruption of utility services and damages to private and public property including buildings, roads, and underground infrastructure. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result. If mitigation measures are not taken, the cost to fill in and stabilize sinkholes can be significant although sinkholes are limited in extent.

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

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

The worst-case scenario for sinkholes in Dauphin County would be a series of large sinkholes opening in Derry Township, where there have been historic sinkholes and potential sinkholes. The limestone belt area in the intensely developed Hummelstown-Hershey represents a significant subsidence hazard to personal property and public infrastructure. The Township's major roadways, US-322 and US-422, and all businesses and residences along that roadway, lie on near-surface limestone, making them vulnerable to sinkholes. This series of sinkholes could close roads, cause power outages, prevent the delivery of emergency services, cause injuries or death to residents, and could cause serious property damage.

4.3.7.3. *Past Occurrence*

DCNR conducted a partial inventory of karst features categorized as sinkholes, surface depressions, surface mines, or cave entrances that have been cataloged in Pennsylvania by the staff of the Pennsylvania Geological Survey since 1985 (DCNR, 2015). This inventory indicates that Dauphin County has had 55 sinkholes and 2,436 surface depressions recorded (see Figure 4.3.7-1).

Since the last HMP, there have been a number of sinkhole occurrences in southern Dauphin County, particularly in Lower Swatara Township. Figure 4.3.7-2 shows a sinkhole that occurred

on Rosedale Avenue in Lower Swatara Township after Tropical Storm Lee. Figure 4.3.7-3 shows another sinkhole that occurred in Lower Swatara Township.

Figure 4.3.7-2 Sinkhole on Rosedale Avenue in Lower Swatara Township after Tropical Storm Lee.



Figure 4.3.7-3 Sinkhole in Lower Swatara Township.



There have also been sinkhole occurrences in the local news in Derry Township and Hershey. In April of 2014, a sinkhole on Route 322 resulted in a closure of a portion of the road in Derry Township while crews repaired it (Pennlive, April 11, 2014). Similarly, a sinkhole on Route 422

in Derry Township, also in April of 2014, affected traffic in both directions as crews worked to repair it (Pennlive, April 7, 2014).

In addition, there have been a number of sinkholes in Harrisburg in the local news. In March 2014, several large sinkholes opened on 14th Street in Harrisburg resulting in the condemnation of nine homes and a water main break (Pennlive, July 30, 2014). Dauphin County approved property tax rebates for 50 homes on the street and is working with the City of Harrisburg to secure federal and state money to repair the sinkholes, buy residents' homes, assist with relocation and demolish condemned properties (Dauphin County, May 20, 2015).

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 Dauphin 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 4.4.1-1).

4.3.7.5. *Vulnerability Assessment*

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

- Derry Township
- East Hanover Township
- City of Harrisburg
- Hummelstown Borough
- Lower Paxton Township
- Lower Swatara Township
- Paxtang Borough
- South Hanover Township
- Steelton Borough
- Susquehanna Township
- Swatara Township
- West Hanover Township

Table 4.3.7-1 presents the vulnerability of structures and critical facilities to subsidence and sinkhole events by community, and Table 4.3.7-2 breaks down the vulnerable structures by generalized structure type. There are 15,913 structures in areas vulnerable to subsidence, with the greatest number in Derry Township (7,044) and Lower Paxton Township (1,801). Swatara Township has 22 of the 71 total critical facilities in areas vulnerable to subsidence.

Approximately 12,898 of the structures in areas vulnerable to subsidence are residential out of 15,913 total.

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MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SUBSIDENCE-PRONE AREAS	PERCENT OF STRUCTURES IN SUBSIDENCE-PRONE AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN SUBSIDENCE-PRONE AREAS	PERCENT CRITICAL FACILITIES IN SUBSIDENCE-PRONE AREAS
Berrysburg Borough	347	0	0.00%	3	0	0.00%
Conewago Township	2,266	0	0.00%	4	0	0.00%
Dauphin Borough	490	0	0.00%	4	0	0.00%
Derry Township	10,690	7,044	65.89%	32	21	65.63%
East Hanover Township	4,721	352	7.46%	8	0	0.00%
Elizabethville Borough	1,000	0	0.00%	6	0	0.00%
Gratz Borough	752	0	0.00%	2	0	0.00%
Halifax Borough	476	0	0.00%	5	0	0.00%
Halifax Township	3,409	0	0.00%	11	0	0.00%
Harrisburg, City of	19,164	1,456	7.60%	61	5	8.02%
Highspire Borough	1,314	0	0.00%	5	0	0.00%
Hummelstown Borough	2,560	1,579	61.68%	8	8	100.00%
Jackson Township	2,163	0	0.00%	7	0	0.00%
Jefferson Township	618	0	0.00%	3	0	0.00%
Londonderry Township	5,205	2	0.04%	11	0	0.00%
Lower Paxton Township	20,333	1,801	8.90%	25	2	8.00%
Lower Swatara Township	4,738	361	7.62%	17	0	0.00%
Lykens Borough	1,323	0	0.00%	5	0	0.00%
Lykens Township	2,036	0	0.00%	1	0	0.00%
Middle Paxton Township	3,862	0	0.00%	13	0	0.00%
Middletown Borough	3,732	0	0.00%	16	0	0.00%
Mifflin Township	1,047	0	0.00%	1	0	0.00%
Millersburg Borough	1,316	0	0.00%	7	0	0.00%
Paxtang Borough	898	283	31.51%	3	2	66.67%
Penbrook Borough	1,338	0	0.00%	4	0	0.00%

Table 4.3.7-1 Subsidence Vulnerability for Dauphin County (DCNR, 2015).						
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SUBSIDENCE-PRONE AREAS	PERCENT OF STRUCTURES IN SUBSIDENCE-PRONE AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN SUBSIDENCE-PRONE AREAS	PERCENT CRITICAL FACILITIES IN SUBSIDENCE-PRONE AREAS
Pillow Borough	300	0	0.00%	2	0	0.00%
Reed Township	266	0	0.00%	1	0	0.00%
Royalton Borough	694	0	0.00%	1	0	0.00%
Rush Township	314	0	0.00%	1	0	0.00%
South Hanover Township	3,755	49	1.30%	8	0	0.00%
Steelton Borough	2,070	8	0.39%	5	0	0.00%
Susquehanna Township	10,301	1,028	9.98%	35	10	28.57%
Swatara Township	10,838	1,622	14.97%	39	22	56.41%
Upper Paxton Township	3,392	0	0.00%	10	0	0.00%
Washington Township	2,302	0	0.00%	11	0	0.00%
Wayne Township	1,233	0	0.00%	1	0	0.00%
West Hanover Township	5,767	319	5.53%	11	1	9.09%
Wiconisco Township	1,094	0	0.00%	3	0	0.00%
Williams Township	950	0	0.00%	1	0	0.00%
Williamstown Borough	923	0	0.00%	4	0	0.00%
TOTAL	139,997	15,913	11.37%	395	71	17.97%

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Table 4.3.7-2 Structures in Subsidence-Prone Areas by Generalized Land Use Type (DCNR, 2015).								
MUNICIPALITY	COMMERCIAL/ AGRICULTURAL	EDUCA- TIONAL	GOVERNMENT	MISCELLANEOUS	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Berrysburg Borough	0	0	0	0	0	0	0	0
Conewago Township	0	0	0	0	0	0	0	0
Dauphin Borough	0	0	0	0	0	0	0	0
Derry Township	485	319	131	224	5,800	11	74	7,044
East Hanover Township	70	0	0	0	282	0	0	352
Elizabethville Borough	0	0	0	0	0	0	0	0
Gratz Borough	0	0	0	0	0	0	0	0
Halifax Borough	0	0	0	0	0	0	0	0
Halifax Township	0	0	0	0	0	0	0	0
Harrisburg, City of	193	2	5	125	1,097	27	7	1,456
Highspire Borough	0	0	0	0	0	0	0	0
Hummelstown Borough	153	14	2	33	1,370	2	5	1,579
Jackson Township	0	0	0	0	0	0	0	0
Jefferson Township	0	0	0	0	0	0	0	0
Londonderry Township	1	0	0	0	1	0	0	2
Lower Paxton Township	132	1	2	49	1,621	2	3	1,810
Lower Swatara Township	68	0	0	11	282	0	0	361
Lykens Borough	0	0	0	0	0	0	0	0
Lykens Township	0	0	0	0	0	0	0	0
Middle Paxton Township	0	0	0	0	0	0	0	0
Middletown Borough	0	0	0	0	0	0	0	0
Mifflin Township	0	0	0	0	0	0	0	0
Millersburg Borough	0	0	0	0	0	0	0	0
Paxtang Borough	54	0	1	2	224	0	2	283

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Table 4.3.7-2 Structures in Subsidence-Prone Areas by Generalized Land Use Type (DCNR, 2015).								
MUNICIPALITY	COMMERCIAL/ AGRICULTURAL	EDUCA- TIONAL	GOVERNMENT	MISCELLANEOUS	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Penbrook Borough	0	0	0	0	0	0	0	0
Pillow Borough	0	0	0	0	0	0	0	0
Reed Township	0	0	0	0	0	0	0	0
Royalton Borough	0	0	0	0	0	0	0	0
Rush Township	0	0	0	0	0	0	0	0
South Hanover Township	8	0	0	6	35	0	0	49
Steelton Borough	8	0	0	0	0	0	0	8
Susquehanna Township	96	1	9	20	892	3	7	1,028
Swatara Township	510	0	20	60	998	25	9	1,622
Upper Paxton Township	0	0	0	0	0	0	0	0
Washington Township	0	0	0	0	0	0	0	0
Wayne Township	0	0	0	0	0	0	0	0
West Hanover Township	3	0	0	16	296	2	2	319
Wiconisco Township	0	0	0	0	0	0	0	0
Williams Township	0	0	0	0	0	0	0	0
Williamstown Borough	0	0	0	0	0	0	0	0
Total	1,781	337	170	546	12,898	72	109	15,913

4.3.8. Tornado, Windstorm

4.3.8.1. Location and Extent

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 building and structure damage.

Tornadoes can occur at any time during the day or night, but are most frequent during late afternoon into early evening, the warmest hours of the day. Tornado movement is characterized in two ways: direction and speed of the spinning winds, and forward movement of the tornado/storm track. Rotational wind speeds of the vortex can range from 100 mph to more than 250 mph. In addition, the speed of forward motion can be zero to 45 or 50 mph. Therefore, some estimates place the maximum velocity (combination of ground speed, wind speed, and upper winds) of tornadoes at about 300 mph.

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

4.3.8.2. Range of Magnitude

Each year, tornadoes account for \$1.1 billion in damages and cause over 80 deaths nationally (NCAR, 2001). While the extent of tornado damage is usually localized, the vortex of extreme wind associated with a tornado can result in some of the most destructive forces on Earth. Rotational wind speeds can range from 100 mph to more than 250 mph. In addition, the speed of forward motion can range from 0 to 50 mph. Therefore, some estimates place the maximum velocity (combination of ground speed, wind speed and upper winds) of tornadoes at about 300 mph. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

Damages and deaths can be especially significant when tornadoes and windstorms move through populated, developed areas. Windstorms are generally defined as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration. The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size and duration of the storm. Typically, tornadoes cause the

greatest damages to structures of light construction such as mobile homes. The EF-Scale is an update to the earlier Fujita Scale, also known as the “F-Scale,” which was published in 1971. The EF-Scale provides engineered wind estimates and better damage descriptions. It classifies United States tornadoes into six intensity categories, as shown in Table 4.3.8-1, 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 also provided since previous tornado occurrences are described 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.

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

Since tornado and windstorm events are typically localized, environmental impacts of these events are rarely widespread. The impacts of windstorms on the environment typically take place over a larger area. In either case, where these events occur, severe damage to plant species is likely. This includes uprooting or total destruction of trees and an increased threat of wildfire in areas where dead trees are not removed. Hazardous material facilities should meet design requirements for the wind zones identified in the Hurricane, Tropical Storm, and Nor'easter profile (Figure 4.3.3-1) in order to prevent release of hazardous materials into the environment.

The most significant damage caused by a tornado in Dauphin County was an F2 tornado in April 1977 resulting in estimated damage of \$2.5 million. Dauphin County received Small Business Administration (SBA) Disaster Assistance funding to help address this incident. A worst case scenario for Dauphin County would be a tornado event similar to the F-3 tornado that struck in Campbelltown in 2004 in neighboring Lebanon County. Tornado wind speeds were estimated between 175 mph and 200 mph. A total of 32 homes were destroyed, 37 had significant damage, and an additional 59 homes and farm buildings sustained wind damage.

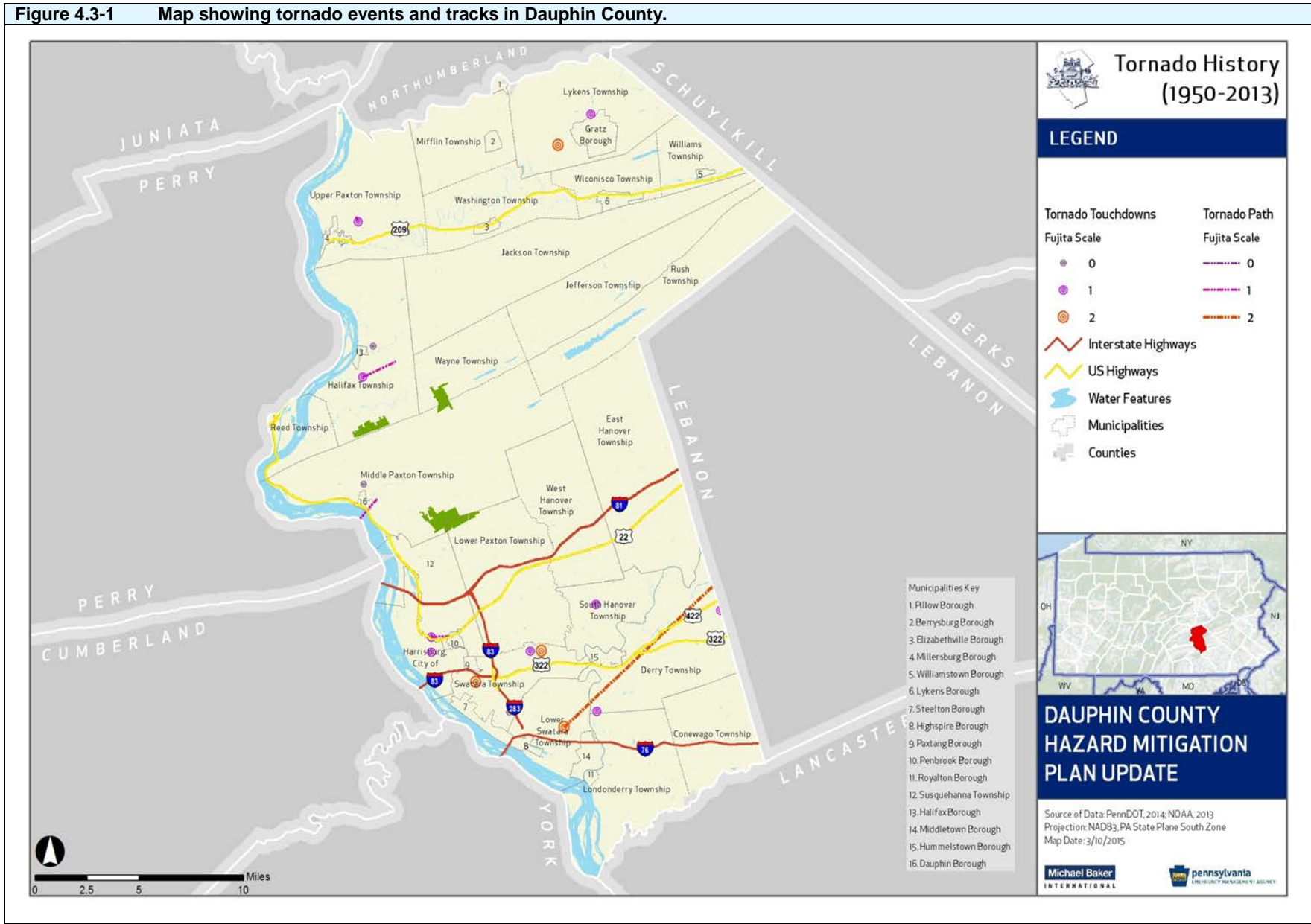
4.3.8.3. Past Occurrence

Tornadoes have occurred throughout Pennsylvania in all seasons and in all parts of the state, but they are most common between noon and 9 PM in May through August. Table 4.3.8-2 lists each tornado and associated impacts reported in Dauphin County according to the NCDC and The Tornado History Project, a database of all reported U.S. tornadoes from 1950-2014. Figure 4.3.8-1 shows the spatial location of these events. There are 16 reported tornado events collectively resulting in 1 death, 18 injuries, and nearly \$6 million in property damage.

LOCATION	DATE	MAGNITUDE	DEATHS	INJURIES	ESTIMATED PROPERTY DAMAGE (\$)
County-wide (Lykens Township)	7/5/1950	F2	0	0	\$2,500
County-wide (Swatara Township)	4/5/1952	F0	0	6	\$250,000
County-wide (Lykens Township)	8/16/1952	F1	0	0	\$2,500
County-wide (Lower Swatara Township)	10/18/1967	F2	0	11	\$250,000
County-wide (Swatara Township)	3/26/1970	F2	0	0	\$250,000
County-wide (Swatara Township)	4/5/1977	F2	0	1	\$2,500,000
County-wide	7/17/1992	F1	0	0	\$250,000

Table 4.3.8-2 Previous tornado events between 1950 and 2014 in Dauphin County (NCDC, 2015).					
LOCATION	DATE	MAGNITUDE	DEATHS	INJURIES	ESTIMATED PROPERTY DAMAGE (\$)
(South Hanover Township)					
Harrisburg	4/30/1994	F1	0	0	\$0
Dauphin (Middle Paxton Township)	7/6/1995	F0	0	0	\$0
Harrisburg	5/11/1996	F1	0	0	\$0
Halifax (Halifax Township)	7/22/2003	F0	0	0	\$50,000
Swatara Township	8/4/2004	F1	0	0	\$200,000
Hummelstown (Derry Township)	8/4/2004	F1	0	0	\$100,000
Halifax (Halifax Township)	12/1/2006	F1	1	0	\$2,000,000
Millersburg (Upper Paxton Township)	5/18/2011	EF1	0	0	\$10,000
Dauphin	5/26/2011	EF1	0	0	\$75,000
TOTAL			1	18	\$5,940,000
<i>Source: NCDC, 2015. Further details pertaining to municipal location in parentheses from Tornado History Project, 2015.</i>					

Figure 4.3-1 Map showing tornado events and tracks in Dauphin County.



According to the 2010 HMP, the first known tornado occurred in November 1918, was categorized as an F2, and resulted in a damage path that was 200 yards wide and ½ mile long. The tornado which occurred in April 1977 was categorized as an F2 with wind speeds between 113 and 157 mph according to the Fujita Tornado Scale and resulted in an estimated \$2.5 million (1977) in damage. The tornado which occurred in December 2006 in Halifax was rated as an F1 and was approximately 2 miles long and 75 yards wide. Major damages occurred to four businesses and one home. Moderate and minor damages occurred to several dozen homes. Winds were in excess of 100 mph, causing severe wind damage. One fatality was recorded as the result of a tree falling on a car. Damages were nearly \$2 million.

In August 2004, two F1 tornados occurred in Dauphin County, one outside of Harrisburg and one outside of Hummelstown. Peak winds were recorded at 90 mph for both events. There were no injuries or deaths; however, several homes were warranted uninhabitable. Both storms were approximately 2 miles in length and between 200 to 400 yards wide. Combined damages of both storms totaled \$300,000. In December 2006, an F1 tornado touched down in Halifax causing nearly \$2,000,000 in damages. Major damages occurred to four businesses and one home. Moderate and minor damages occurred to several dozen homes. Winds were in excess of 100 mph, causing severe wind damage. One fatality was recorded as the result of a tree falling on a car.

Most recently, two EF1 tornadoes touched down in Millersburg/Upper Paxton Township and Dauphin Borough on separate days in May 2011, causing \$10,000 and \$75,000 in damage, respectively. On May 18 the tornado in Millersburg/Upper Paxton Township damaged several homes in the area and a section of a church building roof was blown off. Maximum wind speeds were estimated at 95 mph. On May 26 the tornado in Dauphin Borough started in Perry County and moved east across the Susquehanna River before touching down in the Borough and approximately one quarter mile east on River Road. The tornado continued east approximately 1.5 miles. Six homes were impacted by moderate to minor damage and approximately 150 trees were downed. Maximum wind speeds were estimated at 90 mph.

While not in Dauphin County, it is important to note an F3 tornado occurred east of the County's border in Lebanon County west of Campbelltown in July 2004. A total of 32 homes were destroyed, 37 had significant damage, and another 50 homes and 9 farm buildings were affected by the winds associated with the tornado. The tornado was eight miles long and one quarter mile wide. Winds were estimated between 175 mph and 200 mph. Twenty four people were injured, one critically, during the event. Over 50 families required the assistance and shelter of the Red Cross Mass Care Center which was established. Between 25,000 and 30,000 customers lost power in Dauphin, Lebanon, and Berks counties during the storm event and damages totaled \$18 million.

Windstorm events may be the result of thunderstorms, hurricanes, tropical storms, winter storms, or Nor'easters. There have been 52 events with wind speeds greater than 50 knots as shown in Table 4.3.8-3. These events frequently occurred in conjunction with thunderstorms.

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Table 4.3.8-3 Previous windstorms greater than 50 knots (NCDC, 2015).						
LOCATION	DATE	WIND SPEED	DEATHS	INJURIES	PROPERTY DAMAGE (\$)	CROP DAMAGE
County-Wide	6/10/1963	53 kts.	0	0	None Reported	None Reported
County-Wide	7/28/1963	55 kts.	0	0	None Reported	None Reported
County-Wide	4/30/1968	55 kts.	0	0	None Reported	None Reported
County-Wide	8/13/1975	52 kts.	0	0	None Reported	None Reported
County-Wide	6/1/1976	65 kts.	0	0	None Reported	None Reported
County-Wide	8/10/1979	85 kts.	0	0	None Reported	None Reported
County-Wide	3/8/1980	52 kts.	0	0	None Reported	None Reported
County-Wide	6/3/1980	55 kts.	0	0	None Reported	None Reported
County-Wide	8/5/1986	50 kts.	0	0	None Reported	None Reported
County-Wide	8/16/86	61 kts.	0	0	None Reported	None Reported
County-Wide	11/20/1989	64 kts.	0	0	None Reported	None Reported
County-Wide	5/6/1991	55 kts.	0	0	None Reported	None Reported
County-Wide	5/29/1991	50 kts.	0	0	None Reported	None Reported
County-Wide	1/14/1992	61 kts.	0	0	None Reported	None Reported
County-Wide	6/6/1994	52 kts.	0	0	None Reported	None Reported
County-Wide	7/15/1994	55 kts.	0	0	\$500,000	None Reported
County-Wide	7/21/1994	55 kts.	0	0	None Reported	None Reported
County-Wide	8/4/1994	52 kts.	0	0	None Reported	None Reported
County-Wide	4/9/1995	55 kts.	0	0	None Reported	None Reported
County-Wide	6/7/1995	65 kts.	0	0	None Reported	None Reported
County-Wide	7/16/1995	69 kts.	0	0	\$1,000,000	None Reported
County-Wide	2/22/1997	60 kts.	0	0	None Reported	None Reported
County-Wide	7/21/1997	51 kts.	0	0	None Reported	None Reported
County-Wide	7/22/1997	51 kts.	0	0	None Reported	None Reported
County-Wide	1/9/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	4/8/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	5/29/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	5/29/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	5/31/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	6/16/1998	53 kts.	0	0	None Reported	None Reported
County-Wide	6/26/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	6/30/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	6/30/1998	51 kts.	0	0	None Reported	None Reported

Table 4.3.8-3 Previous windstorms greater than 50 knots (NCDC, 2015).

LOCATION	DATE	WIND SPEED	DEATHS	INJURIES	PROPERTY DAMAGE (\$)	CROP DAMAGE
County-Wide	9/7/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	9/7/1998	58 kts.	0	0	None Reported	None Reported
County-Wide	9/7/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	9/16/1999	60 kts.	1	0	None Reported	None Reported
County-Wide	9/29/1999	60 kts.	0	0	None Reported	None Reported
County-Wide	5/13/2000	69 kts.	0	0	None Reported	None Reported
County-Wide	12/12/2000	N/R	0	0	\$13,900	None Reported
County-Wide	2/10/2001	N/R	0	0	\$5,550	None Reported
County-Wide	7/21/2003	70 kts.	0	0	\$50,000	None Reported
County-Wide	11/13/2003	60 kts.	0	0	None Reported	None Reported
County-Wide	3/13/2006	52 kts.	0	0	None Reported	None Reported
County-Wide	1/24/2006	54 kts.	0	0	\$10,000	None Reported
County-Wide	12/1/2006	70 kts.	0	0	\$200,000	None Reported
County-Wide	3/8/2008	52 kts.	0	0	None Reported	None Reported
County-Wide	6/22/2010	70 kts.	0	0	\$40,000	\$20,000
County-Wide	5/26/2011	74 kts.	0	0	\$5,000	None Reported
County-Wide	5/4/2013	52 kts.	0	0	None Reported	None Reported
County-Wide	6/29/2012	83 kts.	0	0	\$20,000	None Reported
County-wide	4/19/2013	70 kts.	0	0	\$20,000	None Reported
Totals:			0	0	\$1,864,450	\$20,000

4.3.8.4. Future Occurrence

The probability of a tornado or windstorm directly affecting Dauphin County is relatively high. Most of Pennsylvania is susceptible to tornadoes of a magnitude of at most an EF-3. It can reasonably be assumed that future tornadoes will be similar in nature to those that have affected the County in the past, and will strike the County once every four years. The degree of damage and impact to the County will vary as it has in years past.

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

4.3.8.5. Vulnerability Assessment

Tornadoes and windstorms may affect the entire County, including all critical infrastructure and all structures. However, there are a number of evaluation criteria to consider when discussing the vulnerability of structures and critical facilities. These criteria include age of the building (and what building codes may have been in effect at the time it was built), type of construction, and

condition of the structure (i.e., how well has the structure been maintained). For most assets, this would require site-specific analysis.

As noted in Section 4.3.8.2, mobile homes may be at higher risk during tornadoes, thunderstorms, and high wind events due to their lightweight, unanchored design. Table 4.3.8-4 lists the number of mobile homes per municipality in Dauphin County. Londonderry Township and Lower Swatara Township have the highest percentage of mobile homes at 20.52 percent and 16.80 percent, respectively. Just over 3 percent of Dauphin County's structures are mobile homes.

MUNICIPALITY	TOTAL STRUCTURES	NUMBER OF MOBILE HOMES	PERCENT MOBILE HOMES
Berrysburg Borough	347	11	3.17%
Conewago Township	2,266	145	6.40%
Dauphin Borough	490	3	0.61%
Derry Township	10,690	87	0.81%
East Hanover Township	4,721	622	13.18%
Elizabethville Borough	1,000	12	1.20%
Gratz Borough	752	30	3.99%
Halifax Borough	476	8	1.68%
Halifax Township	3,409	240	7.04%
Harrisburg City	19,164	0	0.00%
Highspire Borough	1,314	93	7.08%
Hummelstown Borough	2,560	17	0.66%
Jackson Township	2,163	89	4.11%
Jefferson Township	618	23	3.72%
Londonderry Township	5,205	1,068	20.52%
Lower Paxton Township	20,333	108	0.53%
Lower Swatara Township	4,738	796	16.80%
Lykens Borough	1,323	42	3.17%
Lykens Township	2,036	49	2.41%
Middle Paxton Township	3,862	99	2.56%
Middletown Borough	3,732	253	6.78%
Mifflin Township	1,047	28	2.67%
Millersburg Borough	1,316	4	0.30%
Paxtang Borough	898	0	0.00%
Penbrook Borough	1,338	8	0.60%
Pillow Borough	300	8	2.67%
Reed Township	266	3	1.13%
Royalton Borough	694	52	7.49%
Rush Township	314	13	4.14%

Table 4.3.8-4 Number of mobile homes by municipality (Dauphin County GIS, 2015).

MUNICIPALITY	TOTAL STRUCTURES	NUMBER OF MOBILE HOMES	PERCENT MOBILE HOMES
South Hanover Township	3,755	92	2.45%
Steelton Borough	2,070	3	0.14%
Susquehanna Township	10,301	66	0.64%
Swatara Township	10,838	4	0.04%
Upper Paxton Township	3,392	309	9.11%
Washington Township	2,302	89	3.87%
Wayne Township	1,233	73	5.92%
West Hanover Township	5,767	236	4.09%
Wiconisco Township	1,094	53	4.84%
Williams Township	950	38	4.00%
Williamstown Borough	923	19	2.06%
TOTAL	139,997	4,893	3.50%

4.3.9. Wildfire

4.3.9.1. Location and Extent

On average, Pennsylvania experiences approximately 1,000 wildfires every year. The vast majority of these wildfires (90 percent) is caused by people and could be easily prevented by applying simple common-sense safety practices when using fire. Fortunately, it is rare in Pennsylvania for a wildfire to consume structures. Rather, most Pennsylvania wildfires affect forested areas in rural settings that have a minimal number of permanent structures. This is not to say, however, that Pennsylvania is not susceptible to a wildfire event that could destroy a significant number of structures. This is true now more than ever, as development encroaches further into the rural countryside, often taking place in wooded mountainous settings. This concept is particularly applicable to northern Dauphin County with its wooded, mountainous setting and its ever-increasing development potential brought about by its close proximity to the Harrisburg urban center.

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

Wildfires occur throughout wooded and open vegetation areas of Pennsylvania. They can occur any time of the year, but mostly occur during long, dry hot spells. Any small fire, if not quickly detected and suppressed, can get out of control. Wildfires can be started by human negligence, lightning strikes, and rare instances of spontaneous combustion.

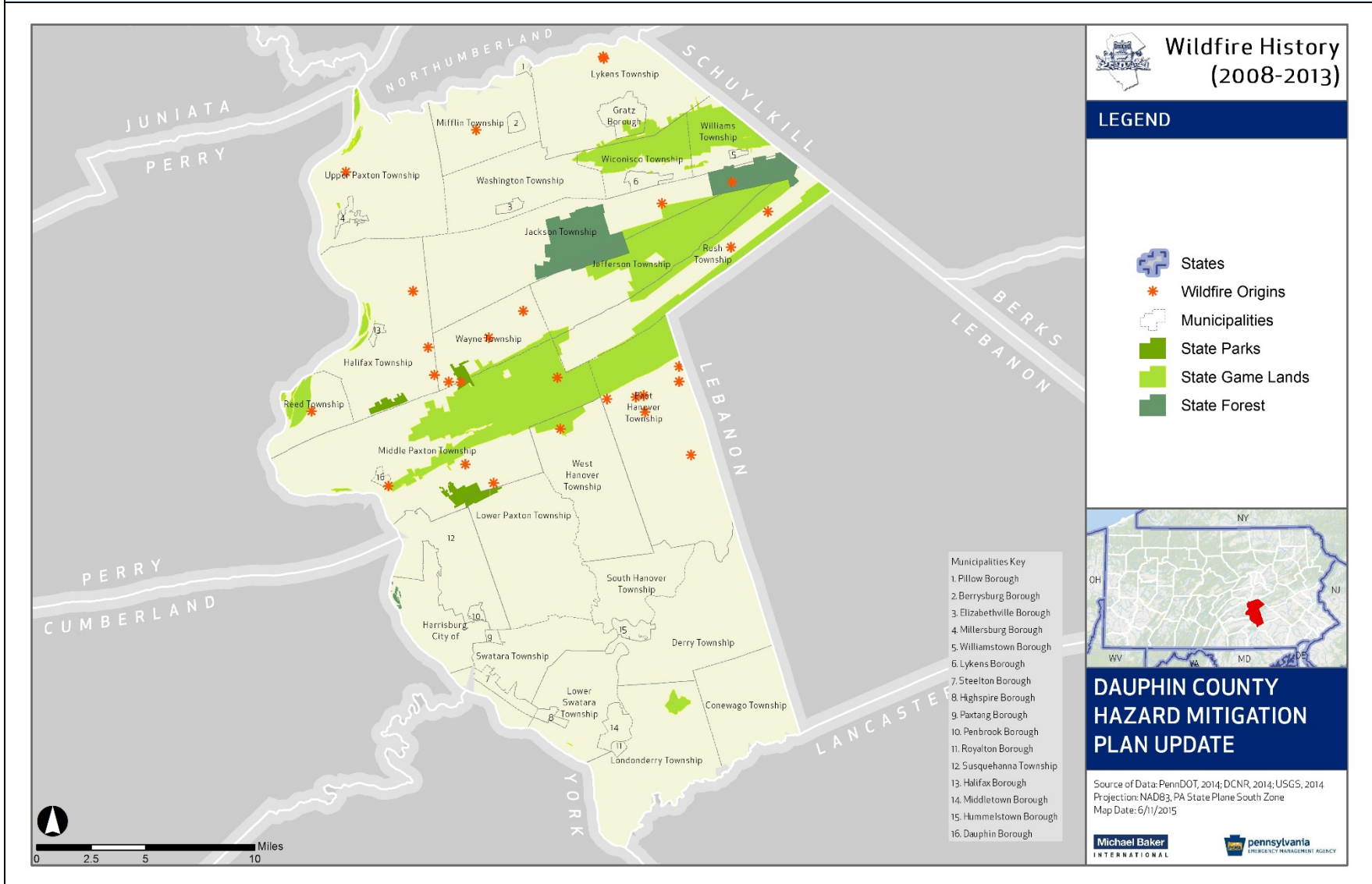
The greatest potential for wildfires is in the spring months of March, April and May, and, to a lesser extent, the autumn months of October and November. In the spring, bare trees allow

sunlight to reach the forest floor, drying fallen leaves and other ground debris. In the fall, dried leaves are also fuel for fires.

Weiser State Forest is located in Dauphin County. This forests, as well as several State Gameland areas and State Parks, 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.

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Figure 4.3.9-1 Map of wildfire origins in Dauphin County from 2008-2014. Note that only events for which latitude/longitude information was reported are shown (DCNR – BOF, 2014).



4.3.9.2. Range of Magnitude

As stated in Section 4.3.9.1, wildfires can occur at any time of the year, but mostly occur during long, dry, hot spells. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion.

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

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

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

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

The worst wildfire in Dauphin County burned almost 26 acres in Washington Township in 2006. The specific cause of this fire is unknown. No property damage, injuries, or deaths were reported.

4.3.9.3. Past Occurrence

Since 1977, there have been more than 230 major wildfires in the Commonwealth, resulting in more than 100,000 acres of forest being destroyed. According to DCNR, in Dauphin County, over 108 acres have burned since 2002. Table 4.3.9-1 lists all wildfire events in Dauphin County reported to DCNR since 2002 (also see Figure 4.3.9-1). Note that specific dates were not available for events after 2008.

YEAR	LOCATION	ACRES BURNED	YEAR	LOCATION	ACRES BURNED
2002	East Hanover Township	0.25	2005	Swatara Township	0.5
2002	East Hanover Township	0.5	2005	Halifax Township	1.5
2002	East Hanover Township	0.1	2005	Halifax Township	0.1

Table 4.3.9-1 Wildfire events reported to DCNR (DCNR – BOF, 2014).

YEAR	LOCATION	ACRES BURNED	YEAR	LOCATION	ACRES BURNED
2002	East Hanover Township	0.4	2005	Halifax Township	2.5
2002	East Hanover Township	0.25	2005	Halifax Township	0.1
2002	East Hanover Township	1.5	2005	East Hanover Township	0.3
2002	Mifflin Township	2	2005	Jackson Township	4.2
2002	Mifflin Township	1	2005	Jackson Township	0.1
2002	Jackson Township	1	2005	Jackson Township	0.1
2002	Jackson Township	5.4	2005	Jackson Township	0.1
2002	Middle Paxton Township	0.3	2005	Middle Paxton Township	0.1
2002	Middle Paxton Township	20.4	2005	Upper Paxton Township	0.1
2002	Middle Paxton Township	0.1	2005	Rush Township	0.2
2002	Jefferson Township	0.25	2005	South Hanover Township	0.2
2002	Jefferson Township	0.25	2005	Wiconisco Township	0.7
2002	Lower Paxton Township	0.25	2005	Wiconisco Township	0.3
2002	South Hanover Township	0.2	2006	Washington Township	25.75
2002	Lykens Township	0.25	2006	East Hanover Township	0.4
2002	Reed Township	0.25	2006	Mifflin Township	2
2002	Susquehanna Township	0.5	2006	Mifflin Township	0.1
2003	Halifax Township	0.5	2006	Middle Paxton Township	0.937
2003	Halifax Township	0.1	2006	Middle Paxton Township	1.5
2003	Middle Paxton Township	3	2006	Upper Paxton Township	0.105
2003	Derry Township	8.5	2006	Derry Township	0.01
2004	Wayne Township	0.4	2006	Derry Township	0.75
2004	Gratz Borough	1	2007	Conewago Township	0
2004	Jackson Township	0.1	2007	Middle Paxton Township	1.2
2004	Jackson Township	0.2	2007	Middle Paxton Township	1.4
2004	Middle Paxton Township	4	2007	Williams Township	0.2
2004	Middle Paxton Township	2.8	2007	Upper Paxton Township	0.01
2004	Upper Paxton Township	0.1	2008	Wayne Township	1.5
2005	Washington Township	0.7	2008	Wayne Township	4.1
2005	Wayne Township	0.1	2008	East Hanover Township	0.3

4.3.9.4. Future Occurrence

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

unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring.

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

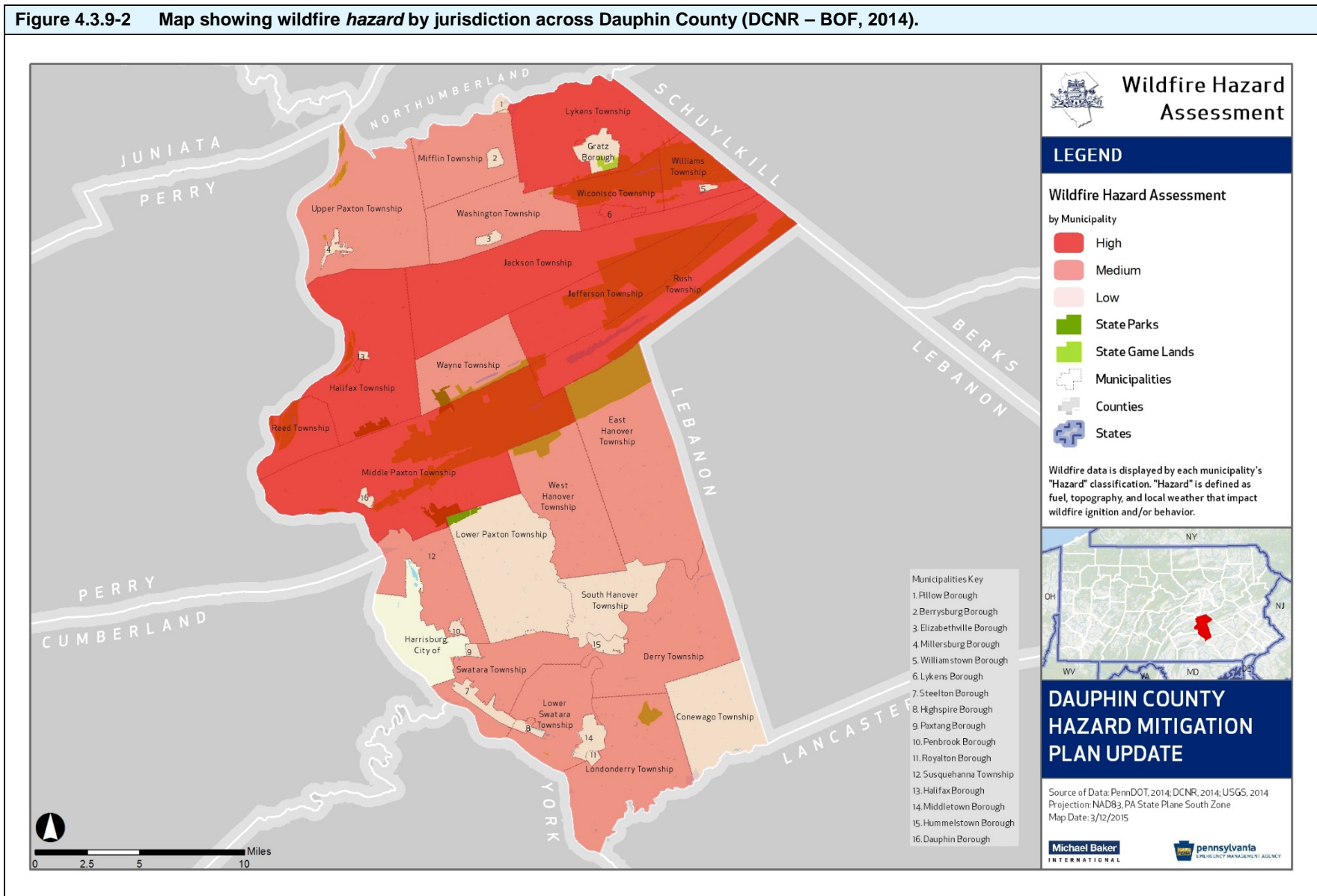
4.3.9.5. *Vulnerability Assessment*

The Pennsylvania Bureau of Forestry has conducted an independent wildfire hazard risk assessment for the various municipalities across Dauphin County. Results of that assessment are shown in Figure 4.3.9-2. *Wildfire hazard* is defined based on conditions that affect wildfire ignition and/or behavior such as fuel, topography and local weather. Based on this assessment, ten jurisdictions in northern Dauphin County have a *high* wildfire rating. Eleven municipalities have a *medium* wildfire hazard potential. The remaining communities have a *low* wildfire hazard. The individual vulnerability of communities will differ based on the design of the urban/wildland interface, the number of ingress and egress points into a community, and the availability of water to fight fires.

Table 4.3.9-2 shows the total addressable structures and critical facilities in the high wildfire hazard areas, and Table 4.3.9-3 shows the number of structures by generalized land use type. Middle Paxton Township has the highest number of structures in the *high wildfire hazard* zone (3,862). Of all structures in the County in the high hazard area, the majority are residential.

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Figure 4.3.9-2 Map showing wildfire hazard by jurisdiction across Dauphin County (DCNR – BOF, 2014).



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Table 4.3.9-2 Structures and critical facilities located in wildfire high hazard areas of Dauphin County (DCNR – BOF, 2014).

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN WILDFIRE HIGH HAZARD AREAS	PERCENT OF STRUCTURES IN WILDFIRE HIGH HAZARD AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN WILDFIRE HIGH HAZARD AREAS	PERCENT CRITICAL FACILITIES IN WILDFIRE HIGH HAZARD AREAS
Berrysburg Borough	347	0	0.00%	3	0	0.00%
Conewago Township	2,266	0	0.00%	4	0	0.00%
Dauphin Borough	490	0	0.00%	4	0	0.00%
Derry Township	10,690	0	0.00%	32	0	0.00%
East Hanover Township	4,721	0	0.00%	8	0	0.00%
Elizabethville Borough	1,000	7	0.70%	6	0	0.00%
Gratz Borough	752	25	3.32%	2	0	0.00%
Halifax Borough	476	25	5.25%	5	1	20.00%
Halifax Township	3,409	3,409	100.00%	11	11	100.00%
Harrisburg, City of	19,164	0	0.00%	61	0	0.00%
Highspire Borough	1,314	0	0.00%	5	0	0.00%
Hummelstown Borough	2,560	0	0.00%	8	0	0.00%
Jackson Township	2,163	2,163	100.00%	7	7	100.00%
Jefferson Township	618	618	100.00%	3	3	100.00%
Londonderry Township	5,205	0	0.00%	11	0	0.00%
Lower Paxton Township	20,333	0	0.00%	25	0	0.00%
Lower Swatara Township	4,738	0	0.00%	17	0	0.00%
Lykens Borough	1,323	1,323	100.00%	5	5	100.00%
Lykens Township	2,036	2,034	99.90%	1	1	100.00%
Middle Paxton Township	3,862	3,862	100.00%	13	13	100.00%
Middletown Borough	3,732	0	0.00%	16	0	0.00%
Mifflin Township	1,047	0	0.00%	1	0	0.00%
Millersburg Borough	1,316	0	0.00%	7	0	0.00%
Paxtang Borough	898	0	0.00%	3	0	0.00%
Penbrook Borough	1,338	0	0.00%	4	0	0.00%
Pillow Borough	300	0	0.00%	2	0	0.00%
Reed Township	266	266	100.00%	1	1	100.00%
Royalton Borough	694	0	0.00%	1	0	0.00%
Rush Township	314	314	100.00%	1	1	100.00%
South Hanover Township	3,755	0	0.00%	8	0	0.00%
Steelton Borough	2,070	0	0.00%	5	0	0.00%
Susquehanna Township	10,301	0	0.00%	35	0	0.00%
Swatara Township	10,838	0	0.00%	39	0	0.00%
Upper Paxton Township	3,392	0	0.00%	10	0	0.00%
Washington Township	2,302	0	0.00%	11	0	0.00%

Table 4.3.9-2 Structures and critical facilities located in wildfire high hazard areas of Dauphin County (DCNR – BOF, 2014).

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN WILDFIRE HIGH HAZARD AREAS	PERCENT OF STRUCTURES IN WILDFIRE HIGH HAZARD AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN WILDFIRE HIGH HAZARD AREAS	PERCENT CRITICAL FACILITIES IN WILDFIRE HIGH HAZARD AREAS
Wayne Township	1,233	0	0.00%	1	0	0.00%
West Hanover Township	5,767	0	0.00%	11	0	0.00%
Wiconisco Township	1,094	1,093	99.91%	3	3	100.00%
Williams Township	950	948	99.79%	1	1	100.00%
Williamstown Borough	923	0	0.00%	4	0	0.00%
Totals	139,997	16,079	11.49%	395	47	11.90%

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Table 4.3.9-3 Structures in Wildfire High Hazard Areas by Generalized Land Use Type (DCNR – BOF, 2014).								
MUNICIPALITY	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISCELL ANEOUS	RESIDEN- TIAL	TRANSPOR- TATION/UTILITY	UN- KNOWN	GRAND TOTAL
Berrysburg Borough	0	0	0	0	0	0	0	0
Conewago Township	0	0	0	0	0	0	0	0
Dauphin Borough	0	0	0	0	0	0	0	0
Derry Township	0	0	0	0	0	0	0	0
East Hanover Township	0	0	0	0	0	0	0	0
Elizabethville Borough	0	0	0	0	0	0	0	0
Gratz Borough	5	0	0	0	19	0	0	24
Halifax Borough	0	2	0	22	1	0	0	25
Halifax Township	1,069	5	3	264	2,055	0	13	3,409
Harrisburg, City of	0	0	0	0	0	0	0	0
Highspire Borough	0	0	0	0	0	0	0	0
Hummelstown Borough	0	0	0	0	0	0	0	0
Jackson Township	868	4	7	124	1,143	1	16	2,163
Jefferson Township	236	0	2	73	306	0	1	618
Londonderry Township	0	0	0	0	0	0	0	0
Lower Paxton Township	0	0	0	0	0	0	0	0
Lower Swatara Township	0	0	0	0	0	0	0	0
Lykens Borough	91	0	6	80	1,137	3	6	1,323
Lykens Township	1,148	10	4	135	725	0	12	2,034
Middle Paxton Township	525	3	7	239	3,064	5	19	3,862
Middletown Borough	0	0	0	0	0	0	0	0
Mifflin Township	0	0	0	0	0	0	0	0
Millersburg Borough	0	0	0	0	0	0	0	0
Paxtang Borough	0	0	0	0	0	0	0	0
Penbrook Borough	0	0	0	0	0	0	0	0
Pillow Borough	0	0	0	0	0	0	0	0

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Table 4.3.9-3 Structures in Wildfire High Hazard Areas by Generalized Land Use Type (DCNR – BOF, 2014).								
MUNICIPALITY	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISCELL ANEOUS	RESIDEN- TIAL	TRANSPOR- TATION/UTILITY	UN- KNOWN	GRAND TOTAL
Reed Township	70	0	2	20	170	3	1	266
Royalton Borough	0	0	0	0	0	0	0	0
Rush Township	33	0	2	32	234	9	4	314
South Hanover Township	0	0	0	0	0	0	0	0
Steelton Borough	0	0	0	0	0	0	0	0
Susquehanna Township	0	0	0	0	0	0	0	0
Swatara Township	0	0	0	0	0	0	0	0
Upper Paxton Township	0	0	0	0	0	0	0	0
Washington Township	0	0	0	0	0	0	0	0
Wayne Township	0	0	0	0	0	0	0	1
West Hanover Township	0	0	0	0	0	0	0	0
Wiconisco Township	72	0	9	122	871	6	13	1,093
Williams Township	89	9	8	128	697	9	8	948
Williamstown Borough	0	0	0	0	0	0	0	0
Grand Total	4,206	33	50	1,239	10,422	36	93	16,079

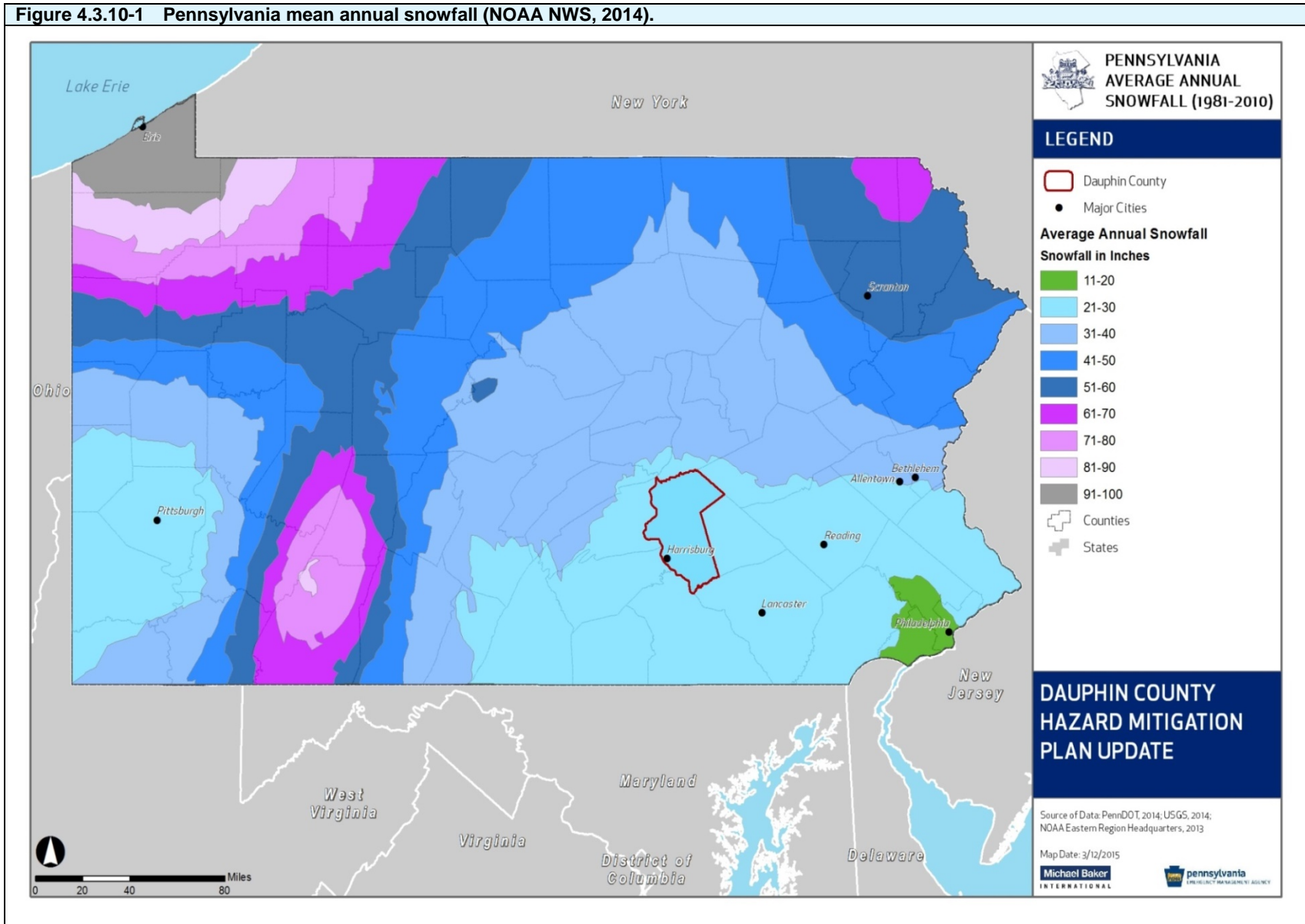
4.3.10. Winter Storm

4.3.10.1. Location and Extent

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

Winter storms begin as low-pressure systems that move through Pennsylvania either following the jet stream or developing as extra-tropical cyclonic weather systems over the Atlantic Ocean called Nor'easters. The effects of these storms can sometimes last for weeks, bringing several inches or even feet of snow and ice and cold temperatures. From 1981 - 2010, annual snowfall in Dauphin County averaged between 21 and 30 inches, 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 4.3.10-1 Pennsylvania mean annual snowfall (NOAA NWS, 2014).



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 usually following the jet stream. Due to their regular occurrence, these storms are considered hazards only when they result in damage to specific structures or cause disruption to traffic, communications, electric power, or other utilities.

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

- **Heavy Snowstorm:** Accumulations of four inches or more in a six-hour period, or six inches or more in a twelve-hour period.
- **Sleet Storm:** Significant accumulations of solid pellets which form from the freezing of raindrops or partially melted snowflakes causing slippery surfaces posing hazards to pedestrians and motorists.
- **Ice Storm:** Significant accumulations of rain or drizzle freezing on objects (trees, power lines, roadways, etc.) as it strikes them, causing slippery surfaces and damage from the sheer weight of ice accumulation.
- **Blizzard:** Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile prevailing over an extended period of time.
- **Severe Blizzard:** Wind velocity of 45 miles per hour, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period time.

Average annual snowfall across Pennsylvania ranges from 11 inches in the southeast to over 100 inches in the northwest (see Figure 4.3.10-1). Storms tracking up the east coast tap into Atlantic moisture, whereas the Great Lakes supply the moisture and instability for heavy snow squalls in the northwest. Orographic lift enhances snowfall over higher elevations (note particularly higher average snowfall in Somerset County in the Allegheny Mountains). The snowfall season is November through April, and amounts are generally below one inch during October and May. The greatest monthly snowfalls occur in March as moisture supply begins to increase with rising temperatures.

Some areas in the northern portion of the County include steep slopes and higher altitudes. As such winter storms may be more severe in the northern portions of the County. The worst winter storm to affect Dauphin County occurred in February 2003. The storm resulted in nearly 30 inches of accumulated snowfall and a disaster declaration by the Governor. Snow removal costs in Harrisburg were in excess of \$332,000 and required nearly a week to complete. Several winter storms have occurred since; however, none resulted in snow and ice accumulations as excessive as the 2003 storm.

Environmental impacts often include damage shrubbery and trees due to heavy snow loading, ice build-up and/or high winds which can break limbs or even bring down large trees. An

indirect effect of winter storms is the treatment of roadway surfaces with salt, chemicals, and other de-icing materials which can impair adjacent surface and ground waters. Another important secondary impact for winter storms is building or structure collapses. A heavy snowfall or a significant accumulation over time may cause building damage or even collapse due to the weight of the snow.

Winter storms have a positive environmental impact as well; gradual melting of snow and ice provides excellent groundwater recharge. However, abrupt high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

4.3.10.3. Past Occurrence

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

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

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

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

During January and February 1994, Pennsylvania experienced at least 17 regional or statewide winter storms. The consequences of these disasters resulted in the need for intervention by the President in an effort to alleviate the severity of the hardship and to aid the recovery of the hardest-hit counties.

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In January 1996, a series of severe winter storms with 27- and 24-inch accumulated snow depths was followed by 50 to 60 degree temperatures, resulting in rapid melting and flooding (as described in Section 4.3.2). Table 4.3.10-1 lists winter storms that have affected Dauphin County as identified through the NCDC.

LOCATION	DATE	TYPE	DEATH	INJURY	PROPERTY DAMAGE (\$)
Statewide	1/1/1966	Winter Storm	UNK	UNK	None Reported
Statewide	2/1/1972	Winter Storm	UNK	UNK	None Reported
Statewide	1/1/1973	Winter Storm	UNK	UNK	None Reported
Statewide	1/1/1978	Winter Storm	UNK	UNK	None Reported
Statewide	2/1/1978	Winter Storm	UNK	UNK	None Reported
Statewide	3/1/1993	Blizzard	UNK	UNK	None Reported
Several counties	1/6/1994	Record Snowfall	0	0	\$988,000
Statewide	1/7/1996	Blizzard	0	0	\$635,000
County-wide	1/12/1996	Heavy Snow	0	0	\$5,000
County-wide	11/28/1996	Heavy Snow	0	0	None Reported
County-wide	12/5/1996	Heavy Snow	0	0	None Reported
County-wide	2/13/1997	Winter Storm	0	0	None Reported
County-wide	1/15/1998	Ice Storm	0	0	None Reported
County-wide	1/2/1999	Winter Storm	0	0	None Reported
County-wide	1/8/1999	Winter Storm	0	0	None Reported
County-wide	1/14/1999	Winter Storm	0	0	None Reported
County-wide	3/14/1999	Heavy Snow	0	0	None Reported
County-wide	1/25/2000	Heavy Snow	0	0	None Reported
County-wide	1/30/2000	Heavy Snow	0	0	None Reported
County-wide	2/13/2000	Ice Storm	0	0	None Reported
County-wide	2/18/2000	Winter Storm	0	0	None Reported
County-wide	12/13/2000	Winter Storm	0	0	None Reported
Several counties	3/4/2001	Heavy Snow	0	0	\$150,000
County-wide	1/6/2002	Heavy Snow	0	0	None Reported
County-wide	12/5/2002	Heavy Snow	0	0	None Reported
County-wide	12/10/2002	Ice Storm	0	0	None Reported
County-wide	12/25/2002	Heavy Snow	0	0	None Reported
County-wide	2/6/2003	Heavy Snow	0	0	None Reported
Statewide	2/16/2003	Heavy Snow	0	2	\$263,000
County-wide	12/5/2003	Heavy Snow	0	0	None Reported
County-wide	2/6/2004	Ice Storm	0	0	None Reported
County-wide	3/19/2004	Heavy Snow	0	0	None Reported
County-wide	1/22/2005	Winter Storm	0	0	None Reported
County-wide	2/24/2005	Heavy Snow	0	0	None Reported
County-wide	3/1/2005	Heavy Snow	0	0	None Reported
County-wide	12/9/2005	Heavy Snow	0	0	None Reported
County-wide	2/13/2007	Winter Storm	0	0	None Reported
County-wide	3/16/2007	Heavy Snow	0	0	None Reported

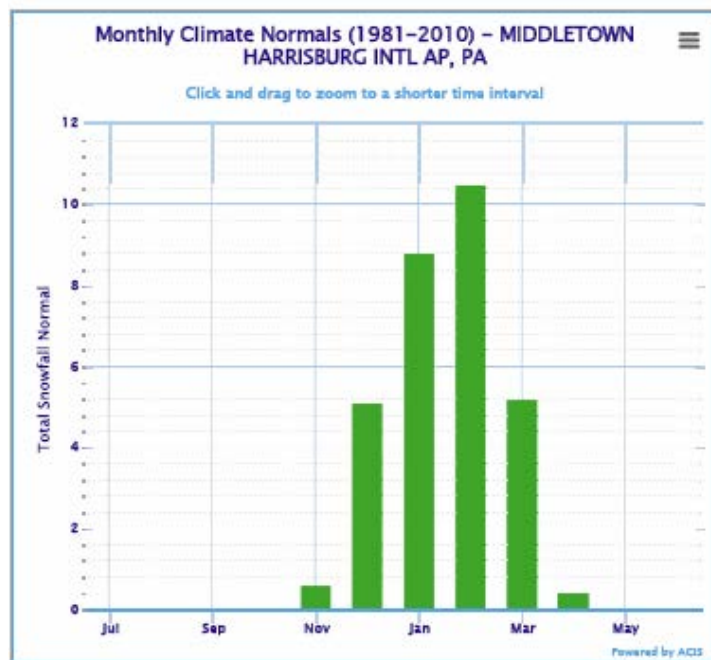
Table 4.3.10-1 Previous winter storms in Dauphin County from 1966-2014 (NCDC, 2015).

LOCATION	DATE	TYPE	DEATH	INJURY	PROPERTY DAMAGE (\$)
County-wide	12/15/2007	Winter Storm	0	0	None Reported
County-wide	2/1/2008	Winter Storm	0	0	None Reported
County-wide	2/12/2008	Ice Storm	0	0	None Reported
County-wide	1/6/2009	Ice Storm	0	0	None Reported
County-wide	1/27/2009	Winter Storm	0	0	None Reported
County-wide	12/19/2009	Winter Storm	0	0	None Reported
County-wide	2/5/2010	Winter Storm	0	0	None Reported
County-wide	2/9/2010	Winter Storm	0	0	None Reported
County-wide	1/26/2011	Heavy Snow	0	0	None Reported
County-wide	2/1/2011	Winter Storm	0	0	None Reported
County-wide	12/14/2013	Winter Storm	0	0	None Reported
County-wide	2/3/2014	Heavy Snow	0	0	None Reported
County-wide	2/4/2014	Winter Storm	0	0	None Reported
County-wide	2/13/2014	Heavy Snow	0	0	None Reported
County-wide	11/25/2014	Heavy Snow	0	0	None Reported

Dauphin County has experienced several winter storms which have had associated damaging winds. In January 2006, 54 mph winds were recorded in both Halifax and Harrisburg. Property damages in Halifax totaled \$10,000. At the end of 2006, in December, there was an eight-mile long path of wind-induced damage east of Halifax, with winds recorded at 70 mph. A short-lived tornado also developed. Property damages exceeded \$200,000 from this storm. In December 2008, non-thunderstorm related wind gusts of up to 60 mph resulted in widespread power outages, structural damage, and vehicular damages from fallen trees. Damages totaled \$10,000 (NCDC).

Figure 4.3.10-3 shows the monthly snowfall normal at Dauphin County's climate station at the Harrisburg International Airport in Middletown. These snowfall normals are derived from observed data from 1981-2010 (NOAA-NWS, 2015).

Figure 4.3.10-2 Snowfall normal at Middletown Station.



4.3.10.4. Future Occurrence

Winter storms occur on the average of 35 times a year in Pennsylvania. The NCDC estimates that Dauphin County has a 5 percent chance of equaling or exceeding annual accumulated snow depths of 21 to 30 inches. According to the NWS, between 1950 and 2015 Dauphin County experienced on average over 9 inches of snow in January and February. The probability of future winter storms can be considered *highly likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.10.5. Vulnerability Assessment

In Dauphin County, wintertime snow accumulations are expected and normal. The most common but potentially serious effect of very heavy snowstorms with accumulations exceeding six or more inches in a 12-hour period are traffic accidents, interruptions in power supply and communications, and the failure of inadequately designed and/or maintained roofing systems. All critical facilities within Dauphin County are vulnerable to the effects of severe winter storms. Vulnerability to the effects of winter storms on buildings is dependent on the age of the building (and what building codes may have been in effect at the time it was built), type of construction, and condition of the structure (i.e., how well the structure has been maintained). The majority of the County’s older structures are located in the northern portion of the County, in Harrisburg, and in communities surrounding Harrisburg. It is assumed that older structures are more vulnerable, but additional information on construction type and building codes enforced at time of construction would allow a more thorough assessment of the vulnerability of structures to winter storm impacts such as severe wind and heavy snow loading.

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

HUMAN-MADE HAZARDS

4.3.11. Building or Structure Collapse

4.3.11.1. Location and Extent

Buildings and other engineered structures, including bridges, may collapse if their structural integrity is compromised, especially due to effects from other natural or human-made hazards. Older buildings or structures, structures that are not built to standard codes, or structures that have been weakened are more susceptible to be affected by these hazards.

Adherence to modern building codes can lower a building’s risk to collapse. Building codes – developed by the International Code Council in partnership with FEMA and other federal, state, local, and private authorities – specify the minimum legal design and construction requirements for structural integrity, construction materials, and fire protection (FEMA, 2014). Most buildings constructed after 1961 in Dauphin County were built under modern building codes with the most comprehensive building code in Pennsylvania adopted in the Pennsylvania Uniform Construction Code in 1999. Table 4.3.11-1 shows the number of buildings constructed before 1969 in Dauphin County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES BUILT BEFORE 1969	PERCENT OF TOTAL STRUCTURES BUILT BEFORE 1969
Berrysburg Borough	188	152	80.85
Conewago Township	1,142	370	32.40
Dauphin Borough	322	234	72.67
Derry Township	10,866	4,053	37.30
East Hanover Township	2,344	726	30.97
Elizabethville Borough	691	568	82.20
Gratz Borough	369	212	57.45
Halifax Borough	414	362	87.44
Halifax Township	1,607	656	40.82
Harrisburg	25,418	21,688	85.33
Highspire Borough	1,260	787	62.46
Hummelstown Borough	2,024	1,296	64.03
Jackson Township	859	298	34.69
Jefferson Township	188	96	51.06

Table 4.3.11-1 Structures built before 1969 (US Census, 2015).

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES BUILT BEFORE 1969	PERCENT OF TOTAL STRUCTURES BUILT BEFORE 1969
Londonderry Township	1,932	899	46.53
Lower Paxton Township	20,928	8,003	38.24
Lower Swatara Township	3,393	1,080	31.83
Lykens Borough	954	866	90.78
Lykens Township	445	239	53.71
Middle Paxton Township	2,267	1,125	49.63
Middletown Borough	4,228	3,076	72.75
Mifflin Township	240	116	48.33
Millersburg Borough	1,366	1,105	80.89
Paxtang Borough	682	665	97.51
Penbrook Borough	1,302	1,110	85.25
Pillow Borough	122	90	73.77
Reed Township	105	48	45.71
Royalton Borough	482	299	62.03
Rush Township	96	45	46.88
South Hanover Township	2,563	917	35.78
Steelton Borough	2,244	1,803	80.35
Susquehanna Township	11,455	5,283	46.12
Swatara Township	9,650	4,819	49.94
Upper Paxton Township	1,824	676	37.06
Washington Township	879	310	35.27
Wayne Township	493	102	20.69
West Hanover Township	3,695	1,265	34.24
Wiconisco Township	519	378	72.83
Williams Township	491	336	68.43
Williamstown Borough	641	600	93.60
Totals	120,688	66,753	55.31

Bridges serve to connect both large and small roadways and communities throughout the County. Whether they span another roadway or a body of water, bridges are a crucial part of every transportation system. However, many of Pennsylvania’s bridge structures are aging and in great need of repair. Inspection and maintenance are necessary to observe and mitigate the extent of the disrepair, especially on older structures.

4.3.11.2. Range of Magnitude

There are different effects of a collapse, depending on the type and cause of the collapse and the type of structure that collapses. A building collapsing in on itself will likely result in debris field which is dense but has a small footprint. However, if a building collapses in an outward

direction, the debris field will be more widely scattered (University of Michigan, 2011). Both of these types of collapses can cause injury to and endanger the lives of those inside or near to the structure and can result in damages to nearby property, especially if the collapse causes a large amount of debris near a populated area. Though occupied buildings are less likely to collapse since they would generally be maintained, more risk of death or injury would be likely with the sudden collapse of an occupied building.

Disrepair can critically affect the integrity of the bridge structure. The level of disrepair depends on how much of the structure is damaged and how critical that portion of the structure is to the safety of drivers. Some structures only need deck replacement or a new superstructure, while others have substructure problems and should be entirely replaced. There are no closed bridges in Dauphin County due to structural integrity (PennDOT, 2015). However, there are four closed bridges on the local road system in Dauphin County and two County road closed bridges.

A worst case scenario for a bridge structure collapse is for a high traffic bridge to collapse during rush hour causing many injuries and several deaths. A worst case scenario for a building collapse would be for a building with multiple people in it to collapse in a denser area causing injuries and possible death to those in the building as well as around the area.

4.3.11.3. Past Occurrence

There is no comprehensive record of building or structure collapses in Dauphin County; however, there have been several recent instances that have made the local news. In June 2014 the Grace United Evangelical Church in Steelton collapsed resulting in the displacement of two families (WGAL, Jun 23, 2014). The church had been abandoned for three years.

In May 2014, two multi-story abandoned and condemned buildings in Harrisburg City collapsed as a result of heavy rains (Pennlive, May 28, 2014). The collapse forced the temporary evacuation of a neighboring family.

In February 2014, the roof of an abandoned church in Harrisburg collapsed, resulting in the evacuation of two nearby homes and closing portions of several streets (Pennlive, February 23, 2014).

Most recently, a vacant building partially collapsed on Camp Street in Harrisburg City. No injuries were reported but the city put up barricades (SCTF, June 19, 2015).

4.3.11.4. Future Occurrence

Structures and buildings can collapse due to deterioration of bridge critical load bearing members and building structural integrity, but external occurrences can also impact bridges and buildings. Pennsylvania has the third-largest number of bridges in the nation, but the most bridges classified as "structurally deficient" (PennDOT, 2015). Consequently, the entire state will see an increased focus on prevention of structure collapse. With at least seven percent of its state owned bridges and 17 percent of its local owned bridges in need of repair, Dauphin County will continue to face deteriorating structures in the future if these are not addressed. There have been several notable issues with building structural integrity in Dauphin County.

Without proper maintenance and code enforcement this risk can grow. The future occurrence of building and structure collapse can be considered *unlikely* as defined by the Risk Factor methodology probability criteria (see Table 4.4.1-1).

4.3.11.5. Vulnerability Assessment

The most vulnerable areas of the County are those with the highest concentration of deteriorating structures. Structures can either collapse into themselves or in an outward direction depending on the cause of the collapse. Construction activities, earthquakes, and subsidence can lead to a structure collapsing in on itself. Weather related hazards, including snowfall and wind, and terrorism can cause a building to collapse in an outward direction (University of Michigan, 2011). Since the HMPT determined that Dauphin County was not at great risk to earthquakes or terrorism, the greatest risk for collapse is from cascading effects on structures, especially those with lower pre-existing structural integrity, by construction activities, from heavy snowfall during winter storms, from an imbalance of water forces on either side of a structural wall, and from high winds during storms.

In Dauphin County, the majority of bridges are owned and maintained by the state, the rest are owned and maintained by the County or local municipalities. PennDOT defines the following bridge terminology for the operational status of bridges:

- Open – bridge is open to traveling public
- Closed – bridge is closed to vehicular traffic (barriers and signs put in place); pedestrian traffic may or may not be allowed
- Posted – bridge is open but signs have been placed stating a weight limit that can travel across the bridge

Additionally, PennDOT defines Structurally Deficient as an indication of the bridge’s overall status in terms of structural soundness and ability to service traveling public. If a bridge is marked as structurally deficient, that indicates that the bridge has deterioration to one or more of its major components (PennDOT, 2011). Table 4.3.11-2 shows the numbers of closed and structurally deficient bridges owned by the state and the County and local municipalities. Countywide, over seven percent of the bridges are structurally deficient. Structurally deficient bridges are often still safe for vehicles to cross over, but will need work in the near future.

BRIDGE OWNER	TOTAL BRIDGE STRUCTURES	CLOSED BRIDGES	POSTED	STRUCTURALLY DEFICIENT BRIDGE STRUCTURES	% STRUCTURALLY DEFICIENT
State Owned	440	0	4	33	7.5
County and Local Owned	117	6	10	20	17.1
TOTAL	557	6	14	53	9.5

4.3.12. Dam Failure

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

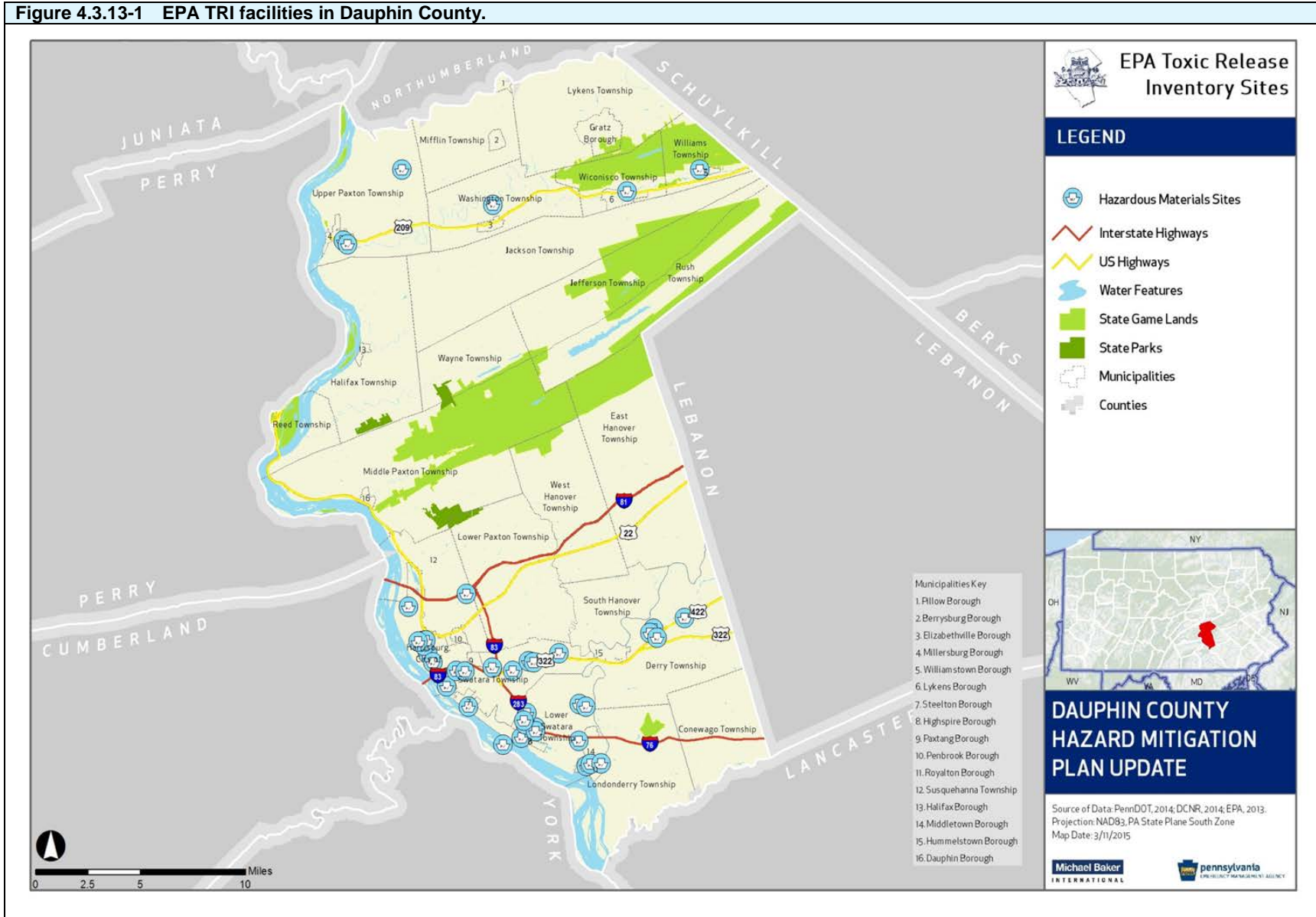
4.3.13. Environmental Hazards: Hazardous Material Releases

4.3.13.1. Location and Extent

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

Any facility in Pennsylvania that uses, manufactures, or stores hazardous materials must comply with Title III of the Superfund Amendments and Reauthorization Act (SARA) also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). Facilities must also comply with the reporting requirements, as amended, in Pennsylvania's Hazardous Materials Emergency Planning and Response Act (1990-165). Information about the chemicals that are being manufactured or processed in facilities can be found in the U.S. Environmental Protection Agency's (USEPA) Toxics Release Inventory (TRI) database. Facilities which employ ten or more full-time employees and which manufacture or process 25,000 pounds or more, or otherwise use 10,000 pounds or more, of any SARA Section 313-listed toxic chemical in the course of a calendar year are required to report TRI information to the EPA, the federal enforcement agency for SARA Title III, and PEMA. This plan focuses on the hazard posed by Dauphin County's 42 EPA TRI facilities since TRI-reporting facilities handle potentially dangerous chemicals in potentially high quantities. The locations of these hazardous materials are shown in Figure 4.3.13-1.

Figure 4.3.13-1 EPA TRI facilities in Dauphin County.



Hazardous materials releases can occur at facilities (fixed sites) or along transportation routes. Hazardous materials releases can create direct injuries and death and contaminate air, water, and soils. They can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary hazards. Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. An accidental hazardous materials release can occur wherever hazardous materials are manufactured, used, stored, or transported. Such releases can affect the nearby population and contaminate critical or sensitive environmental areas. Flooding can cause such an accidental release when a gas station or similar facility is flooded. Figure 4.3.13-2 shows flooding which occurred at a gas station resulting from Tropical Storm Lee in 2011.

Figure 4.3.13-2 Flood impacts in Middletown Borough due to Tropical Storm Lee (2011).



Dauphin County has a significant number of highway transportation corridors including highway I-81, I-83, I-283, US 22, US 322, US 422, PA 283, and the Pennsylvania Turnpike (I-76) as well as freight rail transportation along Norfolk Southern and is therefore susceptible to hazardous materials releases. Transportation of hazardous materials on highways involves tanker trucks or trailers which are responsible for the greatest number of hazard material release incidents. These roads also cross rivers and streams at many points and have the potential to pollute watersheds that serve as domestic water supplies. Potential also exists for hazardous materials releases to occur along rail lines as collisions and derailments of train cars can result in large spills.

4.3.13.2. Range of Magnitude

Hazardous materials 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. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas.

With a hazardous materials 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 materials release. Exacerbating conditions, characteristics that can enhance or magnify the effects of a hazardous materials 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 on the type of materials released and the distance and related response time for emergency response teams. The areas within closest proximity to the releases are generally at greatest risk, yet depending on the agent, a release can travel great distances or remain present in the environment for a long period of time (e.g. centuries to millennia for radioactive materials), resulting in extensive impacts on people and the environment.

The environmental impacts of hazardous materials releases include:

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

The worst possible hazardous materials incident would be a release from a train derailment or a highway accident. Such incidents would potentially cause explosion, fire, injury, death, and impact to ground and surface waters.

4.3.13.3. Past Occurrence

In 2001, Pennsylvania reported to the U.S. Department of Transportation (US DOT) a total of 971 highway incidents, resulting in a cost of over \$1 million (US DOT, July 2002).

Transportation carriers must have response plans in place to address accidents; otherwise, the local emergency response team will step in to secure and restore the area. For example, in May 1998, a truck carrying hazardous waste spilled its load, prompting the Pennsylvania North-Central Region Emergency Response Team of the PA DEP to respond. The cyanide-containing waste was quickly cleaned up with no injuries, property damage, or environmental damage reported.

Table 4.3.13-1 lists hazardous materials release incidents by municipality that have been reported to DEMA from 2004 - through April 2015. DEMA’s database includes any incident where the authority having jurisdiction, usually the fire department or police, ask for the County Hazmat Duty Officer to be notified and/or respond. The majority of incidents reported are small petroleum spills. Beginning in 2013, DEMA began documenting ‘NRC Notification Only’ incidents, which are not Hazmat Duty Officer responses, but rather occur when an entity reported a spill directly to the National Response Center, but did not require a response from outside agencies.

Table 4.3.13-1 Hazardous materials response incidents by municipality (DEMA, 2004 – 2014).		
MUNICIPALITY	# OF REPORTED INCIDENTS	REPORTED HAZARDOUS MATERIALS
Berrysburg Borough	0	
Conewago Township	3	Diesel fuel, hydrochloric acid
Dauphin Borough	5	Diesel fuel, abandoned drum
Derry Township	50	Ammonia, ammonium sulfide, diesel fuel, gasoline, hydrochloric acid, sewage, sodium hypochlorite
East Hanover Township	21	Diesel fuel, fuel oil, gasoline, LPG, Nopcote 1152MFG, Placard 1169, sulfuric acid
Elizabethville Borough	0	
Gratz Borough	0	
Halifax Borough	1	Diesel fuel
Halifax Township	5	Biodiesel, carbon monoxide, diesel fuel,
Harrisburg City	161	Acrylic ester monomers, ammonia, anhydrous ammonia, carbon dioxide, carbon dioxide, diesel fuel, Ethylene glycol, fuel oil, heating fuel, gasoline, hydraulic oil, hydro chemicals, hydrochloric acid, mercury, muratic acid, petroleum propane, sodium azide, sodium hypochlorite, sulfuric acid
Highspire Borough	16	Chlorine, diesel fuel, petroleum, propane
Hummelstown Borough	1	Waste oil
Jackson Township	1	Class B municipal waste
Jefferson Township	0	
Londonderry Township	18	Ammonium hydroxide, diesel fuel, gasoline, heating oil

Table 4.3.13-1 Hazardous materials response incidents by municipality (DEMA, 2004 – 2014).		
MUNICIPALITY	# OF REPORTED INCIDENTS	REPORTED HAZARDOUS MATERIALS
Lower Paxton Township	49	Carbon monoxide, diesel fuel, hydraulic oil, mercury, urea ammonium nitrate, refrigerant
Lower Swatara Township	28	Diesel fuel, ethylene glycol, fuel oil, gasoline, propylene glycol
Lykens Borough	0	
Lykens Township	1	Diesel fuel
Middle Paxton Township	17	Bio-diesel, chlorine, diesel fuel, methanol, sodium hydroxide, transmission fluid
Middletown Borough	17	Diesel fuel, fuel oil, gasoline, heating oil, mercury, sodium hypochlorite
Mifflin Township	3	Diesel fuel
Millersburg Borough	1	Heating oil
Paxtang Borough	7	Fuel oil, gasoline, polychlorinated Biphenyl
Penbrook Borough	1	Fuel oil
Pillow Borough	0	
Reed Township	16	Diesel fuel, fuel oil, gasoline, sewage
Royalton Borough	1	Heating oil
Rush Township	0	
South Hanover Township	5	Chlorine, diesel fuel, heating oil, chlorine
Steelton Borough	6	Diesel fuel, electric arc furnace dust, fuel oil, gasoline, heating oil, petroleum
Susquehanna Township	44	Asphalt, carbon monoxide, diesel fuel, fuel oil, gasoline, heating oil, petroleum, picric acid, potassium permanganate solution, sodium hydroxide solution, zinc orthophosphate
Swatara Township	51	Anhydrous ammonia, 2-butoxyethanol, diesel fuel, ethylene glycol fuel oil, gasoline, hydraulic oil, hydrogen sulfide, Substance pechloric acid fumes, polychlorinated biphenyl, R134A, sewage, sodium hydroxide solution synthetic component resin
Upper Paxton Township	1	Gasoline
Washington Township	4	Carbon dioxide, coal dust, fuel oil, LPG tank
Wayne Township	0	
West Hanover Township	20	Asphalt, diesel fuel, fuel oil, gasoline, sulfuric acid
Wiconisco Township	1	Transmission fluid
Williams Township	4	Diesel fuel, fuel oil, heating oil, propane, school science lab chemicals
Williamstown Borough	0	

Between 2004 and 2014, there were thirty-two reported full-team response incidents in which the Dauphin County Hazardous Materials Response Team responded.

In addition to data collected through DEMA, PEMA collects annual incidences of hazardous material releases in its annual Hazardous Material Emergency Planning and Response Act Annual Reports. The reports from 2008 through 2011, available publicly through PEMA’s website, indicate an average of ten annual hazardous material releases in Dauphin County, as shown in Table 4.3.13-2.

YEAR	NUMBER OF INCIDENTS
2008	41
2009	43
2010	55
2011	57

4.3.13.4. Future Occurrence

There are 42 EPA TRI facilities in Dauphin County, many near population centers. Though facilities follow applicable safety and health regulations and best practices, accidents resulting in the release of hazardous substances may occur at these facilities at any time. Based on review of past incidents, the probability of a hazardous materials release in any given year in Dauphin County is *highly likely*.

The most common types of hazardous materials released in Dauphin County are diesel fuel and gasoline released during transportation accidents. Tanker trucks or trailers and tractor trailer trucks are responsible for a number of hazmat incidents. Hazmat releases from rail transport are also of concern due to collisions and derailments that can result in large spills. There are several points where these transportation routes cross streams within the watersheds that are part of the County's domestic water supply.

While hazardous materials release incidents in Dauphin County have occurred in the past, they are generally considered difficult to predict. Smaller incidents, such as fuel spills, will affect the County many times each year. The County anticipates one significant hazmat release every two years.

4.3.13.5. Vulnerability Assessment

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

Populations in and around the communities that include EPA TRI fixed hazardous materials facilities are more vulnerable to facility releases, particularly those within 1.5 miles of the facility. Table 4.3.13-3 shows the number of addressable structures and critical facilities within 1.5 miles of hazardous materials sites or hazmat zone. Table 4.3.13-4 lists the number of structures within 1.5 miles of a TRI facility by generalized land use type and demonstrates that most vulnerable structures are residential properties.

Dauphin County 2015 All-Hazard Mitigation Plan Update

Table 4.3.13-3 Structures and Critical Facilities within HazMat Zone (1.5 miles of TRI Facility).						
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN HAZMAT ZONE	% STRUCTURES WITHIN HAZMAT ZONE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN HAZMAT ZONE	% CRITICAL FACILITIES WITHIN HAZMAT ZONE
Berrysburg Borough	347	0	0.00%	3	0	0.00%
Conewago Township	2,266	0	0.00%	4	0	0.00%
Dauphin Borough	490	0	0.00%	4	0	0.00%
Derry Township	10,690	6,386	59.74%	32	23	71.88%
East Hanover Township	4,721	0	0.00%	8	0	0.00%
Elizabethville Borough	1,000	1,000	100.00%	6	6	100.00%
Gratz Borough	752	0	0.00%	2	0	0.00%
Halifax Borough	476	0	0.00%	5	0	0.00%
Halifax Township	3,409	67	1.97%	11	0	0.00%
Harrisburg City	19,164	19,144	99.90%	61	61	100.00%
Highspire Borough	1,314	1,314	100.00%	5	5	100.00%
Hummelstown Borough	2,560	116	4.53%	8	0	0.00%
Jackson Township	2,163	6	0.28%	7	0	0.00%
Jefferson Township	618	0	0.00%	3	0	0.00%
Londonderry Township	5,205	792	15.22%	11	2	18.18%
Lower Paxton Township	20,333	3,086	15.18%	25	5	20.00%
Lower Swatara Township	4,738	4,732	99.87%	17	17	100.00%
Lykens Borough	1,323	1,323	100.00%	5	5	100.00%
Lykens Township	2,036	308	15.13%	1	0	0.00%
Middle Paxton Township	3,862	0	0.00%	13	0	0.00%
Middletown Borough	3,732	3,732	100.00%	16	16	100.00%
Mifflin Township	1,047	93	8.88%	1	0	0.00%
Millersburg Borough	1,316	1,316	100.00%	7	7	100.00%

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Table 4.3.13-3 Structures and Critical Facilities within HazMat Zone (1.5 miles of TRI Facility).						
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN HAZMAT ZONE	% STRUCTURES WITHIN HAZMAT ZONE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN HAZMAT ZONE	% CRITICAL FACILITIES WITHIN HAZMAT ZONE
Paxtang Borough	898	898	100.00%	3	3	100.00%
Penbrook Borough	1,338	759	56.73%	4	0	0.00%
Pillow Borough	300	0	0.00%	2	0	0.00%
Reed Township	266	0	0.00%	1	0	0.00%
Royalton Borough	694	694	100.00%	1	1	100.00%
Rush Township	314	0	0.00%	1	0	0.00%
South Hanover Township	3,755	804	21.41%	8	6	75.00%
Steelton Borough	2,070	2,070	100.00%	5	5	100.00%
Susquehanna Township	10,301	6,283	60.99%	35	27	71.43%
Swatara Township	10,838	10,786	99.52%	39	38	97.44%
Upper Paxton Township	3,392	1,912	56.37%	10	9	90.00%
Washington Township	2,302	871	37.84%	11	6	54.55%
Wayne Township	1,233	0	0.00%	1	0	0.00%
West Hanover Township	5,767	0	0.00%	11	0	0.00%
Wiconisco Township	1,094	964	88.12%	3	3	100.00%
Williams Township	950	864	90.95%	1	0	0.00%
Williamstown Borough	923	923	100.00%	4	4	100.00%
TOTAL	139,997	71,243	50.89%	395	247	62.53%

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Table 4.3.13-4 Structures in HazMat Zones by Generalized Land Use Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	GRAND TOTAL
Berrysburg Borough	347	0	0	0	0	0	0	0	0
Conewago Township	2,266	0	0	0	0	0	0	0	0
Dauphin Borough	490	0	0	0	0	0	0	0	0
Derry Township	10,690	593	177	141	468	4,930	48	29	6,386
East Hanover Township	4,721	0	0	0	0	0	0	0	0
Elizabethville Borough	1,000	81	0	7	78	829	1	4	1,000
Gratz Borough	752	0	0	0	0	0	0	0	0
Halifax Borough	476	0	0	0	0	0	0	0	0
Halifax Township	3,409	25	0	0	6	35	0	1	67
Harrisburg City	19,164	1,710	80	105	812	16,275	85	77	19,144
Highspire Borough	1,314	86	0	2	32	1,169	14	11	1,314
Hummelstown Borough	2,560	28	0	1	9	78	0	0	116
Jackson Township	2,163	0	0	0	6	0	0	0	6
Jefferson Township	618	0	0	0	0	0	0	0	0
Londonderry Township	5,205	118	0	8	49	611	2	4	792
Lower Paxton Township	20,333	225	1	2	68	2,782	3	5	3,086
Lower Swatara Twp.	4,738	423	38	14	211	4,028	3	15	4,732
Lykens Borough	1,323	91	0	6	80	1,137	3	6	1,323
Lykens Township	2,036	141	0	0	14	147	0	6	308
Middle Paxton Twp.	3,862	0	0	0	0	0	0	0	0

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Table 4.3.13-4 Structures in HazMat Zones by Generalized Land Use Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	GRAND TOTAL
Middletown Borough	3,732	169	8	22	154	3,319	18	42	3,732
Mifflin Township	1,047	61	0	0	1	29	0	2	93
Millersburg Borough	1,316	113	0	10	69	1,110	1	13	1,316
Paxtang Borough	898	66	1	1	16	808	0	6	898
Penbrook Borough	1,338	43	0	0	14	702	0	0	759
Pillow Borough	300	0	0	0	0	0	0	0	0
Reed Township	266	0	0	0	0	0	0	0	0
Royalton Borough	694	25	0	2	30	626	5	6	694
Rush Township	314	0	0	0	0	0	0	0	0
South Hanover Twp.	3,755	27	3	4	43	727	0	0	804
Steelton Borough	2,070	183	11	5	187	1,664	5	15	2,070
Susquehanna Township	10,301	314	16	138	182	5,606	8	19	6,283
Swatara Township	10,838	742	19	31	355	9,573	37	29	10,786
Upper Paxton Township	3,392	313	2	17	109	1,460	1	10	1,912
Washington Township	2,302	314	4	5	37	506	1	4	871
Wayne Township	1,233	0	0	0	0	0	0	0	0
West Hanover Twp.	5,767	0	0	0	1	3	0	0	0
Wiconisco Township	1,094	64	0	9	104	774	2	11	964
Williams Township	950	80	0	8	122	637	9	8	864
Williamstown Borough	923	37	0	7	39	834	0	6	923
TOTAL	139,997	6,072	360	545	3,295	60,396	246	329	71,243

4.3.14. Nuclear Incident

4.3.14.1. Location and Extent

Through a Memorandum of Understanding (MOU), the Nuclear Regulatory Commission (NRC) and FEMA share federal oversight for nuclear/radiological emergency response planning matters for licensed nuclear power plants. Their mutual efforts will be directed toward more effective plans and related preparedness measures at and in the vicinity of nuclear reactors and fuel cycle facilities. The MOU between the agencies was signed on January 14, 1980, in response to the President's decision of December 7, 1979, stating that FEMA will coordinate all federal planning for the off-site impact of nuclear/radiological emergencies; take the lead for assessing off-site nuclear/radiological emergency response plans and preparedness; make findings and determinations as to the adequacy and capability of implementing off-site plans; and communicate those findings and determinations to the NRC. The NRC reviews those FEMA findings and determinations, in conjunction with the NRC's on-site findings, to determine the overall state of emergency preparedness.

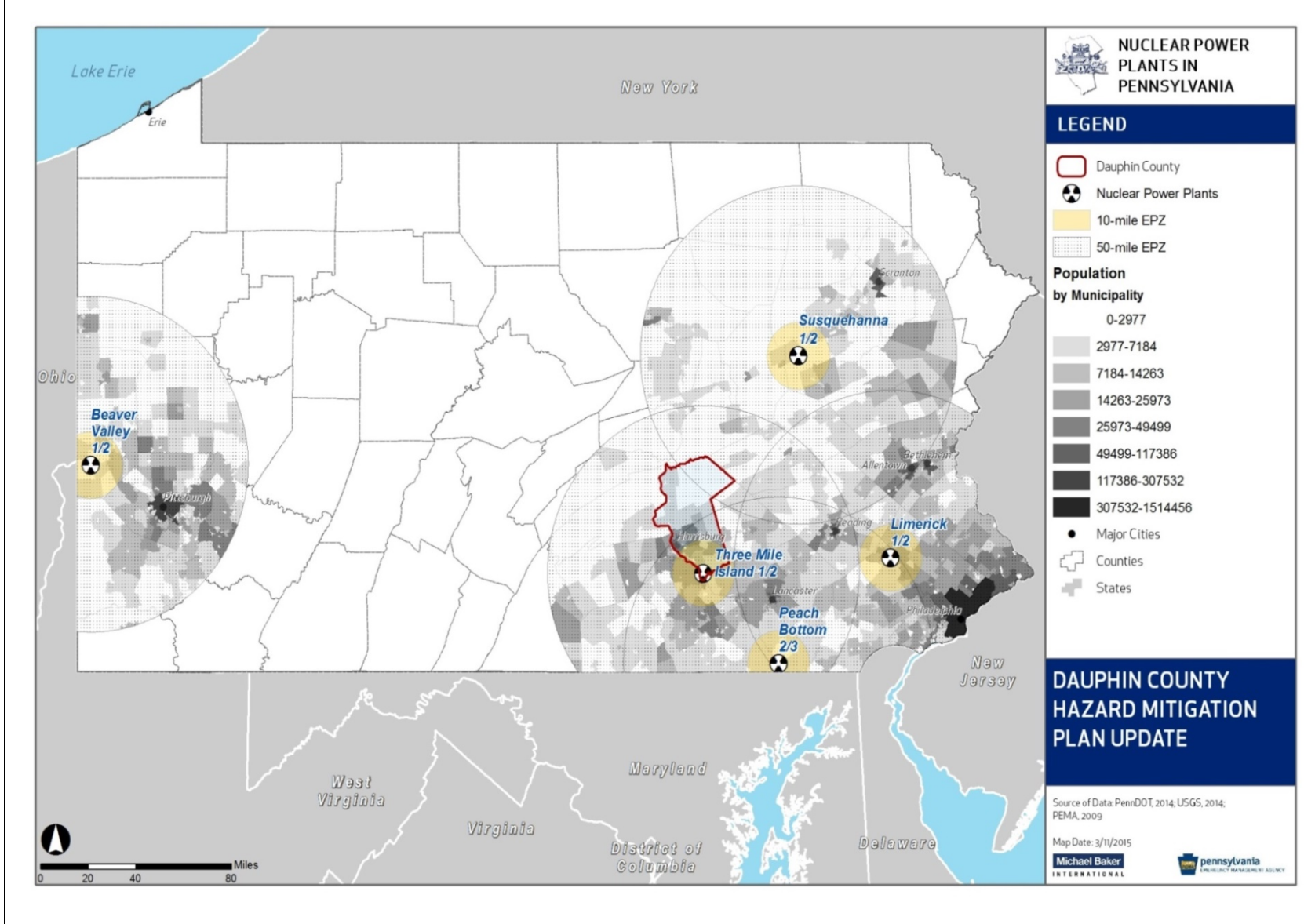
A separate MOU, dated October 22, 1980, deals with NRC and FEMA cooperation and responsibilities in response to an actual or potential nuclear/radiological emergency. Operations Response Procedures have been developed that implement the provisions of the Incident Response MOU. These documents are intended to be consistent with the Federal Radiological Emergency Response Plan, which describes the relationships, roles, and responsibilities of federal agencies for responding to accidents involving peacetime nuclear/radiological emergencies.

As Dauphin County is home to the Three Mile Island (TMI) nuclear power plant, the entire County is within the power plant's Ingestion Exposure Pathway Emergency Planning Zone (EPZ) (within 50 miles) and several municipalities are located within Plume Exposure Pathway EPZ (within 10 miles). In addition, the southern portion of the County is located within the EPZ surrounding the Peach Bottom nuclear power plant in York County and the northeastern portion is located within the EPZ surrounding the Susquehanna nuclear power plant in Columbia County. The remaining two nuclear power plants in Pennsylvania are more than 50 miles away from Dauphin County; this distance exceeds the Plume-Exposure and Ingestion Exposure Pathway EPZs for nuclear emergencies. Therefore, these other facilities are considered a minimal threat to the County. Figure 4.3.14-1 illustrates the location of Pennsylvania's nuclear power plants in relation to Dauphin County, their associated ingestion areas, and population density within the ingestion areas.

Three Mile Island is located in Londonderry Township, 10 miles southeast of Harrisburg. The facility was issued an initial operating license in April 1974. The most current renewal is October 2009 with an expiration of April 2034.

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Figure 4.3.14-1 Location of Dauphin County in relation to Pennsylvania nuclear power facilities, associated Emergency Planning Zones, and population densities of municipalities.



The NRC encourages the use of Probabilistic Risk Assessments (PRAs) to estimate quantitatively the potential risk to public health and safety when considering the design, operations, and maintenance practices at nuclear power plants. PRAs typically focus on accidents that can severely damage the core and that may challenge containment. FEMA, PEMA, and county governments have formulated Radiological Emergency Response Plans (RERPs) to prepare for nuclear/radiological emergencies at the five nuclear power-generating facilities in Pennsylvania. These plans include the following:

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

Plume Exposure Pathway refers to whole-body external exposure to gamma radiation from the plume and from deposited materials and inhalation exposure from the passing radioactive plume. The duration of primary exposures could range in length from hours to days. The Ingestion Exposure Pathway refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation. The County RERPs, which are part of the County Emergency Operations Plan (EOP), also include the following:

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

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

4.3.14.2. Range of Magnitude

TMI is located in Dauphin County and the entire County lies within the Ingestion Exposure Pathway EPZ designated for nuclear/radiological emergencies. The magnitude of a nuclear incident differs for those within the Plume Exposure Pathway EPZ and those within the Ingestion Exposure Pathway EPZ. The Plume Exposure Pathway refers to whole-body external exposure to gamma radiation from a radioactive plume and from deposited materials and inhalation exposure from the passing radioactive plume. The duration of primary exposures could range in length from hours to days. The Ingestion Exposure Pathway refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation.

Nuclear accidents themselves are classified into three categories:

- **Criticality accidents:** Involves loss of control of nuclear assemblies or power reactors.

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

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

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

The accident at the Three Mile Island nuclear power plant in March 1979 remains the nation's only nuclear incident at the General Emergency level and remains the worst nuclear incident on record in the Commonwealth and the nation. During this incident, equipment malfunctions, design-related problems, and worker errors led to a partial meltdown of the TMI Unit 2 reactor core at TMI.

The worst-case radiological release event would be a major release of radioactive material from the Three Mile Island nuclear power plant. This event would cause a great deal of fear for residents of Dauphin County and the south central Pennsylvania region. Specific impacts depend on the extent of the spread of the contamination.

The nuclear industry has adopted pre-determined, site-specific Emergency Action Levels (EALs). The EALs provide the framework and guidance to observe, address, and classify the severity of site-specific events and conditions that are communicated to off-site emergency response organizations (Nuclear Regulatory Commission, 2008). There are additional EALs that specifically deal with issues of security, such as threats of airborne attack, hostile action within the facility, or facility attack. These EALs ensure that appropriate notifications for the security

threat are made in a timely manner. Each facility is also equipped with a public alerting system, which includes a number of sirens to alert the public located in the Plume Ingestion Pathway EPZ. This alerting system is activated by the counties of each specific EPZ. Emergency notifications and instructions are communicated to the public via the Emergency Alert System as activated by the Commonwealth of Pennsylvania Emergency Operations Center. State officials also have the capability to send emergency messages as text messages to mobile devices.

4.3.14.3. Past Occurrence

Nuclear incidents rarely occur, but the incident at Three Mile Island nuclear power plant is the worst fixed-nuclear facility accident in U.S. history. The resulting contamination and state of the reactor core led to the development of a fourteen-year cleanup and scientific effort. Additionally, the President's Commission on the Accident at Three Mile Island examined the costs of the accident, concluding, "The accident at Three Mile Island on March 28, 1979, generated considerable economic disturbance. Some of the impacts were short term, occurring during the first days of the accident. Many of the impacts were experienced by the local community; others will be felt at the regional and national levels." The report concluded: "It appears clear that the major costs of the TMI Unit 2 accident are associated with the emergency management replacement power and the plant refurbishment or replacement. The minimum cost estimate of nearly \$1 billion supports the argument that considerable additional resources can be cost effective if spent to guard against future accidents."

Despite the severity of the damage, no injuries due to radiation exposure occurred. However, numerous studies were conducted to determine the measurable health effects related to radiation and/or stress. More than a dozen epidemiological and stress related studies conducted to date have found no discernible direct health effects to the population in the vicinity of the plant. However, one study conducted by the DOH's Three Mile Island Health Research Program did find evidence of psychological stress (National Energy Institute, 2010).

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

Based on information provided by the NRC and DEMA, there have been four classified emergency incidents at Three Mile Island since 1993. A Site Area Emergency occurred in 1993 identified as Intruder in Protected Area. An Alert occurred in 2001 identified as Aircraft Incident after the September 11, 2001 terrorist attacks. Two Unusual Events were reported, one in 2007 and the other in 2011. On November 13, 2007 an incident involved a change in reactor vessel water level during a refueling outage. On August 23, 2011 a Seismic Event was reported. On that day, an earthquake occurred near Mineral, Virginia.

There have been no significant nuclear incidents in Pennsylvania since the 1979 Three Mile Island incident. However, the most recent nuclear incident to occur worldwide involved the Fukushima Daiichi nuclear reactor in Okuma, Fukushima, Japan. This incident occurred on March 11, 2011. An earthquake in the area resulted in a series of equipment failures, nuclear meltdowns and releases of radioactive materials. These failures and releases were largely attributed to the water that penetrated the structures following the tsunami that was generated by the earthquake. The flooding caused the failure of multiple generators meant to keep the systems operating safely after the automatic shutdown. No deaths have been directly attributed to the incidents at the reactor at this time. The World Health Organization completed a report that indicated there were only small proportional increases in the occurrence of certain cancers following the radiation exposure from the plant.

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

4.3.14.4. Future Occurrence

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

The probability of future nuclear incidents is *unlikely*, as defined by the Risk Factor probability criteria (see Table 4.4-1).

4.3.14.5. Vulnerability Assessment

The effects and impacts of a nuclear/radiological threat depend on the type of radiation released, the duration of the release, the volume of the release, and the existing weather conditions, such as wind speed and direction. Dauphin County is located entirely within the 50-mile ingestion zone for the TMI facility, the southern portion of the County is located within the 50-mile ingestion zone for the Peach Bottom facility, and the northeastern portion of the County is located within the 50-mile ingestion zone for the Susquehanna facility.

Fourteen Dauphin County municipalities are located within the 10-mile plume exposure pathway: Conewago Township, Derry Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Middletown Borough, Paxtang Borough, Royalton Borough, South Hanover Township, Steelton Borough, and Swatara Township. Refer to Figure 4.3.14-1.

Water contamination is also a concern in nuclear incidents. The County's 14 public water systems with over 74,000 connections in addition to private water wells are all vulnerable to the effects of a nuclear incident.

To ensure the region is prepared in the event of a nuclear incident, DEMA coordinates a required FEMA mandatory exercise at Three Mile Island every two years. The most recent exercise was conducted April 14, 2015.

4.3.15. Transportation Accidents

4.3.15.1. Location and Extent

Transportation Accidents are incidents involving highway, air, and rail travel. In addition, pipelines are included as part of the Transportation Accidents profile as they have been identified by the HMPSC and Planning Team as a concern due to existing pipeline and anticipated pipeline construction in Dauphin County. As pipelines are regulated by the U.S. Department of Transportation (USDOT), they are profiled under Transportation Accidents.

Dauphin County has an extensive transportation system due in large part to its location relative to the New York- Philadelphia-Washington, DC metropolitan area and the Appalachian/Midwest markets. Major highways traverse the County including Interstate 81 (I-81), Interstate 83 (I-83), Interstate 283 (I-283), US 22, US 322, US 422, PA 283, and the Pennsylvania Turnpike (I-76).

Freight rail is a significant component of the County's transportation network with Norfolk Southern maintaining rail lines and operating a multi-modal facility in the County. Augmenting the highway and freight rail system is local and intercity bus, passenger rail including Amtrak, and airport services. Dauphin County has 23 airports and heliports; four are public including the Harrisburg International Airport and three state owned heliports. Private aviation facilities include seven heliports, five of which serve local hospitals, and 12 private air fields. Figure 4.3.15-1 illustrates the major transportation systems in the County and Figure 4.3.15-2 shows the traffic volume on key roadways.

PennDOT defines seven roadway crash types:

- Non-Collision: a harmful event that does not involve a collision, such as a fire, explosion, or overturn;
- Angle: a crash in which two vehicles on opposite roadways collide at an intersection, driveway, or ramp;
- Rear-End: a crash in which vehicles traveling in the same direction on the same road collide;
- Head-on: a crash in which vehicles traveling in opposite directions, on the same road collide;
- Sideswipe: a crash between two vehicles in which the sides of the vehicles engage;
- Hit Fixed Object: a collision in which a vehicle hits a stationary object on or adjacent to the roadway; and
- Hit Pedestrian: a collision between a motor vehicle and any person not in or upon the vehicle (PennDOT, 2012).

Figure 4.3.15-1 Dauphin County's transportation infrastructure.

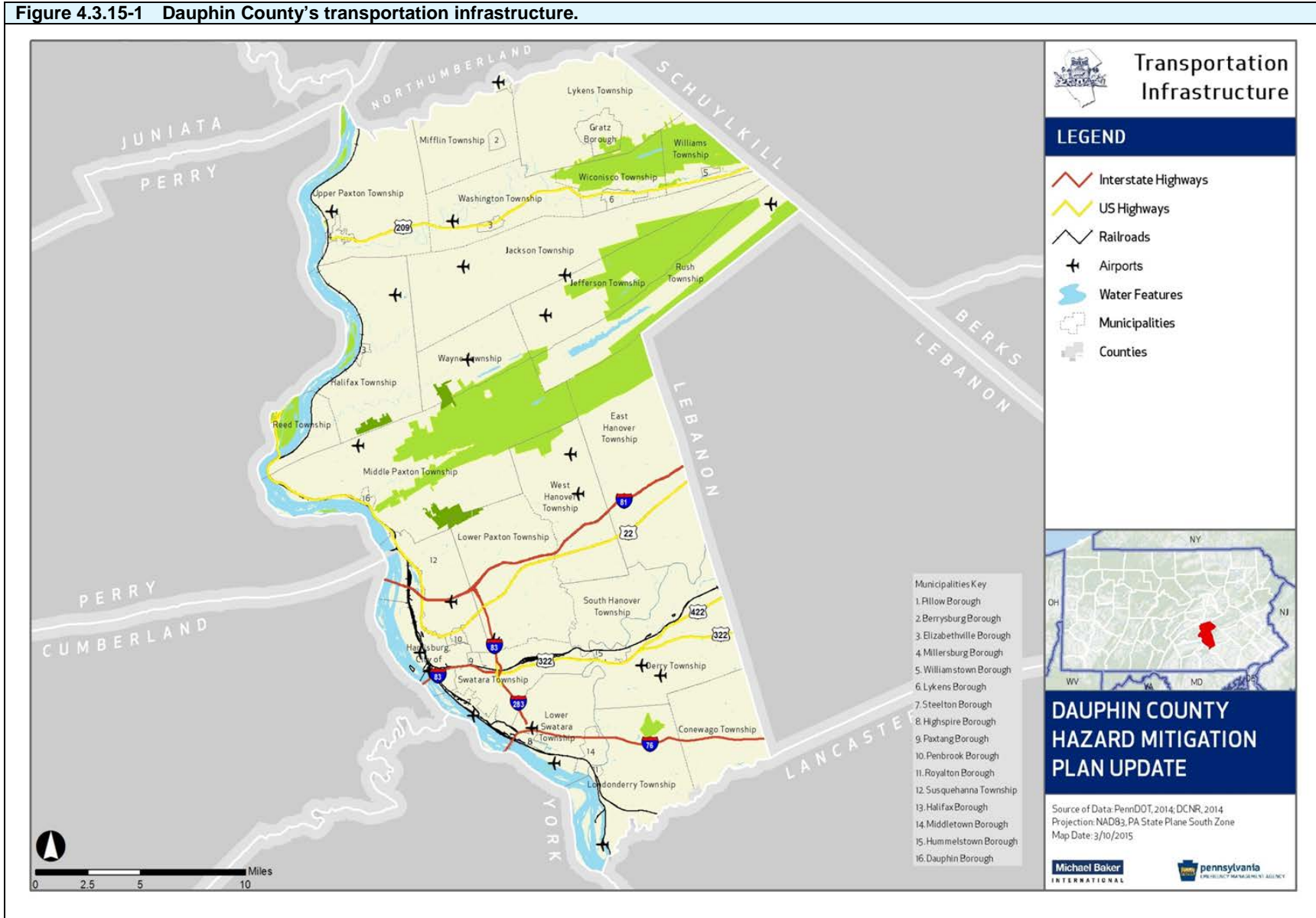
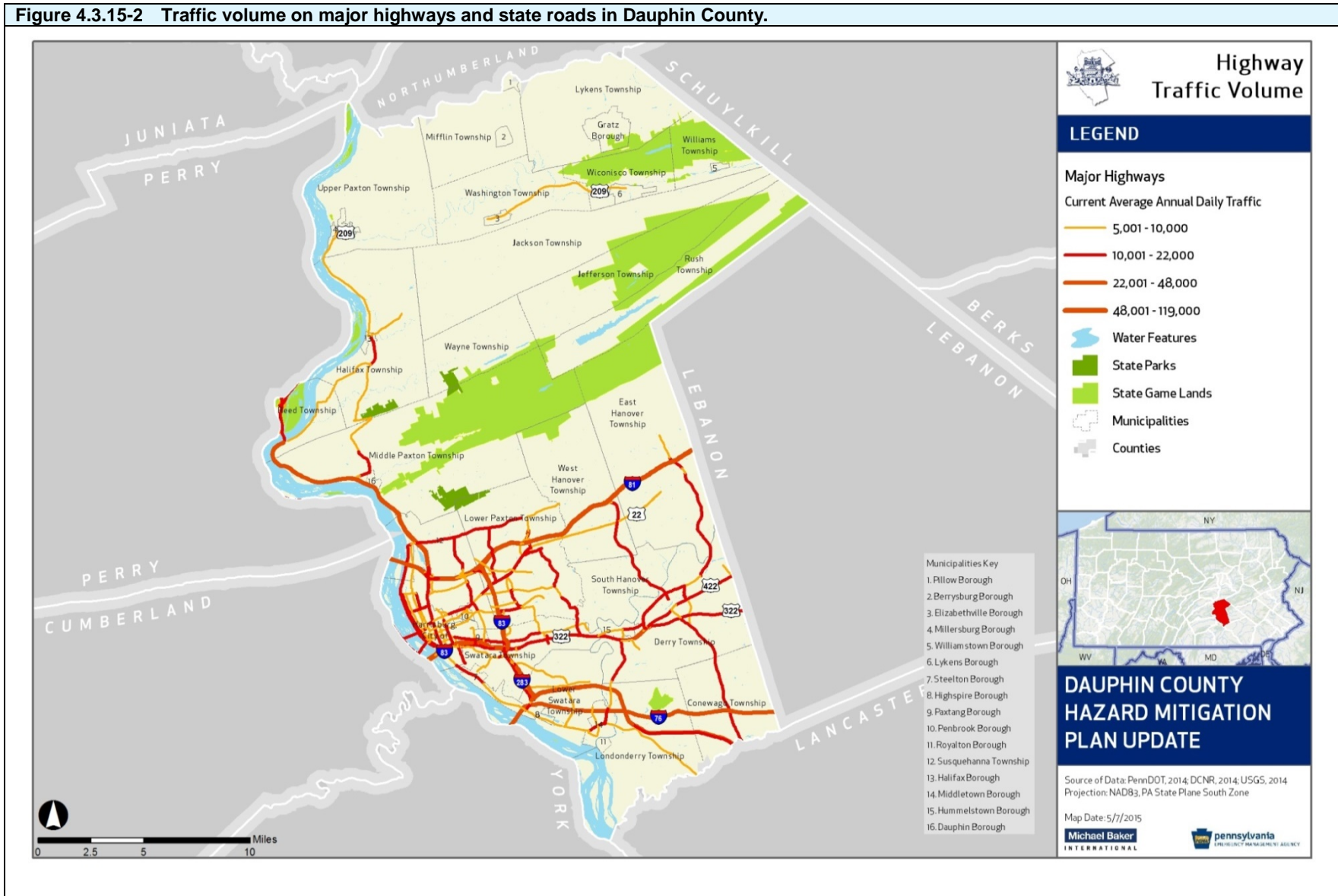


Figure 4.3.15-2 Traffic volume on major highways and state roads in Dauphin County.



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

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

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

Dauphin County also hosts natural gas transmission pipelines and hazardous liquid trunk lines that traverse the County. Transmission pipelines are often used as a preferred means to safely transport large quantities of energy products. The characteristics of transmission lines can vary in size and placement based on the products carried and the geographic location of pipeline. For example, those located in more urban settings are often placed at greater depths below ground and subject to stricter regulations according to the National Association of Counties, Pipelines and Informed Planning Alliance (PIPA) (PIPA, 2010).

Pipeline safety standards are established within the U.S. Code of Federal Regulations (CFR), Title 49 "Transportation," Parts 190-1999 with inspection and enforcement of these standards carried out by the Office of Pipeline Safety (OPS), within the USDOT, Pipeline and Hazardous Materials Safety Administration (PHMSA). PHMSA estimates that gas transmission pipelines run through roughly 90% of all US counties. As of 2014, PHMSA reports that Pennsylvania has a total of approximately 85,000 miles of gas pipelines, with the vast majority of these pipelines used for distribution. PHMSA's National Pipeline Mapping System (NPMS) has been in place since 1999. Operators are required to submit data on gas transmission and hazardous liquid pipelines annually to PHMSA. According to data retrieved from the NPMS Public Map Viewer, several gas transmission and hazardous liquid pipelines are located in Dauphin County. The NPMS does not contain gathering or distribution pipelines; therefore, not all pipelines Dauphin County are visible in the Public Map Viewer.

Both gas and hazardous liquid pipelines are concentrated in the southern portion of the County as shown in Figure 4.3.15-3 with data current to December 31, 2013. Table 4.3.15-1 summarizes pipeline operators in Dauphin County by commodity and pipeline status as identified through the NPMS Public Map Viewer. An idle pipeline is one that is maintained to a degree that it may potentially be brought back into service in the future. A retired pipeline has been taken out of service, is no longer maintained, but has not yet been permanently abandoned according to pipeline regulations.

Figure 4.3.15-3 Location of gas transmission and hazard liquid pipelines in Dauphin County (TCRPC, 2015).

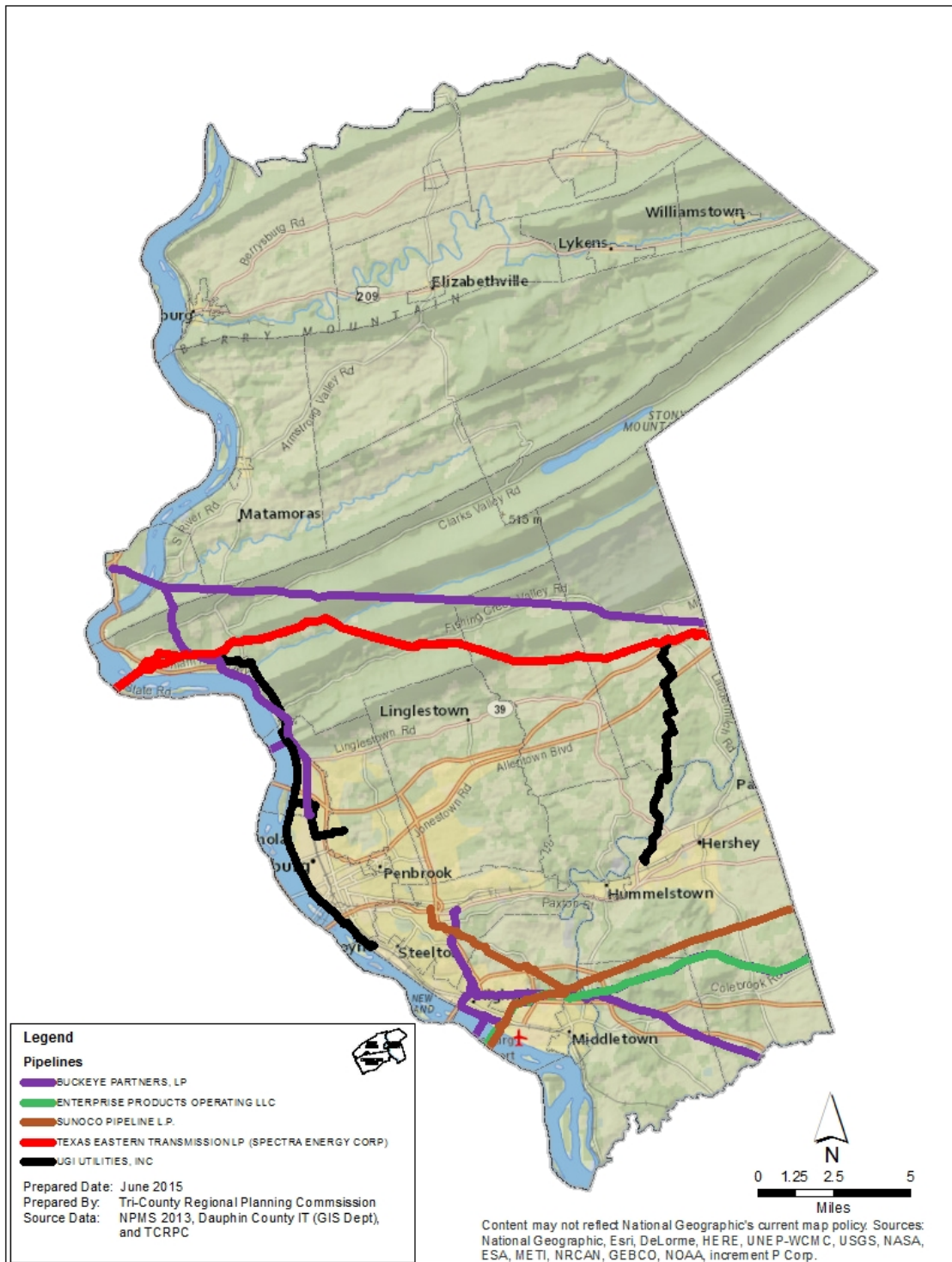


Table 4.3.15-1 Dauphin County pipeline operators by commodity.		
OPERATOR NAME	COMMODITY	PIPELINE STATUS
Gas Transmission Pipelines		
Texas Eastern Transmission LP	Natural Gas	In Service
UGI Utilities, Inc.	Natural Gas	In Service
Hazardous Liquid Pipelines		
Buckeye Partners, LP	Nitrogen	Idle
Buckeye Partners, LP	Multiple Non-HVL Products	In Service
Enterprise Products Operating LLC	Butane, Isobutane, Propane	In Service
Sunoco Pipeline, LP	Empty liquid	Retired
Sunoco Pipeline, LP	Other HVLs	In Service
Source: NPMS Public Map Viewer, May 2015.		

There are current plans to install portions of the Sunoco Logistics' Mariner East 2 Pipeline project in Dauphin County. The proposed project will transport propane and ethane derived from shale gas formations in western Pennsylvania to the Marcus Hook Refinery in Delaware County, Pennsylvania. As currently proposed, the pipelines would fully traverse Lower Swatara Township and portions of Londonderry Township, Middletown Borough, and Highspire Borough.

Although rare, pipeline failures can occur due to both technical issues and natural hazard events and have the potential to significantly impact the surrounding community. The susceptibility of failure can depend on the characteristics the pipeline or the environment where the pipeline is operating. PHMSA reports the main causes of pipeline failure can be attributed to material damage (e.g. corrosion), operational failure (due to the failure of equipment/ weld/ materials or incorrect operation), or physical damage associated with excavation, natural hazard events or other outside forces (PHMSA, 2015).

4.3.15.2. 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. See Section 4.3.13 for additional details pertaining to hazardous materials releases. The FRA and the National Transportation Safety Board are the lead responders on major derailments and accidents and PUC inspectors offer assistance when needed. The expected impacts of transportation accidents are amplified by the fact that there is often little warning of accidents.

Dauphin County experienced one of its most significant transportation related incidents on May 9, 2013 when a tanker truck carrying diesel fuel overturned and caught fire on the ramp from I-81 northbound to Route 22/322 westbound. The fire not only destroyed the ramp in the I-81 Exit 67 interchange, but also destroyed the overhead bridge that carried eastbound Route 22 traffic toward downtown Harrisburg. This bridge was demolished in the immediate days following the fire. I-81 remained closed for five days and Route 22/322 at I-81 was impacted eastbound and westbound for months as bridge replacement and repairs were made. The incident warranted a Governor's Proclamation of Disaster Emergency. This is a worst case transportation incident for Dauphin County.

4.3.15.3. Past Occurrence

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

As noted in Section 4.3.15.2, the tanker truck accident/explosion in 2013 was the most significant transportation accident impacting the County in years. It involved impacts to two major highways, I-81 and Rt. 22/322, which receive maximum average daily traffic of 119,000 vehicles. Both PennDOT and the Pennsylvania Turnpike Commission took steps to alleviate transportation congestion caused by the incident including the Turnpike Commission waiving tolls between local interchanges when I-81 was closed for 5 days.

Over the ten-year period from 2004-2013, highway accidents have remained fairly steady with an annual average number of crashes of 2,961. Table 4.3.15-2 summarizes the overall vehicular crash data from 2004-2013 as obtained through PennDOT Crash Statistics Reports. The number of fatal crashes has decreased over the past 5 years while the number of injuries has fluctuated and is around 1,350 per year. Figure 4.3.15-3 shows a transportation incident which impacted the Pennsylvania Turnpike at the Harrisburg East (Exit 247) interchange.

YEAR	TOTAL FATAL CRASHES	TOTAL INJURY CRASHES	TOTAL PROPERTY DAMAGE-ONLY CRASHES	TOTAL CRASHES
2004	28	1,491	1,497	3,016
2005	35	1,405	1,526	2,966
2006	21	1,373	1,478	2,872
2007	33	1,488	1,589	3,110
2008	34	1,390	1,502	2,926
2009	25	1,412	1,494	2,931

Table 4.3.15-2 Total number of crashes by type in Dauphin County (PennDOT, 2015).

YEAR	TOTAL FATAL CRASHES	TOTAL INJURY CRASHES	TOTAL PROPERTY DAMAGE-ONLY CRASHES	TOTAL CRASHES
2010	36	1,397	1,434	2,867
2011	30	1,354	1,633	3,017
2012	24	1,381	1,473	2,878
2013	23	1,430	1,572	3,025
TOTAL	289	14,121	15,198	29,608

Figure 4.3.15-4 Tractor trailer incident at the Harrisburg East Interchange of the Pennsylvania Turnpike (Exit 247) (Lower Swatara Township).



Aviation accidents are the least frequent type of transportation accident. Most accidents involve small aircraft and result in only minimal injuries. The National Transportation Safety Board (NTSB) maintains an Aviation Accident Database which provides details on aviation incidents going back to 1962. There have been 46 incidents reported in Dauphin County from both airplanes and helicopters with 21 reported fatalities and 11 injuries. The most significant incident occurred on February 24, 1977 when a Commonwealth aircraft carrying state officials crashed shortly after take-off from Capital City Airport into a home in Bressler near Harrisburg. All eight passengers including 2 pilots were killed as was a person in the home. Table 4.3.15-3 provides details pertaining to these incidents.

Table 4.3.15-3 Aircraft incidents reported in Dauphin County (NTSB, 2015).				
DATE	AIRCRAFT TYPE	FATALITY	INJURY	DETAILS
06/03/1964	Navion	0	0	Hershey – Student pilot inadvertently retracted gear. Substantial aircraft damage.
06/21/1964	Beechcraft	3	1	Harrisburg - Aircraft destroyed; aircraft failure during initial climb.
07/21/1964	Piper	0	0	Hershey – Fuel failure caused forced landing; substantial aircraft damage.
11/05/1964	Viscount	0	1	Harrisburg - Minor damage reported; in flight fire on United Airlines operated aircraft; smoke in cockpit; emergency landing.
12/16/1965	Ercoupe	0	0	Londonderry Township – Inadequate area for takeoff caused crash resulting in destroyed aircraft.
07/25/1966	Piper	0	0	Hershey – Failure to extend landing gear caused substantial aircraft damage.
08/09/1966	Boeing 707	0	1	Harrisburg - No aircraft damage reported; American Airlines operated flight; inclement weather caused turbulent landing.
04/09/1967	Piper	0	0	Hershey – Wind conditions resulted in pilot unable to maintain directional control; substantial aircraft damage.
04/30/1967	Piper	2	0	Hershey – Engine failure caused pilot disorientation resulting in crash and fire after impact. Two fatalities.
08/12/1967	Cherokee	0	0	Hershey – Premature lift off; substantial aircraft damage.
10/07/1967	Beech	0	0	Hershey – Pilot inadvertently retracted gear on landing; substantial aircraft damage.
11/15/1967	Beech	0	0	Middletown – Failure to extend landing gear; suspected mechanical failure; substantial aircraft damage.
11/26/1967	Piper	0	1	Hershey – Pilot injured by propeller when checking engine compression. No aircraft damage.
09/08/1968	Schweizer	0	0	Hershey – Helicopter damaged after striking highway guardrail.
10/20/1968	Bell	0	1	Harrisburg – Helicopter destroyed after striking power lines.
01/26/1969	Piper	0	0	Hershey – Unfavorable weather conditions caused roll landing; substantial aircraft damage.
04/27/1969	Piper	0	0	Hershey – Roll landing caused aircraft to cartwheel and strike hangar; substantial aircraft damage.
05/06/1969	Piper	0	0	Gratz – Pilot disorientation caused forced landing on unstable terrain; substantial aircraft damage.
04/12/1970	Aero Commander	1	0	Grantville – Aircraft collided with trees; aircraft destroyed. Pilot fatality.
01/23/1971	Piper	0	0	Hershey – Wind gust caused hard landing; substantial aircraft damage.

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Table 4.3.15-3 Aircraft incidents reported in Dauphin County (NTSB, 2015).				
DATE	AIRCRAFT TYPE	FATALITY	INJURY	DETAILS
07/07/1971	Piper	3	1	Hershey – Three fatalities and aircraft destroyed after aircraft collided with tree.
08/01/1971	Wittman	0	0	Halifax – Unfavorable weather caused pilot to make a precautionary landing on sloping terrain; substantial aircraft damage.
02/23/1973	Cessna	0	0	Halifax – Engine failure resulted in forced landing; collision with wires/poles; substantial aircraft damage.
03/17/1973	Boeing	0	2	Harrisburg – Turbulence associated with clouds and/or thunderstorms resulted in passenger injury due to unfastened seatbelts.
07/16/1974	Bensen	0	0	Harrisburg – Gyrocopter lost directional control on takeoff; substantial aircraft damage.
07/23/1974	Beech	0	0	Middletown – Landing gear jammed causing substantial aircraft damage upon landing.
02/24/1977	Piper	9	0	Bressler - Commonwealth aircraft destroyed after crashing shortly after takeoff from Capital City Airport in New Cumberland, Cumberland County. The airplane crashed into a home in Bressler, a suburb of Harrisburg. All eight passengers, including 2 pilots, were killed as well as a resident of the home. Several surrounding homes and businesses were severely damaged.
02/17/1978	Beech	0	0	Middletown – Unfavorable weather conditions caused accident on takeoff; substantial aircraft damage.
06/28/1978	Sikorsy	0	1	Harrisburg - Substantial helicopter damage after pilot collided with overhead utility lines.
08/29/1978	Cessna	0	0	Hershey – Bounced landing caused roll landing; substantial aircraft damage.
08/30/1979	Beech	1	0	Middletown – Aircraft struck trees on landing; pilot fatality; aircraft destroyed.
06/11/1981	Shorts	0	0	Middletown – Landing gear equipment failure; no reported aircraft damage.
11/24/1982	Cessna	0	0	Substantial aircraft damage; strong wind gust caused landed aircraft to be lifted off the ground and land inverted at HIA.
10/28/1983	Shorts	1	0	Middletown – Passenger deplaned aircraft while climbing after takeoff.
12/02/1983	Cessna	1	0	Hershey – Unfavorable weather conditions (snow) caused aircraft to crash. Pilot fatality.
06/21/1984	Cessna	0	0	Harrisburg - Aircraft destroyed; student pilot encountered wake turbulence from another aircraft causing the airplane to land with nose buried in the ground.
04/27/1985	Cessna	0	0	Middletown – Power failure caused forced landing in field; substantial aircraft damage.
09/04/1987	Piper	0	0	Harrisburg - Substantial aircraft damage; aircraft lost engine power while descending for landing.
10/28/1994	Piper	0	0	Pillow Township – Aircraft skidded off grass

DATE	AIRCRAFT TYPE	FATALITY	INJURY	DETAILS
				runway during landing; substantial aircraft damage.
07/07/1996	Piper	0	0	Aircraft destroyed; aircraft lost engine power after taking off from Capital City Airport and made a water landing in the Susquehanna River.
05/25/2001	Boeing 727	0	0	Harrisburg - Minor aircraft damage; electrical fire reported on aircraft while on ground during maintenance check.
11/07/2006	Eurocopter Deutschland	0	0	Harrisburg - Minor helicopter damage during takeoff from Harrisburg Hospital Heliport; no patients on board.
08/31/2009	Cessna	0	0	Jackson Township - Substantial aircraft damage; student pilot aborted takeoff and veered off the end of the runway at Harman Airport.
4/27/2012	Bell	0	1	Hershey – Agricultural application helicopter crashed; substantial aircraft damage.
5/22/2014	Cessna	0	0	Harrisburg – Wind gust caused propeller to strike runway during landing; substantial aircraft damage.
7/22/2014	Ultrastar	0	1	Halifax Township – Forced landing after takeoff resulted in substantial aircraft damage.
TOTALS		21	11	

According to the Federal Railroad Administration (FRA), 168 railroad incidents (train accidents, crossing incidents, and other accidents or incidents) were reported in Dauphin County between 2006 and 2014. The incidents include two fatalities both related to trespassing, five trespassing injuries, and 44 railroad employee injuries. Two highway-rail crossing incident injuries were also reported. Nineteen derailments were reported with 13 railcars carrying hazardous materials damaged (FRA, 2015). Table 4.3.15-4 lists the total number of incidents, train accidents, and derailments by year.

YEAR	TOTAL ACCIDENTS/ INCIDENTS	TRAIN ACCIDENTS	DERAILMENTS	HAZMAT RAILCARS DAMAGED/ DERAILED
2006	13	4	4	7
2007	20	2	0	0
2008	18	4	3	0
2009	24	3	2	0
2010	21	3	3	0
2011	16	4	3	0
2012	18	1	0	0

Table 4.3.15-4 Rail incidents reported in Dauphin County (2006 – 2014) (FRA, 2015).

YEAR	TOTAL ACCIDENTS/ INCIDENTS	TRAIN ACCIDENTS	DERAILMENTS	HAZMAT RAILCARS DAMAGED/ DERAILED
2013	17	1	1	6
2014	21	3	3	0
TOTAL	168	25	19	13

DEMA’s HazMat database has record of two train derailments. The first is reported on July 5, 2006 in Derry Township when eight rail cars including one carrying chlorine car and two of carrying potassium hydroxide of a 76 car train derailed requiring evacuation of fourteen homes and three businesses in Hershey. According to Hershey Volunteer Fire Department, emergency officials were on scene for three days while railroad officials and hazardous materials crews cleaned up the wreckage. Derry Presbyterian Church, Hershey Trust Company, and Zoo America were closed (Hershey Volunteer Fire Department, 2015).

A second train derailment was reported on December 27, 2010 when a strong gust of wind derailed a train while crossing the Rockville Bridge in Harrisburg causing two empty shipping containers to fall off the train and into the Susquehanna River. The incident closed the bridge to train traffic including Amtrak service carrying passengers between New York and Pittsburgh. Nearly 300 Amtrak passengers were bused from Harrisburg to Pittsburgh.

PHMSA has no reports of any gas transmission or hazardous liquid pipeline failures in Dauphin County (PHMSA, 2015).

4.3.15.4. Future Occurrence

The County’s population is growing, meaning it is likely that traffic volumes will likely rise accordingly. The trucking industry is expected to continue, maintaining and possibly increasing the number of tractor-trailers on the County’s road system. Transportation accidents may increase slightly over the next five years without proper mitigation strategies in place. Based on this and past occurrences, the probability of highway transportation accidents is characterized as *highly likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.4-1). However, the low number of rail and air traffic accidents in the County indicates that the bulk of future transportation accidents will be roadway accidents and; therefore, the probability of future air and rail hazard events is possible. Based on a small number of pipeline incidents across the country, the probability of a pipeline hazard event is unlikely.

4.3.15.5. Vulnerability Assessment

A transportation-related incident can occur on any stretch of road or railway in Dauphin County with severe accidents more likely on the County’s major highways. These highways (I-81, I-83, I-283, US 22, US 322, US 422, PA 283, and the Pennsylvania Turnpike (I-76)) experience heavier traffic volumes including heavy freight vehicles. The combination of high traffic volume, severe winter weather in the County, and large numbers of hazardous materials haulers increase the chances of traffic accidents occurring. Like highway incidents, rail incidents can impact populations living near rail lines and airports.

Vulnerability for transportation accidents was defined as jurisdictions falling within $\frac{1}{4}$ miles of major roads (Interstates, US highways, state highways) and rail and 5 miles from an airport (including heliports). Tables 4.3.15-5, 4.3.15-6, and 4.3.15-7 illustrate the vulnerability by jurisdiction of structures and critical facilities for each mode of transportation and Tables 4.3.15-8, 4.3.15-9, and 4.3.15-10 break down the vulnerability of structures for each mode of transportation by generalized land use type.

Resultant impacts associated with transportation accidents can be minimized by ensuring the County has an up-to-date Evacuation Plan. Dauphin County is currently updating its plan, which will be integrated into the Harrisburg Area Transportation Study (HATS) Regional Transportation Plan (RTP) plan to ensure the most current Dauphin County hazard related information is included in regional transportation planning.

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Table 4.3.15-5 Structures and Critical Facilities within 0.25 miles of Major Highways (Interstates, US highways, state highways).						
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 0.25 MILES OF MAJOR ROADS	% STRUCTURES WITHIN 0.25 MILES OF MAJOR ROADS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.25 MILES OF MAJOR ROADS	% CRITICAL FACILITIES WITHIN 0.25 MILES OF MAJOR ROADS
Berrysburg Borough	347	0	0.00%	3	0	0.00%
Conewago Township	2,266	125	5.52%	4	0	0.00%
Dauphin Borough	490	287	58.57%	4	4	100.00%
Derry Township	10,690	3,530	33.02%	32	9	28.13%
East Hanover Township	4,721	960	20.33%	8	6	75.00%
Elizabethville Borough	1,000	972	97.20%	6	6	100.00%
Gratz Borough	752	0	0.00%	2	2	100.00%
Halifax Borough	476	0	0.00%	5	0	0.00%
Halifax Township	3,409	0	0.00%	11	0	0.00%
Harrisburg City	19,164	2,924	15.26%	61	10	16.39%
Highspire Borough	1,314	423	32.19%	5	0	0.00%
Hummelstown Borough	2,560	574	22.42%	8	2	25.00%
Jackson Township	2,163	0	0.00%	5	0	0.00%
Jefferson Township	618	0	0.00%	3	0	0.00%
Londonderry Township	5,205	322	6.19%	11	0	0.00%
Lower Paxton Township	20,333	4,231	20.81%	25	7	28.00%
Lower Swatara Township	4,738	1,050	22.16%	17	5	29.41%
Lykens Borough	1,323	1,270	95.99%	5	5	100.00%
Lykens Township	2,036	0	0.00%	1	0	0.00%
Middle Paxton Township	3,862	510	13.21%	13	2	15.38%
Middletown Borough	3,732	824	75.27%	16	3	18.75%
Mifflin Township	1,047	0	0.00%	1	0	0.00%
Millersburg Borough	1,316	1,035	78.65%	7	7	100.00%
Paxtang Borough	898	463	51.56%	3	2	66.67%
Penbrook Borough	1,338	650	48.58%	4	2	50.00%
Pillow Borough	300	0	0.00%	2	0	0.00%
Reed Township	266	36	13.53%	1	0	0.00%
Royalton Borough	694	0	0.00%	1	0	0.00%
Rush Township	314	0	0.00%	1	0	0.00%
South Hanover Township	3,755	0	0.00%	8	0	0.00%
Steelton Borough	2,070	63	3.04%	5	0	0.00%
Susquehanna Township	10,301	3,060	29.71%	35	9	25.71%
Swatara Township	10,838	2,011	18.56%	39	16	41.03%

Table 4.3.15-5 Structures and Critical Facilities within 0.25 miles of Major Highways (Interstates, US highways, state highways).						
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 0.25 MILES OF MAJOR ROADS	% STRUCTURES WITHIN 0.25 MILES OF MAJOR ROADS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.25 MILES OF MAJOR ROADS	% CRITICAL FACILITIES WITHIN 0.25 MILES OF MAJOR ROADS
Upper Paxton Township	3,392	794	23.41%	10	2	20.00%
Washington Township	2,302	1,295	56.26%	11	8	72.73%
Wayne Township	1,233	0	0.00%	1	0	0.00%
West Hanover Township	5,767	1,358	23.55%	11	4	36.36%
Wiconisco Township	1,094	238	21.76%	3	0	0.00%
Williams Township	950	241	25.37%	1	1	100.00%
Williamstown Borough	923	50	5.42%	4	3	75.00%
TOTAL	139,997	29,296	20.93%	395	115	29.11%

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MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 0.25 MILES OF RAIL	% STRUCTURES WITHIN 0.25 MILES OF RAIL	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.25 MILES OF RAIL	% CRITICAL FACILITIES WITHIN 0.25 MILES OF RAIL
Berrysburg Borough	347	0	0.00%	3	0	0.00%
Conewago Township	2,266	0	0.00%	4	0	0.00%
Dauphin Borough	490	270	55.10%	4	4	100.00%
Derry Township	10,690	1,522	14.24%	32	3	9.38%
East Hanover Township	4,721	0	0.00%	8	0	0.00%
Elizabethville Borough	1,000	0	0.00%	6	0	0.00%
Gratz Borough	752	0	0.00%	2	2	100.00%
Halifax Borough	476	365	76.68%	5	5	100.00%
Halifax Township	3,409	693	20.33%	11	2	18.18%
Harrisburg City	19,164	5,977	31.19%	61	31	50.82%
Highspire Borough	1,314	912	69.41%	5	5	100.00%
Hummelstown Borough	2,560	1,721	67.23%	8	3	37.50%
Jackson Township	2,163	0	0.00%	7	0	0.00%
Jefferson Township	618	0	0.00%	3	0	0.00%
Londonderry Township	5,205	619	11.89%	11	2	18.18%
Lower Paxton Township	20,333	0	0.0%	25	0	0.00%
Lower Swatara Township	4,738	428	9.03%	17	3	17.65%
Lykens Borough	1,323	0	0.00%	5	0	0.00%
Lykens Township	2,036	0	0.00%	1	0	0.00%
Middle Paxton Township	3,862	481	12.45%	13	0	0.00%
Middletown Borough	3,732	748	20.04%	16	5	31.25%
Mifflin Township	1,047	0	0.00%	1	0	0.00%
Millersburg Borough	1,316	501	38.07%	7	5	71.43%
Paxtang Borough	898	601	66.93%	3	3	100.00%
Penbrook Borough	1,338	0	0.00%	4	0	0.00%
Pillow Borough	300	0	0.00%	2	0	0.00%
Reed Township	266	87	32.71%	1	1	100.00%
Royalton Borough	694	592	85.30%	1	1	100.00%
Rush Township	314	0	0.00%	1	0	0.00%
South Hanover Township	3,755	152	4.05%	8	0	0.00%
Steelton Borough	2,070	1,596	77.01%	5	5	100.00%
Susquehanna Township	10,301	1,211	11.76%	35	1	2.86%
Swatara Township	10,838	2,513	23.19%	39	11	28.21%
Upper Paxton Township	3,392	536	15.80%	10	3	30.00%

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 0.25 MILES OF RAIL	% STRUCTURES WITHIN 0.25 MILES OF RAIL	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.25 MILES OF RAIL	% CRITICAL FACILITIES WITHIN 0.25 MILES OF RAIL
Washington Township	2,302	0	0.00%	11	0	0.00%
Wayne Township	1,233	0	0.00%	1	0	0.00%
West Hanover Township	5,767	0	0.00%	11	0	0.00%
Wiconisco Township	1,094	0	0.00%	3	0	0.00%
Williams Township	950	0	0.00%	1	0	0.00%
Williamstown Borough	923	0	0.00%	4	4	100.00%
TOTAL	139,997	21,525	15.38%	395	95	24.05%

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MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 5 MILES OF AN AIRPORT	% STRUCTURES WITHIN 5 MILES OF AN AIRPORT	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 5 MILES OF AN AIRPORT	% CRITICAL FACILITIES WITHIN 5 MILES OF AN AIRPORT
Berrysburg Borough	347	347	100.00%	3	3	100.00%
Conewago Township	2,266	2,082	91.88%	4	4	100.00%
Dauphin Borough	490	490	100.00%	4	4	100.00%
Derry Township	10,690	10,671	99.82%	32	32	100.00%
East Hanover Township	4,721	3,970	84.09%	8	8	100.00%
Elizabethville Borough	1,000	1,000	100.00%	6	6	100.00%
Gratz Borough	752	176	23.40%	2	2	100.00%
Halifax Borough	476	476	100.00%	5	5	100.00%
Halifax Township	3,409	3,409	100.00%	11	11	100.00%
Harrisburg City	19,164	19,164	100.00%	61	61	100.00%
Highspire Borough	1,314	1,314	100.00%	5	5	100.00%
Hummelstown Borough	2,560	2,560	100.00%	8	8	100.00%
Jackson Township	2,163	2,163	100.00%	7	7	100.00%
Jefferson Township	618	618	100.00%	3	3	100.00%
Londonderry Township	5,205	5,205	100.00%	11	11	100.00%
Lower Paxton Township	20,333	20,333	100.00%	25	25	100.00%
Lower Swatara Township	4,738	4,738	100.00%	17	17	100.00%
Lykens Borough	1,323	1,321	99.85%	5	5	100.00%
Lykens Township	2,036	1,155	56.73%	1	1	100.00%
Middle Paxton Township	3,862	3,791	98.16%	13	13	100.00%
Middletown Borough	3,732	3,732	100.00%	16	16	100.00%
Mifflin Township	1,047	1,047	100.00%	1	1	100.00%
Millersburg Borough	1,316	1,316	100.00%	7	7	100.00%
Paxtang Borough	898	898	100.00%	3	3	100.00%
Penbrook Borough	1,338	1,338	100.00%	4	4	100.00%
Pillow Borough	300	300	100.00%	2	2	100.00%
Reed Township	266	266	100.00%	1	1	100.00%
Royalton Borough	694	694	100.00%	1	1	100.00%
Rush Township	314	314	100.00%	1	1	100.00%
South Hanover Township	3,755	3,755	100.00%	8	8	100.00%
Steelton Borough	2,070	2,070	100.00%	5	5	100.00%
Susquehanna Township	10,301	10,301	100.00%	35	35	100.00%
Swatara Township	10,838	10,838	100.00%	39	39	100.00%
Upper Paxton Township	3,392	3,392	100.00%	10	10	100.00%

Table 4.3.15-7 Structures and Critical Facilities within 5 miles of an Airport.						
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 5 MILES OF AN AIRPORT	% STRUCTURES WITHIN 5 MILES OF AN AIRPORT	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 5 MILES OF AN AIRPORT	% CRITICAL FACILITIES WITHIN 5 MILES OF AN AIRPORT
Washington Township	2,302	2,302	100.00%	11	11	100.00%
Wayne Township	1,233	1,233	100.00%	1	1	100.00%
West Hanover Township	5,767	5,767	100.00%	11	11	100.00%
Wiconisco Township	1,094	284	25.96%	3	2	66.67%
Williams Township	950	909	95.68%	1	1	100.00%
Williamstown Borough	923	923	100.00%	4	4	100.00%
TOTAL	139,997	136,662	97.62%	395	394	99.75%

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MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	TOTAL
Berrysburg Borough	347	0	0	0	0	0	0	0	0
Conewago Township	2,266	31	0	0	8	86	0	0	125
Dauphin Borough	490	8	3	2	13	247	8	6	287
Derry Township	10,690	446	94	82	155	2,720	11	22	3,530
East Hanover Township	4,721	257	3	2	35	660	1	2	960
Elizabethville Borough	1,000	81	0	7	64	816	1	3	972
Gratz Borough	752	0	0	0	0	0	0	0	0
Halifax Borough	476	0	0	0	0	0	0	0	0
Halifax Township	3,409	0	0	0	0	0	0	0	0
Harrisburg City	19,164	307	27	16	62	2,464	29	19	2,924
Highspire Borough	1,314	23	0	0	10	388	0	2	423
Hummelstown Borough	2,560	6	10	0	4	548	0	6	574
Jackson Township	2,163	0	0	0	0	0	0	0	0
Jefferson Township	618	0	0	0	0	0	0	0	0
Londonderry Township	5,205	64	0	0	27	288	0	3	322
Lower Paxton Township	20,333	562	2	4	101	3,541	3	18	4,231
Lower Swatara Twp.	4,738	88	8	5	24	920	0	5	1,050
Lykens Borough	1,323	86	0	6	73	1,096	3	6	1,270
Lykens Township	2,036	0	0	0	0	0	0	0	0
Middle Paxton Twp.	3,862	70	0	2	32	396	0	10	510
Middletown Borough	3,732	4	0	5	22	768	0	25	824
Mifflin Township	1,047	0	0	0	0	0	0	0	0
Millersburg Borough	1,316	102	0	7	53	862	1	10	1,035
Paxtang Borough	898	54	0	1	3	403	0	2	463
Penbrook Borough	1,338	82	0	2	24	542	0	0	650
Pillow Borough	300	0	0	0	0	0	0	0	0
Reed Township	266	22	0	0	4	9	0	1	36
Royalton Borough	694	0	0	0	0	0	0	0	0
Rush Township	314	0	0	0	0	0	0	0	0
South Hanover Twp.	3,755	0	0	0	0	0	0	0	0
Steeltown Borough	2,070	10	0	1	2	48	0	2	63
Susquehanna Township	10,301	220	1	76	91	2,644	17	11	3,060
Swatara Township	10,838	478	2	3	99	1,395	20	14	2,011
Upper Paxton Township	3,392	102	0	10	62	616	1	3	794
Washington Township	2,302	226	6	7	51	995	1	9	1,295

Table 4.3.15-8 Structures Vulnerable to Highway Accidents by Generalized Structure Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	TOTAL
Wayne Township	1,233	0	0	0	0	0	0	0	0
West Hanover Twp.	5,767	172	1	4	18	1,160	1	2	1,358
Wiconisco Township	1,094	25	0	0	30	183	0	0	238
Williams Township	950	59	9	5	21	142	5	0	241
Williamstown Borough	923	9	0	5	0	30	0	6	50
TOTAL	139,997	3,594	166	252	1,088	23,907	102	187	29,296

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Table 4.3.15-9 Structures Vulnerable to Rail Accidents by Generalized Structure Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	TOTAL
Berrysburg Borough	347	0	0	0	0	0	0	0	0
Conewago Township	2,266	0	0	0	0	0	0	0	0
Dauphin Borough	490	8	3	2	11	235	7	4	270
Derry Township	10,690	253	2	1	351	901	8	6	1,522
East Hanover Township	4,721	0	0	0	0	0	0	0	0
Elizabethville Borough	1,000	0	0	0	0	0	0	0	0
Gratz Borough	752	0	0	0	0	0	0	0	0
Halifax Borough	476	15	2	2	43	302	1	0	365
Halifax Township	3,409	100	1	2	80	506	0	4	693
Harrisburg City	19,164	800	25	66	310	4,665	85	26	5,977
Highspire Borough	1,314	52	0	1	9	626	2	5	695
Hummelstown Borough	2,560	175	2	3	36	1,489	7	9	1,721
Jackson Township	2,163	0	0	0	0	0	0	0	0
Jefferson Township	618	0	0	0	0	0	0	0	0
Londonderry Township	5,205	208	0	2	46	362	1	0	619
Lower Paxton Township	20,333	0	0	0	0	0	0	0	0
Lower Swatara Twp.	4,738	60	5	4	84	269	0	6	428
Lykens Borough	1,323	0	0	0	0	0	0	0	0
Lykens Township	2,036	0	0	0	0	0	0	0	0
Middle Paxton Twp.	3,862	60	0	0	39	373	0	9	481
Middletown Borough	3,732	74	0	5	34	625	0	10	748
Mifflin Township	1,047	0	0	0	0	0	0	0	0
Millersburg Borough	1,316	93	0	9	28	367	1	3	501
Paxtang Borough	898	59	1	1	3	535	0	2	601
Penbrook Borough	1,338	0	0	0	0	0	0	0	0
Pillow Borough	300	0	0	0	0	0	0	0	0
Reed Township	266	14	0	2	9	59	3	0	87
Royalton Borough	694	22	0	2	28	529	5	6	592
Rush Township	314	0	0	0	0	0	0	0	0
South Hanover Twp.	3,755	2	0	0	10	140	0	0	152
Steeltown Borough	2,070	173	10	5	171	1,218	5	14	1,596
Susquehanna Township	10,301	105	0	4	34	1,051	8	7	1,211
Swatara Township	10,838	456	2	10	73	1,934	27	11	2,513
Upper Paxton Township	3,392	75	0	0	30	424	0	7	536
Washington Township	2,302	0	0	0	0	0	0	0	0

Table 4.3.15-9 Structures Vulnerable to Rail Accidents by Generalized Structure Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	TOTAL
Wayne Township	1,233	0	0	0	0	0	0	0	0
West Hanover Twp.	5,767	0	0	0	0	0	0	0	0
Wiconisco Township	1,094	0	0	0	0	0	0	0	0
Williams Township	950	0	0	0	0	0	0	0	0
Williamstown Borough	923	0	0	0	0	0	0	0	0
TOTAL	139,997	2,832	53	122	1,442	16,774	172	130	21,525

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Table 4.3.15-10 Structures by Municipality Vulnerable to Aviation Accidents by Generalized Structure Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	GRAND TOTAL
Berrysburg Borough	347	43	1	12	16	270	0	5	347
Conewago Township	2,266	445	6	0	78	1,550	2	1	2,082
Dauphin Borough	490	8	3	2	22	441	8	6	490
Derry Township	10,690	840	339	146	545	8,618	50	133	10,671
East Hanover Township	4,721	876	3	14	187	2,882	4	4	3,970
Elizabethville Borough	1,000	81	0	7	78	829	1	4	1,000
Gratz Borough	752	50	0	1	5	118	0	2	176
Halifax Borough	476	25	2	2	47	399	1	0	476
Halifax Township	3,409	1,069	5	3	264	2,055	0	13	3,409
Harrisburg City	19,164	1,721	80	105	812	16,275	94	77	19,164
Highspire Borough	1,314	86	0	2	32	1,169	14	11	1,314
Hummelstown Borough	2,560	186	14	3	47	2,290	7	13	2,560
Jackson Township	2,163	868	4	7	124	1,143	1	16	2,163
Jefferson Township	618	236	0	2	73	306	0	1	618
Londonderry Township	5,205	905	1	19	608	3,655	4	13	5,205
Lower Paxton Township	20,333	1,086	39	17	437	18,699	15	40	20,333
Lower Swatara Twp.	4,738	428	38	14	211	4,029	3	15	4,738
Lykens Borough	1,323	89	0	6	80	1,137	3	6	1,321
Lykens Township	2,036	685	0	4	101	365	0	0	1,155
Middle Paxton Twp.	3,862	510	3	7	235	3,012	5	19	3,791
Middletown Borough	3,732	169	8	22	154	3,319	18	42	3,732
Mifflin Township	1,047	567	0	3	42	427	0	8	1,047
Millersburg Borough	1,316	113	0	10	69	1,110	1	13	1,316
Paxtang Borough	898	66	1	1	16	808	0	6	898
Penbrook Borough	1,338	112	0	2	35	1,189	0	0	1,338
Pillow Borough	300	39	0	5	23	232	1	0	300
Reed Township	266	70	0	2	120	170	3	1	266
Royalton Borough	694	25	0	2	30	626	5	6	694
Rush Township	314	33	0	2	32	234	9	4	314
South Hanover Twp.	3,755	312	3	7	94	3,329	6	4	3,755
Steelton Borough	2,070	183	11	5	187	1,664	5	15	2,070
Susquehanna Township	10,301	474	24	142	278	9,298	17	68	10,301
Swatara Township	10,838	745	19	31	356	9,611	47	29	10,838
Upper Paxton Township	3,392	752	2	21	209	2,389	1	18	3,392

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Table 4.3.15-10 Structures by Municipality Vulnerable to Aviation Accidents by Generalized Structure Type.									
MUNICIPALITY	TOTAL STRUCTURES	COMMERCIAL/ AGRICULTURAL	EDUCATIONAL	GOVERNMENT	MISC.	RESIDENTIAL	TRANS. / UTILITY	UNKNOWN	GRAND TOTAL
Washington Township	2,302	768	8	7	99	1,390	2	28	2,302
Wayne Township	1,233	403	0	3	64	760	1	2	1,233
West Hanover Twp.	5,767	727	10	10	198	4,806	6	10	5,767
Wiconisco Township	1,094	21	0	6	44	206	5	2	284
Williams Township	950	89	9	8	125	661	9	8	909
Williamstown Borough	923	37	0	7	39	834	0	6	923
TOTAL	139,997	15,942	633	669	6,116	112,305	348	649	136,662

4.3.16. Utility Interruption

4.3.16.1. Location and Extent

Utility interruption includes any impairment of the functioning of telecommunication, gas, electric, water, or waste networks. These interruptions or outages occur because of geomagnetic storms, fuel or resources shortage, electromagnetic pulses, information technology failures, transmission facility or linear utility accident, and major energy, power, or utility failure. The focus of utility interruptions as a hazard lies in fuel, energy, or utility failure with interruptions often a secondary impact of another hazard. Severe thunderstorms, windstorms, tornadoes, winter storms, and hurricanes or tropical storms can also lead to increased regional utility interruptions. More localized outages can be caused by traffic accidents or wind damage. Heat waves may also result in rolling blackouts where power may not be available for an extended period of time. Beyond electricity storm events can cause significant damage on stormwater and transportation infrastructure. For example, Tropical Storm Lee had significant impact on Dauphin County’s stormwater systems, bridges, and roads.

Utility interruptions have the potential to take place anywhere throughout Dauphin County and an interruption caused by a natural or human-made incident could impact both public and/or private utility providers and sources. According to the 2013 estimates of the U.S. Census American Community Survey there are 108,831 occupied housing units in Dauphin County. Of these housing units, 35.1 percent use utility gas, 33.0 percent use electric power, and 24.3 percent use fuel oil or kerosene to heat their homes (US Census, 2015). This means that should a utility interruption occur countywide, nearly 98,000 households could potentially be without heat or cooling. Beyond home heating, PUC estimates there are 175,769 electric and natural gas customers under their purview in Dauphin County. Table 4.3.16-1 illustrates these customers by utility.

UTILITY	NUMBER OF CUSTOMERS	NUMBER OF PROVIDERS
Electric	127,100	2
Natural Gas	48,669	23
Total	175,769	25

The natural gas and electric utilities providing distribution in Dauphin County include: UGI Utilities (natural gas) and Met Ed Electric Utility/ First Energy and PPL Electric Utilities (electricity).

According to the Dauphin County 2008 Comprehensive Plan, the County has 14 public water systems with approximately 74,070 connections. There are also private wells that serve residents in areas without public water.

The County Comprehensive Plan notes that 29 of the County’s 40 municipalities have public sewer treated in one of 17 municipal or authority sewage treatment facilities. Property owners in areas without public sewerage are required to have a permitted on-lot disposal system or

private waste water treatment facility. As of the 2008 there were 59 private waste water treatment facilities in the County.

Multiple companies provide telephone, cable, and telecommunications services throughout Dauphin County.

4.3.16.2. Range of Magnitude

The most severe utility interruptions are regional or widespread power and telecommunications outages. With the loss of power, electrical powered equipment and systems are not operational. Examples may include: lighting; HVAC and ancillary support equipment; communication (i.e. public address systems, telephone, computer servers, and peripherals); ventilation systems; fire and security systems; refrigerators, sterilizers, trash compactors, office equipment; and medical equipment. This can cause food spoilage, loss of heat or air conditioning, basement flooding (sump pump failure), lack of light, loss of water (well pump failure), lack of phone service, or lack of internet service. However, this is most often a short term nuisance rather than a catastrophic hazard.

The severity of a utility interruption can be compounded with extreme weather events, especially winter weather events. Interruptions can also be more severe for special needs populations that are dependent on electronic medical equipment. Utility interruptions can significantly hamper first responders in their efforts to provide aid in a compound disaster situation, especially with losses of telecommunications and wireless capabilities. Telecommunications interruptions will also hinder first responders' efforts.

In a possible worst-case scenario in Dauphin County, a winter storm event could cause widespread power outages, leaving citizens without heat in the midst of subzero temperatures. The power outage also means that elderly populations or others at risk of health problems due to the lack of heat are unable to call for assistance or leave their homes. Power lines are unable to be repaired because of the magnitude of the storm, and the power outage lasts for several days.

Likewise, most fuel shortages are regional or national events. A fuel shortage can have numerous impacts including increases in the cost of fuel putting an economic burden on families and businesses, long lines at gas stations due to fuel rationing, disruptions in freight traffic, incidents of violence, truck driver strikes, and a shortage of heating fuels.

4.3.16.3. Past Occurrence

Dauphin County, like most of Pennsylvania, experienced long lines at gasoline pumps and shortages of fuel in 1973 as a result of the OPEC oil embargo. Government actions were taken to assure that fuels and power were available for emergency and priority users. Between 1976 and 1977, prices for fuel rapidly increased and a similar fuel shortage was experienced in the County as the fuel shortage of 1972-73, which presented hardships for low income consumers in particular.

Utility interruptions are largely minor, routine events, but are nonetheless impactful depending on the location and length of interruption. Power outages in Dauphin County are primarily a

secondary impact associated with adverse storms events. Windstorms and winter storms have caused localized power outages throughout Dauphin County on numerous occasions. Severe cold in January 1994 caused a state-wide electrical energy crisis, resulting in rolling-blackouts in some areas and extensive voluntary cutbacks in other areas. Schools, government offices and private businesses responded by curtailing operations to reduce electric consumption. The 2010 HMP notes that a July 1995 thunderstorm event resulted in widespread utility outages throughout Dauphin County. In February 2014 winter storms resulted in a Governor's Proclamation of Emergency. The winter storm events impacted over 2,200 Met Ed and PPL customers. In October 2012 Tropical Storm Sandy significantly impacted utilities throughout the northeast impacting close to 500,000 customers. Both Met Ed and PPL customers in Dauphin County were without power at some point during the storm.

In 2014 there were over 1,300 electric utility outages reported to the PUC impacting approximately 16,557 customers. Figure 4.3.16-1 shows the impact a severe storm can have on power lines in Dauphin County.

Figure 4.3.16-1 Downed tree impacting a power line across Rosedale Avenue in Lower Swatara Township (Lower Swatara Township, 2014).



While power outages in the County are primarily a secondary impact associated with adverse storms events, there have also been a few incidents caused by equipment failure. In June 2014 nearly 8,000 PPL electricity customers in northern Dauphin County and neighboring Schuylkill and Northumberland counties lost power due to a broken cross arm, the horizontal piece that holds power lines on a utility pole.

Extreme cold has hampered distribution of natural gas, while transportation accidents have also caused minor power outages.

Utility interruptions occur annually in Dauphin County, caused by these and other circumstances. There is no comprehensive data source or complete list of utility interruption events available for the County.

4.3.16.4. *Future Occurrence*

Minor, short-term utility interruptions may occur several times a year for any given area in Dauphin County, while major, long-term events may take place once every few years. Utility interruptions are difficult to predict, but they are likely to have a relatively short duration of 24 hours or less. Since utility interruptions are sometimes by-products of severe weather events, citizens should prepare for them during severe storms.

A major fuel crisis could develop in the future depending on international relationships and tensions. Alternate and alternative sources of energy, conservation, and significant increases in efficiency through technological advances have begun to reduce the growth in demand for oil thus reducing the probability of another 1973 type of crisis will occur.

The future occurrence of utility interruptions and fuel shortages can be considered *likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

4.3.16.5. *Vulnerability Assessment*

The entire County is vulnerable to utility interruptions, although they are usually short lived. Hospitals and emergency medical facilities, including retirement homes and senior centers, are particularly vulnerable to fuel shortages and utility interruptions as elderly populations are particularly vulnerable to temperature extremes. Back-up power generators are often used at these facilities, but the population will become particularly vulnerable if the fuel shortage or power outage lasts longer than the back-up power supply. Elderly residents who live outside of these facilities are vulnerable to these interruptions or fuel shortages as well, and they often do not have access to back-up power supplies.

Additionally, escalating fuel prices can make lower income household more vulnerable to utility shut offs and more frequent depletion of fuel supplies. The Commonwealth has developed programs to provide emergency fuel assistance to these households. Businesses and industries are also vulnerable to fuel shortages and utility interruptions, as these events can have a large impact on the amount of time they can be operational.

To ensure municipalities are prepared in the event of a power outage, a few actions have been included in the 2015 mitigation strategy. One is to identify the need for emergency generators by municipality so that efforts can be made to secure equipment. Another action is to develop language for potential inclusion in subdivision regulations requiring new power and communications lines to be buried for new construction.

4.4. Hazard Vulnerability Summary

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

4.4.1. Methodology

Ranking hazards helps communities set goals and priorities for mitigation based on their vulnerabilities. A Risk Factor (RF) is a tool used to measure the degree of risk for identified hazards in a particular planning area. The RF can also be used to assist local community officials in ranking and prioritizing those hazards that pose the most significant threat to their area based on a variety of factors deemed important by the planning team and other stakeholders involved in the hazard mitigation planning process. The RF system relies mainly on historical data, local knowledge, general consensus opinions from the planning team and information collected through development of the hazard profiles included in Section 4.3. The RF approach produces numerical values that allow identified hazards to be ranked against one another; the higher the RF value, the greater the hazard risk.

RF values were obtained by assigning varying degrees of risk to five categories for each of the sixteen hazards profiled in the 2015 HMP. Those categories include: probability, impact, spatial extent, warning time and duration. Each degree of risk was assigned a value ranging from 1 to 4. The weighting factor is shown in Table 4.4-1. To calculate the RF value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories equals the final RF value, as demonstrated in the example equation:

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

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

RISK ASSESSMENT CATEGORY	DEGREE OF RISK			WEIGHT VALUE
	LEVEL	CRITERIA	INDEX	
PROBABILITY <i>What is the likelihood of a hazard event occurring in a given year?</i>	UNLIKELY	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1% & 49.9% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 50% & 90% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	GREATER THAN 90% ANNUAL PROBABILITY	4	

Table 4.4.1-1 Summary of Risk Factor approach used to rank hazard risk.				
RISK ASSESSMENT CATEGORY	DEGREE OF RISK			WEIGHT VALUE
	LEVEL	CRITERIA	INDEX	
IMPACT <i>In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</i>	MINOR	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT <i>How large of an area could be impacted by a hazard event? Are impacts localized or regional?</i>	NEGLIGIBLE	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10.9% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 11 & 25% OF AREA AFFECTED	3	
	LARGE	GREATER THAN 25% OF AREA AFFECTED	4	
WARNING TIME <i>Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</i>	MORE THAN 24 HRS	SELF-DEFINED	1	10%
	12 TO 24 HRS	SELF-DEFINED	2	
	6 TO 12 HRS	SELF-DEFINED	3	
	LESS THAN 6 HRS	SELF-DEFINED	4	

Table 4.4.1-1 Summary of Risk Factor approach used to rank hazard risk.

RISK ASSESSMENT CATEGORY	DEGREE OF RISK			WEIGHT VALUE
	LEVEL	CRITERIA	INDEX	
DURATION <i>How long does the hazard event usually last?</i>	LESS THAN 6 HRS	SELF-DEFINED	<i>(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)</i>	10%
	LESS THAN 24 HRS	SELF-DEFINED		
	LESS THAN 1 WEEK	SELF-DEFINED		
	MORE THAN 1 WEEK	SELF-DEFINED		

4.4.2. Ranking Results

Using the methodology described in Section 4.4.1, Table 4.4.2-1 lists the Risk Factor calculated for each of the sixteen hazards identified in the 2015 HMP. Hazards identified as high risk have risk factors greater than 2.5. Risk Factors ranging from 2.0 to 2.4 were deemed moderate risk hazards. Hazards with Risk Factors 1.9 and less are considered low risk.

Table 4.4.2-1 Dauphin County 2015 Hazard Ranking.

	HAZARD	RISK ASSESSMENT CATEGORY					RISK FACTOR
		PROBABILITY (1-4)	IMPACT (1-4)	SPATIAL EXTENT (1-4)	WARNING TIME (1-4)	DURATION (1-4)	
HIGH	Flood, Flash Flood, Ice Jam (N)	4	4	3	3	4	3.7
	Transportation Accidents (H)	4	3	4	4	4	3.7
	Winter Storm (N)	4	3	4	1	3	3.3
	Drought (N)	2	4	4	1	4	3.1
	Environmental Hazards (H)	4	3	2	4	2	3.1
	Nuclear Incidents (H)	1	4	4	4	3	3.0
	Hurricane, Tropical Storm, Nor'easter (N)	2	4	3	1	4	2.9
	Subsidence, Sinkhole (N)	4	2	1	4	4	2.8
	Tornado, Wind Storm (N)	3	3	2	4	1	2.7
MODERATE	Dam Failure (H)	1	3	2	4	4	2.4
	Utility Interruption (H)	3	1	3	4	2	2.4
	Wildfire (N)	3	2	2	3	2	2.4
	Pandemic and Infectious Disease (N)	1	2	4	1	4	2.2
	Radon Exposure (N)	2	1	4	1	4	2.2
LOW	Building or Structure Collapse (H)	1	3	1	4	1	1.9
	Landslide (N)	1	1	1	4	2	1.4

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

A risk assessment result for the entire County does not mean that each municipality is at the same amount of risk to each hazard. Table 4.4.2-2 lists Dauphin County municipalities and identifies whether their risk is greater than (>), less than (<), or equal to (=) the risk factor assigned to the County as a whole. This table was developed by the consultant team based on the findings in the hazard profiles of Section 4.3 and municipal input from the “Hazards in Your Community” worksheet distributed at the March 17, 2015 and March 19, 2015 Risk Assessment & Mitigation Solutions Workshops.

Table 4.4.2-2 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk.																
JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR															
	Flood, Flash Flood, Ice Jam (N)	Transportation Accidents (H)	Winter Storm (N)	Drought (N)	Environmental Hazards (H)	Nuclear Incidents (H)	Hurricane, Tropical Storm, Nor'easter(N)	Subsidence, Sinkhole (N)	Tornado, Windstorm (N)	Dam Failure (H)	Utility Interruption (H)	Wildfire (N)	Pandemic (N)	Radon Exposure (N)	Building or Structure Collapse (H)	Landslide (N)
	3.7	3.7	3.3	3.1	3.1	3.0	2.9	2.8	2.7	2.4	2.4	2.4	2.2	2.2	1.9	1.4
Berrysburg Borough	<	<	=	=	<	<	=	<	=	<	=	=	<	=	<	<
Conewago Township	=	<	=	>	<	=	=	<	=	<	=	<	=	=	<	<
Dauphin Borough	<	>	>	=	>	=	=	=	=	>	=	=	<	=	<	<
Derry Township	>	>	=	<	=	=	=	=	=	<	>	<	=	=	=	<
East Hanover Township	=	=	=	<	=	=	=	<	=	<	=	=	<	>	<	<
Elizabethville Borough	=	=	=	=	>	<	=	<	=	<	=	=	=	=	<	<
Gratz Borough	<	<	=	<	=	<	=	=	=	<	=	=	=	=	=	<
Halifax Borough	=	=	=	<	=	<	=	<	=	<	=	<	=	>	<	<
Halifax Township	=	=	=	=	=	<	=	<	=	<	=	>	<	>	<	<
Harrisburg City	>	>	=	<	>	=	=	>	=	>	=	<	>	=	>	<
Highspire Borough	>	>	=	<	>	=	=	=	=	<	=	<	=	=	=	<
Hummelstown Borough	>	>	=	<	=	=	=	>	=	<	=	<	=	=	=	<
Jackson Township	<	<	=	=	=	<	=	<	=	>	=	>	<	>	<	<
Jefferson Township	=	<	=	>	=	<	=	<	=	<	=	>	<	>	<	>
Londonderry Township	>	=	=	=	=	=	=	=	=	>	=	<	=	=	=	<
Lower Paxton Township	=	=	=	<	>	=	=	=	=	<	=	<	=	=	=	<
Lower Swatara Township	>	>	=	=	>	=	>	=	=	>	=	<	=	=	=	<
Lykens Borough	>	=	=	<	=	=	=	<	=	<	=	=	=	=	=	<

Table 4.4.2-2 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk.																
JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR															
	Flood, Flash Flood, Ice Jam (N)	Transportation Accidents (H)	Winter Storm (N)	Drought (N)	Environmental Hazards (H)	Nuclear Incidents (H)	Hurricane, Tropical Storm, Nor'easter(N)	Subsidence, Sinkhole (N)	Tornado, Windstorm (N)	Dam Failure (H)	Utility Interruption (H)	Wildfire (N)	Pandemic (N)	Radon Exposure (N)	Building or Structure Collapse (H)	Landslide (N)
	3.7	3.7	3.3	3.1	3.1	3.0	2.9	2.8	2.7	2.4	2.4	2.4	2.2	2.2	1.9	1.4
Lykens Township	=	=	=	<	=	<	=	<	=	<	=	>	<	=	=	>
Middle Paxton Township	<	>	=	=	>	=	=	=	=	>	=	>	<	=	<	>
Middletown Borough	>	=	=	=	>	=	>	=	=	<	=	<	=	=	=	<
Mifflin Township	=	=	=	>	=	<	=	<	=	=	=	>	=	=	<	>
Millersburg Borough	>	>	=	=	=	<	=	<	=	=	=	=	<	=	=	<
Paxtang Borough	=	>	=	<	>	<	=	=	=	<	=	<	=	=	=	<
Penbrook Borough	=	>	=	<	=	=	=	<	=	<	=	<	=	=	=	<
Pillow Borough	<	<	=	<	<	<	=	<	=	<	=	<	<	=	=	=
Reed Township	=	>	=	>	=	<	=	<	=	=	=	>	=	>	<	>
Royalton Borough	>	>	=	<	>	=	=	=	=	<	<	<	=	=	=	<
Rush Township	<	<	=	<	<	<	=	<	=	>	=	>	<	=	<	>
South Hanover Township	=	=	=	=	=	=	=	<	=	<	=	=	=	=	=	<
Steelton Borough	=	=	=	<	>	=	=	<	=	<	=	<	=	=	=	<
Susquehanna Township	>	>	=	<	>	=	=	<	=	<	=	<	=	=	=	<
Swatara Township	>	>	=	<	>	=	=	=	=	<	=	<	=	=	<	<
Upper Paxton Township	>	=	=	>	=	<	=	=	=	<	=	=	<	=	=	>
Washington Township	=	=	=	=	>	<	=	<	=	<	=	=	<	=	<	<
Wayne Township	<	<	=	=	=	<	=	<	=	<	=	>	>	>	=	<
West Hanover Township	=	=	=	<	=	=	=	=	=	<	=	>	=	=	=	<
Wiconisco Township	>	<	=	=	=	<	=	<	=	<	=	=	=	=	=	<
Williams Township	<	<	=	=	=	<	=	<	=	<	=	=	<	=	=	=
Williamstown Borough	<	<	=	<	=	<	=	<	=	<	=	<	<	=	=	=

4.4.3. Potential Loss Estimates

Potential loss estimates for hazard events help a community understand the monetary value of what might be at stake during a hazard event. Estimates are considered potential in that they generally represent losses that could occur in a countywide hazard scenario. In events that are localized, losses may be lower, while regional events could yield higher losses.

Potential loss estimates have four basic components, including:

- **Replacement Value:** Current cost of returning an asset to its pre-damaged condition, using present-day cost of labor and materials.
- **Content Loss:** Value of building's contents, typically measured as a percentage of the building replacement value.
- **Functional Loss:** The value of a building's use or function that would be lost if it were damaged or closed.
- **Displacement Cost:** The dollar amount required for relocation of the function (business or service) to another structure following a hazard event.

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

Historical Losses

Sufficient data was available from NCDRC, USDA RMA, and the NFIP to determine historical losses for Drought; Flood, Flash Flood, Ice Jams; Hurricanes, Tropical Storms Nor'easters; Tornado, Windstorm, and Winter Storms.

NCDRC reports include property and crop damage estimates with their incident reports. As noted in many of the hazard profiles, though, many of the events have no damages reported. This does not mean that there was no damage; rather, it indicates that no damages were reported to NCDRC. As a result, these should be considered low-end estimates of losses. The flood and flash flood events reported in NCDRC list \$335,087,000 including \$700,000 in crop damage and four fatalities over the history of flooding in the County. Property damage estimates for tornado were reported at \$5,940,000 with a range of property damage from \$2,500 to \$2.5 million and one reported death and 18 injuries. Wind events of greater than 50 knots had estimated losses of \$1,864,450 as well as \$20,000 in crop damage. Historical losses for winter storms, including ice storms, freezing rain, sleet, and heavy snow, include \$2,041,000 in property damage.

Agriculture is integral to portions of Dauphin County's economy, and agricultural production is highly vulnerable to natural hazard events. As previously mentioned, losses are available from the USDA RMA. The RMA operates and manages the Federal Crop Insurance Corporation, which provides crop insurance to American farmers. While not all crops are insured through RMA, their records provide strong insight into agricultural losses nationwide and in Dauphin County. Table 4.4.3-1 illustrates the total amount of indemnities paid through RMA since 1980 in Dauphin County by type of crop failure. Only crop failures related to the hazards related to the

HMP are listed. The majority of the historical crop losses have been due to drought conditions, followed by excessive precipitation.

Table 4.4.3-1 Historic Insured Crop Losses, 1980-2014 (USDA RMA, 2015).

REASON FOR LOSS	INDEMNITY AMOUNT
Cold Wet Weather	\$37,043.00
Drought	\$952,078.84
Excess Moisture/Precipitation /Rain	\$439,487.58
Flood	\$94,858.30
Freeze	\$47,293.00
Frost	\$24,106.00
Hail	\$244,776.00
Heat	\$220,811.50
Hurricane/Tropical Depression	\$10,576.50
Wind/Excess Wind	\$264,112.00
TOTAL	\$2,335,142.72

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

Table 4.4.3-2 Dauphin County Historic Flood Losses (FEMA CIS, 2015).

COMMUNITY	PARTICIPATION STATUS	TOTAL AMOUNT OF PAID CLAIMS
Berrysburg Borough	Not Participating (No SFHAs)	\$0.00
Conewago Township	Participating	\$29,048.15
Dauphin Borough	Participating	\$719,991.94
Derry Township	Participating	\$1,654,647.06
East Hanover Township	Participating	\$328,847.75
Elizabethville Borough	Participating	\$0.00
Gratz Borough	Participating	\$0.00
Halifax Borough	Participating	\$25,510.02
Halifax Township	Participating	\$367,797.95
Harrisburg City	Participating	\$28,523,800.41
Highspire Borough	Participating	\$2,517,450.73
Hummelstown Borough	Participating	\$1,873,987.78
Jackson Township	Participating	\$0.00

Table 4.4.3-2 Dauphin County Historic Flood Losses (FEMA CIS, 2015).		
COMMUNITY	PARTICIPATION STATUS	TOTAL AMOUNT OF PAID CLAIMS
Jefferson Township	Participating	\$1,067.97
Londonderry Township	Participating	\$11,601,134.33
Lower Paxton Township	Participating	\$250,215.14
Lower Swatara Township	Participating	\$2,186,675.86
Lykens Borough	Participating	\$533,677.12
Lykens Township	Participating	\$17,749.14
Middle Paxton Township	Participating	\$3,763,092.36
Middletown Borough	Participating	\$9,678,755.69
Mifflin Township	Participating	\$0.00
Millersburg Borough	Participating	\$259,245.64
Paxtang Borough	Participating	\$198,005.30
Penbrook Borough	Participating	\$0.00
Pillow Borough	Participating	\$6,459.12
Reed Township	Participating	\$456,683.66
Royalton Borough	Participating	\$1,241,484.52
Rush Township	Participating	\$0.00
South Hanover Township	Participating	\$6,267,603.61
Steelton Borough	Participating	\$1,420,265.96
Susquehanna Township	Participating	\$5,765,709.61
Swatara Township	Participating	\$3,986,626.53
Upper Paxton Township	Participating	\$611,803.54
Washington Township	Participating	\$202,503.11
Wayne Township	Participating	\$3,380.58
West Hanover Township	Participating	\$225,099.72
Wiconisco Township	Participating	\$9,212.21
Williams Township	Participating	\$0.00
Williamstown Borough	Participating	\$0.00
TOTAL		\$84,727,532.51

Modeled Losses (via HAZUS)

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

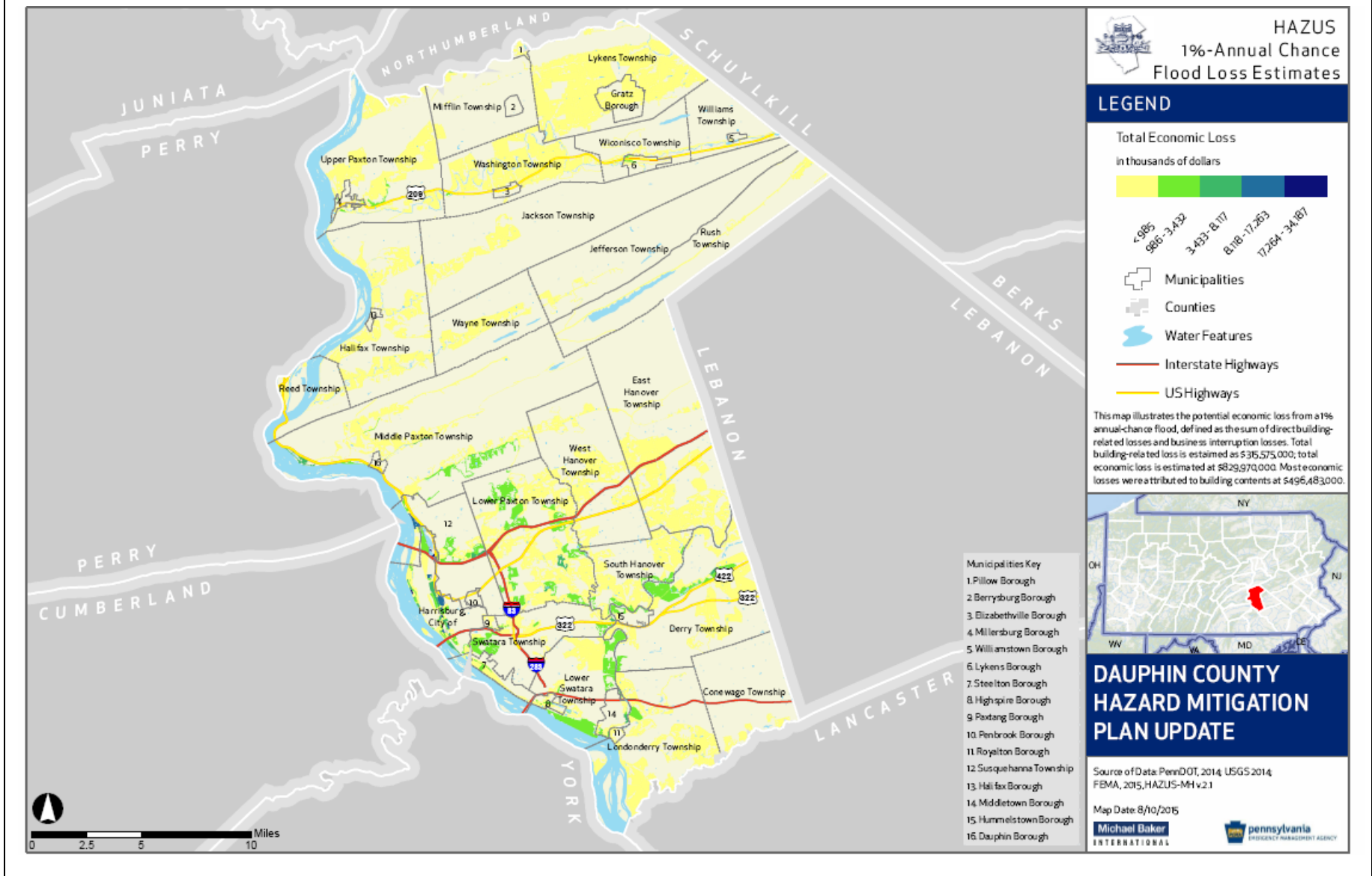
- Updated demographic data from the 2010 Census at the Census Block level,
- Updated essential facilities data from the County and other sources, and

- A user-delineated SFHA depth grid derived for Dauphin County from the effective DFIRM data and PaMAP LiDAR data digital elevation models.

Using these datasets in HAZUS-MH Version 2.2, total economic losses from a 1%-annual-chance flood in Dauphin County are estimated to equal \$828.97million. The total building-related losses are estimated at \$824.26 million with residential occupancies making up 32.20 percent of the total loss. Figure 4.4.3-1 shows a distribution of building-related losses by census block across Dauphin County. In this scenario, an estimated 606 buildings would be at least moderately damaged with 160 of these buildings completely destroyed. In addition, an estimated five essential facilities would sustain at least moderate damage and maximum total crop loss is estimated at \$17.41 million.

For more details on the HAZUS methodology used and additional results, see *Appendix F – HAZUS Methodology and Results Reports*.

Figure 4.4.3-2 HAZUS Dauphin County Flood Loss Estimates.



4.4.4. Future Development and Vulnerability

Population projections are useful in determining if a given area’s population trends will continue into the future. TCRPC, which provides planning services for the tri-county region which includes Dauphin and neighboring Cumberland and Perry counties, developed population projections to identify growth issues associated with land use, resource protection, and infrastructure planning. .

The U.S. Census Bureau released the official 2010 Census population data and this served as the baseline forecast year. This data was used to update the TCRPC population projections through 2040. Projections for years 2020, 2030 and 2040 for Dauphin County were developed based on the component cohort method using three factors: births, deaths, and migration. Municipal population forecasts were developed based on past municipal growth rates, building permits, and proposed land developments. Municipal population forecasts aggregate to county totals. Projections developed for each of Dauphin County’s municipalities are shown in Table 4.4.4-1.

The projections anticipate slight, steady increases in population at the County level to 2040. Between 2015 and 2040 continued population increases greater than 20 percent are anticipated in West Hanover and South Hanover Townships located in the southern portion of the County in the more densely populated area between Harrisburg and Hershey. Following trends seen in cities and boroughs throughout the country, slight population decreases are projected in Harrisburg, Steelton Borough, Lykens Borough, and Williamstown Borough.

Table 4.4.4-1 Municipal population and population projections (1990 – 2040).						
MUNICIPALITY	BASELINE POPULATION 2010 US CENSUS	POPULATION PROJECTIONS				PERCENT CHANGE, 2010 - 2014
		2015	2020	2030	2040	
Berrysburg Borough	368	371	374	380	384	4.3%
Conewago Township	2,997	3,110	3,223	3,413	3,564	18.9%
Dauphin Borough	791	797	803	813	820	3.7%
Derry Township	24,679	25,343	26,007	27,097	27,625	11.9%
East Hanover Township	5,718	5,823	5,928	6,093	6,218	8.7%
Elizabethville Borough	1,510	1,521	1,532	1,550	1,564	3.6%
Gratz Borough	765	779	793	816	834	9.0%
Halifax Borough	841	847	853	863	871	3.6%
Halifax Township	3,483	3,577	3,671	3,830	3,956	13.6%
Harrisburg City	49,528	49,432	49,335	49,173	49,044	-1.0%
Highspire Borough	2,399	2,408	2,418	2,434	2,447	2.0%
Hummelstown Borough	4,538	4,606	4,674	4,789	4,880	7.5%
Jackson Township	1,941	1,996	2,052	2,145	2,219	14.3%
Jefferson Township	362	374	385	405	421	16.3%

Table 4.4.4-1 Municipal population and population projections (1990 – 2040).						
MUNICIPALITY	BASELINE POPULATION 2010 US CENSUS	POPULATION PROJECTIONS				PERCENT CHANGE, 2010 - 2014
		2015	2020	2030	2040	
Londonderry Township	5,235	5,360	5,484	5,695	5,862	12.0%
Lower Paxton Township	47,360	48,731	50,103	52,600	55,230	16.6%
Lower Swatara Township	8,268	8,504	8,740	9,137	9,453	14.3%
Lykens Borough	1,779	1,778	1,777	1,775	1,773	-0.3%
Lykens Township	1,618	1,658	1,699	1,767	1,821	12.5%
Middle Paxton Township	4,976	5,208	5,439	5,723	5,976	20.1%
Middletown Borough	8,901	8,983	9,065	9,204	9,314	4.6%
Mifflin Township	784	806	828	865	894	14.0%
Millersburg Borough	2,557	2,564	2,571	2,583	2,592	1.4%
Paxtang Borough	1,561	1,562	1,563	1,566	1,567	0.4%
Penbrook Borough	3,008	3,029	3,051	3,087	3,116	3.6%
Pillow Borough	298	300	302	304	307	3.0%
Reed Township	239	246	252	263	272	13.8%
Royalton Borough	907	933	959	1,003	1,038	14.4%
Rush Township	231	236	241	249	256	10.8%
South Hanover Township	6,248	6,606	6,964	7,568	8,047	28.8%
Steelton Borough	5,990	5,985	5,980	5,972	5,965	-0.4%
Susquehanna Township	24,036	24,801	25,567	26,827	27,491	14.4%
Swatara Township	23,362	23,891	24,420	25,313	26,022	11.4%
Upper Paxton Township	4,161	4,285	4,409	4,618	4,783	14.9%
Washington Township	2,268	2,326	2,384	2,481	2,559	12.8%
Wayne Township	1,341	1,393	1,446	1,535	1,605	19.7%
West Hanover Township	9,343	9,902	10,460	11,403	12,151	30.1%
Wiconisco Township	1,210	1,220	1,230	1,247	1,260	4.1%
Williams Township	1,112	1,129	1,146	1,175	1,197	7.6%
Williamstown Borough	1,387	1,383	1,379	1,372	1,367	-1.4%
Dauphin County	268,100	273,803	279,507	289,133	296,765	10.7%

Making use of the analysis of Dauphin County’s current population and demographics along with future population trends, it is important to explore how these projected changes may influence the County’s future vulnerability to the profiled hazards. Hazard vulnerability and loss potential will be higher in the places of higher density such as Harrisburg and the boroughs throughout the County. As areas continue to grow and densify, as many of the townships are projected to, these communities might become more vulnerable to hazards. For example, population growth and its associated development is likely to create increases in loss potential,

as more people may be living in areas prone to hazards, especially flooding, winter storms, droughts, and wildfires.

As noted in Section 2.3, housing projections prepared by TCRPC for Dauphin County reflect that the number of occupied housing units in the County is projected to steadily increase from 110,435 in 2010 to 122,433 in 2040. Middle Paxton, South Hanover, and West Hanover Townships are projected to increase the number of occupied housing units by over 20 percent between 2010 and 2040, consistent with the population projections in Table 4.4.4-1. The projections are useful in determining the location of future land development for hazard mitigation planning purposes.

Based on current County subdivision and land development activity, land development trends are expected to increase over the HMP planning period between 2015 and 2020. Similar to the housing projections noted above, subdivision and land development activity is useful for hazard mitigation planning purposes. DCPC's annual report includes subdivision and land development reviews and residential development activity. According to the 2013 annual report, DCPC acted on 123 subdivision and land development plans in 2013, the first year since 2005 that there has been an increase in the number of plans reviewed. The submitted plans included 644 proposed housing units and 40.04 acres of proposed commercial and industrial development. Refer to Figure 2.4-1 in Section 2.4 which shows the location of the subdivision and land development plan submission activity and is a good indication of future development activity.

While future growth which in return can lead to increased risk in the County can be estimated by reviewing population and housing projections and recent subdivision and land development activity, planning for growth is extremely useful in that it provides an area with a framework to guide future growth based on infrastructure and citizen input. TCRPC has developed the Planned Growth Area (PGA) strategy as part of the RGMP adopted in 2011. The strategy utilizes a process where local and county officials participate in an organized effort to identify areas already served by existing capital infrastructure such as water, sewer, transportation facilities, emergency services, and parks and schools and to establish the most practical future development areas (TCRPC, 2011).

The PGA strategy does not preclude land not located in a future development area from being developed. Rather the process attempts to guide and coordinate increased land use density and intensity where there is existing and available capital infrastructure and should be a municipality's first preference for managing future growth. The PGA strategy promotes the delineation of PGAs around Community Service Areas (CSAs) where existing infrastructure is located. Of the 213 plans submitted in 2013, 68 or 55.3 percent were located within CSAs.

Specific hazards in which risk increases due to Dauphin County's growth and development patterns include flooding, nuclear incidents, and wildfires.

- Traditional development increases impervious surface, one of the leading contributors to flooding and an affecting factor of the water supply. As a result, as impervious surfaces

increase (or shrink), flooding hazards will change, and made some areas even more prone to flooding. This was noted repeatedly by the Planning Team throughout the planning process. The County should take future development patterns into consideration and find ways to mitigate this high risk hazard.

- All of Dauphin County is within the 50-mile EPZ, or Ingestion Exposure Pathway and several municipalities are located within Plume Exposure Pathway EPZ (within 10 miles) of Three Mile Island. In addition, the southern portion of the County is located within the EPZ surrounding the Peach Bottom nuclear power plant in York County and the northeastern portion is located within the EPZ surrounding the Susquehanna nuclear power plant in Columbia County. Therefore, the agriculture industry and water sources are at risk of being contaminated in the case of a nuclear incident at any of the nuclear power plants. Though nuclear incidents are often few and far between, they can have catastrophic effects. As future development occurs, it is important that the County take into consideration the best ways to mitigate this type of hazard given its high risk to agriculture and water sources.
- Several municipalities with population growth greater than 15 percent by 2040 (20.1 percent in Middle Paxton Township) are ranked high risk from wildfires. As more development occurs in proximity to these highly wooded areas, more structures are vulnerable to wildfires and the risk of wildfires increases as the urban-wildland interface shrinks.

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 networks, 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. As noted above in 2013, 644 housing units and development of 40.04 acres of commercial and industrial development were proposed in Dauphin County. If constructed as proposed, this development would result in increased people and structures to account for and at risk of during a natural or human-made hazard incident.

5. Capability Assessment

5.1. Update Process Summary

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

The County's original HMP adopted in 2004 included an assessment of capabilities which was updated in the 2010 HMP. The 2010 HMP summarized institutional capability relative to staff resources, legal capability in terms of regulations and plans, fiscal capability, political capability in terms of each jurisdiction's willingness to accomplish hazard mitigation objectives, and technical capability relative to staff expertise and experience in carrying out hazard mitigation related activities.

For the 2015 HMP update, a Capability Assessment Survey was developed based on PEMA's 2013 SOG. The survey contained 5 sections including: planning and regulatory capability, administrative and technical capability, financial capability, education and outreach, and self-assessment of capability.

In addition, FEMA's NFIP Worksheet was incorporated into the Capability Assessment Survey. The NFIP Worksheet was developed to obtain information on participation in and compliance with the NFIP.

To assist municipalities in reducing the amount of time needed to complete the survey, NFIP information collected by the consultant team was inserted into a survey prepared for each municipality, with the exception of Berrysburg Borough as it does not participate in the NFIP. A hard copy of the Capability Assessment Survey was distributed to municipalities in attendance at the HMP Kick Off meetings on February 17 and February 19, 2015. If a municipality was not able to attend a kick off meeting, the Capability Assessment Survey was sent via e-mail.

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

5.2. Capability Assessment Findings

Findings from the Capability Assessment Survey are presented in this section. Thirty-two of Dauphin County's 40 municipalities updated and completed the Capability Assessment Survey/NFIP Worksheet. In addition to the survey, capability information was gathered during due diligence conducted in preparing the hazard profiles and developing mitigation actions.

The following is a summary of County and municipal activities that have occurred over the five-year planning period which demonstrate an increase of capabilities to implement hazard mitigation actions:

- **Development of a County-Wide CRS Program.** In an effort to increase municipal participation in the CRS with the ultimate goal of reducing flood insurance premiums for Dauphin County residents and businesses, Dauphin County began a CRS Program in 2014. Twenty-two municipalities are participating in the program which provides assistance in assessing readiness to participate in CRS.
- **Adoption of a Regional Growth Management Plan.** Dauphin County, along with neighboring Cumberland and Perry Counties, adopted a Regional Growth Management Plan (RGMP) in 2011 to assess regional development and transportation issues. It establishes a regional planning framework, and it is anticipated that future Municipal and County Comprehensive Plans will be compatible with the planning framework adopted through the RGMP.
- **Establishment of the Dauphin County Land Bank Authority.** In 2013, Dauphin County adopted an ordinance creating the Dauphin County Land Bank Authority. The Land Bank was established to use available resources to facilitate the return of vacant, blighted, abandoned, and tax-delinquent properties to productive use. This action will assist in addressing the Building or Structure Collapse hazard.
- **Coordinating Emergency Management Functions.** Sixteen Dauphin County municipalities coordinate emergency management functions by sharing Emergency Management Coordinators (EMCs). This leverages limited resources particularly in rural areas of the County.
- **Adopting and Updating Planning Tools.** During the 2010 – 2014 planning period several Dauphin County municipalities either adopted new or updated existing plans and ordinances such as but not limited to comprehensive plans, subdivision and land development plans, and zoning ordinances. These activities strengthen the County's overall land use planning capability and subsequently strengthen the County's resiliency to impacts from future hazard events.

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

5.2.1. Planning and Regulatory Capability

5.2.1.1. Comprehensive Plans, Zoning, and Subdivision Regulations

As noted in Section 2.3, TCRPC provides staffing for DCPC. DCPC is in the process of updating the County's 2008 Comprehensive Plan and anticipates adoption of the Comprehensive Plan Update in June 2016. DCPC adopted a Sewerage Plan in 1995 to identify County sewage collection and treatment needs and adopted a Parks, Recreation, Open Space, and Greenways Plan in 2007.

In addition, TCRPC developed a Regional Growth Management Plan (RGMP) in 2011 for the purpose of identifying regional development and transportation issues in the tri-county region including Dauphin, Cumberland, and Perry counties. The RGMP provides a planning framework to serve as a foundation for future county comprehensive plans, regional transportation plans, and other plan updates in an effort to maintain regional land use and transportation planning consistency. From a hazard mitigation planning perspective, the RGMP establishes a sound framework to address natural resources and utility and transportation infrastructure which are

inherently linked in the region. The RGMP is useful for local comprehensive planning in that it identifies the location of existing and planned utility systems and infrastructure and areas that are potentially suitable for development.

Regional transportation planning is provided through Harrisburg Area Transportation Study (HATS), which is the regional Metropolitan Planning Organization (MPO) covering Dauphin, Cumberland, and Perry counties that is responsible to ensure continuing, comprehensive, and coordinated transportation planning in accordance with the Federal-Aid Highway Act of 1962. HATS can provide valuable assistance when addressing the Transportation Accidents hazard. Once Dauphin County completes its Evacuation Plan update, which is currently underway, HATS will incorporate information into the Regional Transportation Plan (RTP) which is updated every four years with the most recent plan updated in December 2014. Further, HATS provides transportation modelling assistance in the event of a transportation incident by determining alternate transportation routes.

Pennsylvania municipalities have the authority to govern more restrictively than state and county minimum requirements, provided municipalities are in compliance with criteria established in the Pennsylvania Municipalities Planning Code (Act of 1968, P.L.805, No.247, as reenacted and amended) (MPC) and respective municipal codes. Municipalities can develop their own policies and programs and implement their own rules and regulations to protect and serve their local residents. Local policies are typically identified in a Comprehensive Plan, implemented via a local ordinance, and enforced through the governmental body or its appointee.

In addition to comprehensive plans, some of the most important planning and regulatory capabilities that can be utilized for hazard mitigation include building codes, floodplain ordinances, subdivision and land development ordinances (SALDOS), and zoning ordinances. These planning tools provide mechanisms for the implementation of adopted mitigation strategies. Table 5.2.1-1 summarizes major planning tools in each Dauphin County municipality. Zoning in the County is conducted at the municipal level; there is no County zoning.

MUNICIPALITY	COMPREHENSIVE PLAN ADOPTION	BUILDING CODE EFF. DATE	NFIP ENTRY	SUBDIVISION REGULATIONS ADOPTION	ZONING REGULATIONS ADOPTION
Berrysburg Borough		05/13/04		County	
Conewago Township	2009	07/08/04	04/30/86	2007	2007
Dauphin Borough	1975	07/06/04	04/15/77	1997	2007
Derry Township	1991	07/08/04	09/30/77	2011	2015
East Hanover Township	2011	06/01/04	01/16/80	2003	2003
Elizabethville Borough		05/12/08	06/25/76	County	
Gratz Borough	1990	08/08/04	12/14/79	1975	1992
Halifax Borough	2014	07/05/04	09/05/79	1961	2014
Halifax Township	1996	07/02/04	11/03/82	2006	
Harrisburg City	1974	07/08/04	05/02/77	1990	2006

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Table 5.2.1-1 Dauphin County municipal planning tools and adoption dates.					
MUNICIPALITY	COMPREHENSIVE PLAN ADOPTION	BUILDING CODE EFF. DATE	NFIP ENTRY	SUBDIVISION REGULATIONS ADOPTION	ZONING REGULATIONS ADOPTION
Highspire Borough	2007	06/15/04	04/15/77	2009	2011
Hummelstown Borough	2005	05/27/04	03/15/77	1993	2005
Jackson Township		07/08/04	10/15/85	1999	
Jefferson Township		10/16/06	10/15/82	County	
Londonderry Township	2005	07/06/04	03/18/80	2001	2001
Lower Paxton Township	2004	07/01/04	04/15/81	2010	2011
Lower Swatara Township	2004	05/24/04	04/15/77	2000	2006
Lykens Borough	1975	06/14/04	09/03/80	1975	1975
Lykens Township	1992	05/23/05	10/15/85	1997	1999
Middle Paxton Township	1999	07/08/04	08/15/79	2008	2006
Middletown Borough	2006	06/01/04	12/28/76	2008	2007
Mifflin Township		07/06/04	06/25/76	1979	
Millersburg Borough	2007	07/08/04	08/15/80	County	
Paxtang Borough	2009	05/23/04	03/18/80	2013	2012
Penbrook Borough	1991	06/07/04	07/31/78	2004	1992
Pillow Borough		07/01/04	11/19/87	1978	
Reed Township	1999	07/08/04	11/01/79	1990	
Royalton Borough	1981	06/06/04	04/15/77	1990	1985
Rush Township		07/01/13	08/19/85	County	
South Hanover Township	1991	05/31/04	05/02/77	2006	2006
Steelton Borough	2002	04/26/04	04/15/77	2004	2005
Susquehanna Township	2000	07/08/04	04/15/77	2003	2003
Swatara Township	1976	05/17/04	02/03/82	2004	2002
Upper Paxton Township	2007	07/07/04	09/05/79	2003	2006
Washington Township	2008	07/08/04	12/17/87	2004	2005
Wayne Township		07/09/04	08/05/85	1990	
West Hanover Township	2003	04/12/04	03/18/80	2007	2006
Wiconisco Township	2007	11/05/12	04/15/81	1975	1975
Williams Township		07/04/04	10/15/85	County	
Williamstown Borough		06/24/04	11/01/79	County	
	Adopted during planning period.				
	Updated during planning period.				

Thirty (30) of Dauphin County's 40 municipalities have adopted a comprehensive plan, 27 have adopted a zoning ordinance, and the County provides subdivision and land development oversight in seven municipalities. Since the 2010 HMP update, Halifax Borough has adopted

both a comprehensive plan and zoning regulations. Several municipalities have updated planning tools as noted in Table 5.2.1-1.

5.2.1.2. *Emergency Management*

DEMA coordinates county-wide emergency management services. DEMA operates the County's 911 Emergency Communications Center; coordinates the Dauphin County Local Emergency Planning Committee (LEPC) which has been established in accordance with the requirements of Title III Superfund Amendments, Reauthorization Act of 1986 (SARA, Title III) and Pennsylvania Act 1990-165 as amended; coordinates the Dauphin County Hazardous Materials Response Team which includes both volunteers and career personnel who train and respond together to mitigate hazardous situations throughout Dauphin County; and coordinates training for the County's emergency responders.

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

The Emergency Management Services Code (PA Title 35) requires all Pennsylvania municipalities to have a Local Emergency Operations Plan (EOP) which is updated every two years. Dauphin County's EOP, updated and adopted in January 2015, complies with the National Incident Management System (NIMS) and is the basis for a coordinated and effective response to any disaster that may affect lives and property in Dauphin County. The EOP, or portions thereof, would be implemented when emergency circumstances warrant.

Municipalities have been increasingly combining efforts to share emergency management functions. Sixteen municipalities share emergency management functions. This leverages limited resources particularly in rural areas of the County. These municipalities include:

- Berrysburg Borough, Mifflin Township, and Pillow Borough
- Dauphin Borough and Middle Paxton Township
- Elizabethville Borough and Washington Township
- Millersburg Borough and Upper Paxton Township
- Jackson Township, Reed Township, and Wayne Township
- Rush Township and Jefferson Township
- Williamstown Borough and Williams Township

5.2.1.3. *Participation in the National Flood Insurance Program*

All municipalities in Dauphin County, with the exception of Berrysburg Borough, participate in the NFIP. Participating municipalities are in good standing and there are no outstanding compliance issues.

The Pennsylvania Floodplain Management Act (Act 166 of 1978) requires every municipality identified by FEMA to participate in the NFIP and permits all municipalities to adopt floodplain management regulations. It is in the interest of all property owners in the floodplain to keep development and land use within the scope of the floodplain regulations for their community.

This helps keep insurance rates low and makes certain that the risk of flood damage is not increased by property development.

FEMA Region III makes available to communities an ordinance review checklist which lists required provisions for floodplain management ordinances. This checklist helps communities develop an effective floodplain management ordinance that meets federal requirements for participation in the NFIP. The Pennsylvania Department of Community and Economic Development (DCED) provides communities, based on their 44 CFR 60.3 level of regulations, with a suggested ordinance document to assist municipalities in meeting the minimum requirements of the NFIP and the Pennsylvania Flood Plain Management Act (Act 166). Act 166 mandates municipal participation in and compliance with the NFIP. It also establishes higher regulatory standards for hazardous materials and high risk land uses. As new Digital Flood Insurance Rate Maps (DFIRMS) are published, the Pennsylvania State NFIP Coordinator at DCED works with communities to ensure the timely and successful adoption of an updated floodplain management ordinance by reviewing and providing feedback on existing and draft ordinances. In addition, DCED provides guidance and technical support through Community Assistance Contacts (CAC) and Community Assistance Visits (CAV). The effective date for DFIRMS in all Dauphin County jurisdictions was August 12, 2012.

Table 4.3.2-8 includes the number of NFIP policies, claims, and substantial damage claims per municipality. Currently, only Harrisburg participates in the CRS, but as noted in Section 4.3.2.3, 21 additional municipalities are participating in Dauphin County's CRS Program. Launched in 2014, the CRS Program is an effort to increase municipal participation in the CRS with the ultimate goal of reducing flood insurance premiums for Dauphin County residents and businesses. Through this program, the County has retained consultant services to work one-on-one with municipalities interested in pursuing CRS designation. In Fall 2014, all municipalities were invited to an outreach session to learn more about the Biggert-Waters Act, the NFIP, and the CRS. Municipalities interested in pursuing CRS designation signed a letter of intent with the County and consultant Tetra Tech to establish their commitment to provide resources necessary for the consultant team to catalogue and assess flood plain management activities and prepare an assessment of the municipality's strengths and areas of improvement prior to preparing a CRS application. The County will then assist municipalities in preparing a CRS application for submission to FEMA. As of May 2015, twenty-two municipalities signed a letter of intent to participate in the County's CRS Program as shown in the 'County CRS Program Participant' column in Table 4.3.2-6. It is the County's hope that augmenting municipal resources to help develop and prepare a CRS application will result in reduced insurance premiums for Dauphin County residents and businesses.

5.2.1.4. Stormwater and Floodplain Management

The Pennsylvania Storm Water Management Act (Act of October 4, 1978, P.L. 864 No. 167), commonly referred to as Act 167, requires Pennsylvania counties to prepare and adopt stormwater management plans. It also requires municipalities to amend or adopt stormwater management ordinances consistent with the plan. Dauphin County Conservation District (DCCD) worked with municipalities, the County, and stakeholders to develop the most recent Dauphin County Act 167 Stormwater Management Plan which was adopted in 2010 and

includes a model stormwater management ordinance for municipal use. DCCD worked with municipalities to adopt the stormwater management plan and ordinance and to date and all of the County's municipalities have done so.

5.2.1.5. *Building and Fire Codes*

Building codes regulate standards for new construction and substantially renovated buildings. Standards can be adopted that require resistant or resilient building design practices to address hazard impacts common to a given community. Enforcement of Pennsylvania's statewide building code, generally known as the Uniform Construction Code (UCC), began in 2004. The UCC establishes minimum regulations for most new construction, including additions and renovations to existing structures. Current UCC Regulations took effect on December 31, 2012 and include the 2009 International Codes issued by the International Code Council (ICC) and Chapter 11 and Appendix E of the 2012 International Building Code with exceptions identified by L & I (PA Department of Labor & Industry, 2014). Over 90 percent of Pennsylvania's municipalities administer and enforce the UCC locally (known as Opt-ins), using their own employees or a certified third party agencies (private code enforcement agencies) they have retained. Opt-outs are those municipalities that have handed over UCC enforcement authority to either L&I (for non-residential buildings and structures) or certified third-party agencies (hired by a property owner for residential code enforcement). All Dauphin County municipalities with the exception of Berrysburg Borough are opt-in municipalities (PA Department of Labor & Industry, May 2015).

Fire code requirements are integrated into the UCC, to which all 40 municipalities are subject, as required by PA Act 45. Under the UCC, the International Fire Code is adopted only to the extent referenced in the International Building Code. In an effort to provide increased fire protection, Lower Swatara Township has adopted a fire protection and fire prevention ordinance.

To address Radon Exposure which has been added as a hazard to the 2015 HMP, an action will be added to adopt the Radon Control Methods Appendix of the current, adopted edition of the International Residential Code to address radon in new construction.

5.2.1.6. *Additional Planning Tools*

Several municipalities have adopted, are in the process of preparing, or in the process of updating functional plans to protect valuable community resources such as natural resources, farmland, open space, and historic resources.

Lower Paxton Township, Lower Swatara Township, and Susquehanna Township have prepared and Conewago Township is in the process of preparing a Natural Resource Protection Plan. Such plans are consistent with several mitigation actions identified in the 2010 HMP.

Jackson Township, Jefferson Township, and Upper Paxton Township have prepared farmland preservation plans and Conewago Township is in the process of preparing a plan. Several additional municipalities have ordinance provisions designed to advance the conservation of farmland and farm uses.

Lower Paxton Township and Middletown Borough have prepared and Conewago Township is in the process of preparing a Historic Preservation Plan. These plans will be useful as the County seeks to mitigate impacts to buildings and structures as part of actions to address the Building or Structure Collapse hazard.

A capital improvement plan is a multi-year policy guide that identifies needed capital projects and is used to coordinate the financing and timing of public improvements such as streets, stormwater systems, water distribution, sewage treatment, and other major public facilities. From a hazard mitigation planning perspective, capital improvement planning can identify and program hazard mitigation projects. According to Capability Assessment Survey results, four municipalities have capital improvement plans in place (Highspire Borough, Londonderry Township, Lower Paxton Township, and Millersburg Borough) and four are in the process of preparing a plan (Conewago Township, Dauphin Borough, Middletown Borough, and Middle Paxton Township). Dauphin Borough and Middle Paxton Township are working jointly to prepare a Capital Improvement Plan. Londonderry Township's plan includes a five year plan for infrastructure replacement and Millersburg Borough Council adopts a capital improvements budget annually.

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.

The majority of Dauphin County municipalities completing the Capability Assessment Survey reported limited levels of administrative and technical staff needed to conduct hazard mitigation activities. County and regional organizations are available as partners to assist in mitigating hazards including DCCD, SRBC, DCPC, and DCDCED. State agencies which can provide technical assistance for mitigation activities include, but are not limited to:

- Pennsylvania Department of Community and Economic Development,
- Pennsylvania Department of Conservation and Natural Resources,
- Pennsylvania Department of Environmental Protection,
- Pennsylvania Department of Transportation, and
- Pennsylvania Historical and Resource Commission.

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

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

As noted in Section 3.3, FEMA Region 3 has already provided assistance in providing technical assistance for mitigation activities by attending the Draft Plan Review Meeting on June 1, 2015 to talk about the NFIP CRS and answer any questions municipalities have regarding the application process and maintaining program participation.

5.2.3. Financial Capability

Financial capability is important to the implementation of hazard mitigation activities. Every jurisdiction must operate within the constraints of limited financial resources. During the 1960s and 1970s, state and federal grants-in-aid were available to finance a large number of programs, including street improvements, water and sewer facilities, airports, and parks and playgrounds. During the early 1980s, there was a significant change in federal policy, based on rising deficits and a political philosophy that encouraged states and local governments to raise their own revenues for capital programs resulting in the need to identify alternate means to augment revenue.

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

Financial resources are particularly important if communities are trying to take advantage of state or federal mitigation grant funding opportunities that require local match contributions. Based on Capability Assessment Survey results, most municipalities within the County perceive financial capability to be limited to moderate. The most common type of fiscal capability is not a funding source, but rather partnering agreements between municipalities or between municipalities and other organizations and agencies that enable resource sharing. Several state funding sources may be available for hazard mitigation planning activities. These sources include, but are not limited to:

- CFA/DCED Flood Mitigation Program,
- CFA/DCED H2O PA Flood Control Projects,
- CFA/DCED H2O PA High Hazard Unsafe Dam Projects,
- CFA/DCED H2O PA Water Supply, Sanitary Sewer and Storm Water Projects,

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

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

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

As discussed in Section 4.3.2.5, Dauphin County has received over \$14 million in CDBG-DR funding since 2012 to address flood impacts associated with Tropical Storm Lee. A total of eleven municipal stormwater and transportation infrastructure improvement projects are in-progress or have been completed through the first round of CDBG-DR funding. The County submitted a Phase I CDBG-DR National Disaster Resilience Competition (NDRC) application in March 2015. In June 2015 HUD, along with its partner the Rockefeller Foundation, announced that Dauphin County was one of six counties or parishes in the country selected to move on to Phase II of the competition. Phase II applications are due October 2015 and awards will be announced January 2016 (HUD, June 2015). If funding is awarded, it would help the County implement approximately \$197 million in hazard mitigation projects.

Dauphin County is proactive in developing new programs, most enabled through state legislation, to improve community and economic development throughout Dauphin County. The

following programs are potentially useful in implementing hazard mitigation planning activities and are in addition to the County CRS Program discussed above.

- Dauphin County Land Bank Authority.

The Dauphin County Land Bank Authority (Land Bank) was created by Ordinance 2013-4 and enabled by Act 153 of 2012, 68 Pa. S.S.A. at Section 2107, Creation of Land Banks for the Conversion of Vacant or Tax-Delinquent Properties into Productive Use. The Land Bank was established to use available resources to facilitate the return of vacant, blighted, abandoned and tax-delinquent properties to productive use thereby combating community deterioration, creating economic growth and stabilizing the housing and job market. Governed by a seven member board, the Land Bank acquires, holds, and transfers interest in real property throughout Dauphin County as approved by the Board of Directors for the following purposes consistent with the goals established by the Dauphin County Land Bank Ordinance, local government partners and other community stakeholders:

- To deter the spread of blight
- To promote redevelopment and reuse of vacant, abandoned, and tax-delinquent properties
- To support targeted efforts to stabilize neighborhoods

Local taxing bodies including the County, municipalities, and local school district enter into an Intergovernmental Cooperation Agreement and Memorandum of Understanding (MOU) with the Land Bank. Properties are referred to the Land Bank with the focus on revitalization to improve a property's condition, ultimately increasing the municipal tax base. To date, twelve Dauphin County municipalities have signed an Intergovernmental Cooperation Agreement/MOU with the Land Bank as noted below. Several municipalities are waiting for signatures from local school districts before the Land Bank agreement is fully authorized. Those municipalities in which agreements are fully authorized are noted below as 'fully authorized'.

- East Hanover Township
 - Highspire Borough
 - Hummelstown Borough (fully authorized)
 - Londonderry Township (fully authorized)
 - Lykens Borough
 - Middletown Borough
 - Millersburg Borough (fully authorized)
 - Royalton Borough
 - Steelton Borough
 - Susquehanna Township (fully authorized)
 - Upper Paxton Township
 - Washington Township
- Dauphin County Local Share Gaming Fund.

The Pennsylvania Race Horse Development and Gaming Act, as amended, established a coordinated system for ensuring that local governments receive a share of the revenues generated by gaming. This "Local Share" system distributes approximately 4 percent of gross revenues of certain licensed gaming facilities to support community and economic well-being and mitigate the impact of gaming and related activities. Those funds are distributed to the licensed facility's host municipality and host county. Dauphin County is a host county. Under the Local Share system, Dauphin County uses a portion of the Local Share monies it receives for awarding municipal grants. Grants may be awarded from two grant pools: (1) a pool for projects with a clear connection to the operations or impacts of the licensed gaming facility; and (2) a pool where a project's connection to the licensed facility may be considered, but is not required, to receive a grant. The Dauphin County Gaming Advisory Board determines whether an application will be considered for funding from one or both grant pools. Eligible uses for funds from Grant Pool 2 include:

- Health: Projects that facilitate, enhance, or otherwise further the health of the residents and communities of the grantee.
 - Safety: Projects that facilitate, enhance, or otherwise further the safety of the residents and communities of the grantee.
 - Transportation: Projects that address transportation needs or improve transportation systems in the grantee communities.
 - Public Interest: Projects that improve the quality of life in the grantee communities.
- Dauphin County Infrastructure Bank.

Starting in 2013, the Dauphin County Infrastructure Bank (DCIB) provides low-interest loan financing to support surface transportation projects county-wide and is intended to leverage other private, local, state, and federal funding resources. The County is working with PennDOT on the DCIB and will provide a maximum of \$30 million through 2016 for low-interest loans for qualifying transportation projects. Program funds are run through PennDOT's PIB Program. Public road and bridge repair, improvement, or construction and Culverts and drainage structures are some of the eligible uses of DCIB Program funding. The program was a 2014 Achievement Award Winner from the National Association of Counties (NACO).

Additional financial resources can be generated from local fees and taxes. Municipalities may exercise their taxing authority to raise funds for projects as they see fit. This includes special taxes to fund mitigation measures such as, but not limited to, EMS, firefighting, fire equipment, fire hydrants, and infrastructure improvements.

Intergovernmental cooperation is one manner of accomplishing common goals, solving mutual problems, and reducing expenditures. Dauphin County municipalities have many types of partnering arrangements in place. According to results of the Capability Assessment Survey 17 municipalities participate in such efforts which some of the activities including:

- Emergency management,
- Council of Governments (Capital Region COG),

- Mutual aid agreements,
- Police service,
- Multi-municipal purchasing (PA COSTARS),
- Regional transportation projects,
- Downtown business development, and
- Water and sewer authorities.

Collectively, these partnering arrangements increase the County's capability for multi-municipal hazard mitigation planning.

The Capital Region Council of Governments (CapCOG) includes 40 municipal members from Dauphin, Cumberland, and York counties. A total of 20 Dauphin County municipalities participate in the COG including: Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Middle Paxton Township, Middletown Borough, Paxtang Borough, Penbrook Borough, Royalton Borough, South Hanover Township. One of the most current initiatives undertaken by CapCOG is developing a regional approach to effectively and economically meet Chesapeake Bay state and federal stormwater requirements - CapCOG Chesapeake Bay Pollutant Reduction Plan.

5.2.4. Education and Outreach Capability

Education and outreach programs and methods are used to implement mitigation activities and communicate hazard-related information. Examples include fire safety programs that fire departments deliver to students at local schools; participation in community programs, such as Firewise Communities Certification or StormReady Certification; and activities conducted as part of hazard awareness campaigns, such as Tornado or Flood Awareness Month. Some communities have their own public information or communications office to handle outreach initiatives. Overall, Dauphin County municipalities reported limited education and outreach capability.

Reported education and outreach activities in Dauphin County are summarized as follows. Several watershed associations serve the County such as Clarks Creek Watershed Preservation Association, Paxton Creek Watershed and Education Association, and Tri-County Conewago Creek Association. Halifax Borough and Paxtang Borough note fire prevention programs for schools and citizens. Middle Paxton Township notes several non-profit organizations conduct stream and river cleanup. Harrisburg has multiple organizations serving the needs of homeless citizens.

DEMA maintains Storm Ready Certification and DEMA staff routinely conducts public outreach to educate citizens on preparedness and safety information. The Dauphin County Crisis Intervention Program received a small grant award to conduct disaster preparedness planning, training, and workshops in 2011. Senior citizens and citizens with mental disabilities were included in the outreach.

DCPC conducts routine outreach with Dauphin County municipalities and planning and related issues.

5.2.5. Plan Integration

Plan integration ensures that hazard mitigation planning is woven into each jurisdiction's planning and regulatory documents. Per FEMA, plan integration is described as the regular consideration and management of hazard risks in a community's existing planning framework. The planning framework is the collection of plans, policies, codes, and programs that guide land use and development, how those are maintained and implemented, and the roles of a range of stakeholders to evaluate and update them. Effective integration of hazard mitigation occurs when the planning framework fosters development that does not increase risks from known hazards or leads to redevelopment that reduces risk from known hazards (FEMA, 2013).

In Pennsylvania, integrating hazard mitigation into planning tools is afforded through the MPC in that protecting and promoting safety and health is a purpose of the code. Further, a purpose of the MPC is "to minimize such problems as may presently exist or which may be foreseen", which is the focus of hazard mitigation planning.

Plan integration is not only accomplished through the MPC and planning tools such as comprehensive plans and zoning ordinances, but through capital improvement planning, area plans such as highway corridors and downtown plans, functional plans like stormwater and open space plans, and public and stakeholder outreach and education.

Dauphin County has been successful at integrating hazard mitigation planning into its planning tools through goals, objectives, and actions and will continue to do so as part of the 2015 HMP Update. The following table is an example of actions completed or ongoing in the 2015 HMP or new actions added to the 2015 mitigation plan which demonstrate plan integration.

PLANNING FRAMEWORK	EXAMPLES OF PLAN INTEGRATION
Comprehensive Plan, Zoning Ordinances, and Municipal Codes	<ul style="list-style-type: none"> • Objective: Encourage and facilitate the development or revision of comprehensive plans and zoning/land use ordinances to limit development in high-hazard areas. This 2010 objective has been carried forward to the 2015 HMP. • Action: Integrate hazard mitigation plan data prepared for the 2015 HMP Update into the Dauphin County Comprehensive Plan Update. This action ensures integration of 2015 HMP data into Dauphin County's Comprehensive Plan update which is scheduled for adoption in 2016. • Action: Evaluate current land use controls using FEMA's guidance document 'Hazard Mitigation Planning: Practices for Land Use Planning and Development near Pipelines' to enhance pipeline safety and protect surrounding communities. This action is added as a mitigation action to ensure Dauphin County's municipalities are prepared to address potential pipeline development.
Building Codes	<ul style="list-style-type: none"> • Action: Encourage municipalities to adopt the Radon Control Methods Appendix of the current, adopted edition of the International Residential Code to address radon in new construction. Radon Exposure was added as a hazard to the 2015 HMP. This action ensures new construction in Dauphin County's municipalities reflects current radon control methods.

Table 5.2.5-1 Integration of Dauphin County HMP with Planning Framework.	
PLANNING FRAMEWORK	EXAMPLES OF PLAN INTEGRATION
Functional Plans	<ul style="list-style-type: none"> • Action: Ensure municipal compliance with local watershed-specific Act 167 Stormwater Management Plans and Ordinances. DEP approved Dauphin County's Countywide Act 167 Stormwater Management plan in 2010. DCCD worked with Dauphin County municipalities to adopt the county plan and update local ordinances. • Action: Review the County's evacuation routes to ensure alternate transportation routes are available in the event of major roadway closures. This action is added to the 2015 HMP to address Transportation Accidents. DEMA is currently updating the Evacuation Plan and once updated data can be shared with HATS to incorporation into the RTP. Data can also be used by HATS to conduct evacuation route modeling in the event of a transportation incident.
Project Review	<ul style="list-style-type: none"> • Action: Implement the suggested precautionary steps recommended by a registered Professional Geologist or other acceptable expert) to remedy surface-exposed sinkhole features that pose an identifiable threat to the general public. This action is continued from the 2010 HMP to ensure that subsidence is evaluated in high risk areas during project review. • Action: Develop a technical proficiency at the municipal level for conducting post-disaster damage assessments and continue to regulate through local planning and zoning reconstruction activities to ensure compliance with NFIP substantial damage/ substantial improvement requirements. This action is carried forward to the 2015 HMP.
Public and Stakeholder Engagement	<ul style="list-style-type: none"> • Objective: Encourage awareness of the County's hazards so that residents and business owners are prepared for future hazard events. This objective is carried forward to the 2015 HMP. • Action: Conduct public outreach to educate Dauphin County citizens about the potential health and safety implications of various natural and human-made hazard events using existing public information materials. This action was modified from the 2010 to reflect Dauphin County's ongoing efforts to educate citizens about natural and human-made hazards. • Objective: Increase Dauphin County's municipal participation in FEMA's Community Rating System. This is a new objective added to the 2015 HMP. • Action: Work with municipalities to evaluate participation in the CRS and facilitate the preparation and submission of CRS applications. As Dauphin County's municipalities were significantly impacted by flooding in 2011 due to Tropical Storm Lee, this action was added to reflect the County's current efforts to assist municipalities in determining municipal-readiness for entering the CRS program • Partnerships: Dauphin County municipalities have formed many multi-municipal partnerships for emergency management services that result in creating efficiency and effectiveness in addressing hazard mitigation.

Dauphin County municipalities report moderate planning, regulatory, administrative, and technical capability; limited and moderate financial capability; and limited education and outreach capability. Table 5.2.5-1 summarizes the number of limited, moderate, and high capability responses received from municipalities while Table 5.2.5-2 identifies responses received from each municipality that submitted a Capability Assessment Survey. With available resources being limited and stretched into the foreseeable future, plan integration is extremely relevant and will help leverage existing resources to the maximum extent possible.

Table 5.2.5-2 Summary of Municipal Self-Assessment of Capability.

AREA	DEGREE OF CAPABILITY		
	LIMITED	MODERATE	HIGH
Planning and Regulatory	14	7	7
Administrative and Technical	14	8	7
Financial	21	2	5
Education and Outreach	14	8	6

Table 5.2.5-3 Self-Assessment Capability Matrix.

MUNICIPALITY	PLANNING AND REGULATORY	ADMINISTRATIVE AND TECHNICAL	FINANCIAL	EDUCATION AND OUTREACH
Berrysburg Borough	Limited	Limited	Limited	Limited
Conewago Township	Moderate	High	Moderate	Moderate
Dauphin Borough	High	High	High	High
Derry Township	Medium	Medium	(blank)	(blank)
East Hanover Township	Limited	Limited	Limited	Limited
Halifax Borough	Limited	Limited	Limited	Limited
Harrisburg City	High	Moderate	Limited	Moderate
Highspire Borough	Moderate	Moderate	Limited	Limited
Hummelstown Borough	Limited	Limited	Limited	Limited
Jackson Township	Limited	Limited	Limited	Limited
Jefferson Township	Limited	Limited	Limited	Limited
Londonderry Township	High	High	Limited	High
Lower Paxton Township	(blank)	Moderate	High	High
Lower Swatara Township	High	High	High	Low
Lykens Township	Limited	Limited	Limited	Limited
Middle Paxton Township	High	High	High	High
Middletown Borough	Moderate	Limited	Limited	Moderate
Mifflin Township	Limited	Limited	Limited	Limited
Millersburg Borough	Limited	Moderate	Limited	Moderate
Paxtang Borough	Moderate	Moderate	Limited	Moderate

Table 5.2.5-3 Self-Assessment Capability Matrix.				
MUNICIPALITY	PLANNING AND REGULATORY	ADMINISTRATIVE AND TECHNICAL	FINANCIAL	EDUCATION AND OUTREACH
Penbrook Borough	Limited	Limited	Limited	Limited
Reed Township	Limited	Limited	Limited	Limited
Royalton Borough	High	High	Limited	High
Rush Township	Limited	Limited	Limited	Limited
Susquehanna Township	Moderate	Moderate	Limited	Moderate
Swatara Township	High	High	High	High
Upper Paxton Township	Moderate	Limited	Limited	Moderate
Washington Township	Limited	Moderate	Moderate	Moderate
Wayne Township	Limited	Limited	Limited	Limited

6. Mitigation Strategy

6.1. Update Process Summary

Mitigation goals are general guidelines that explain what the County wants to achieve. Goals are usually expressed as broad policy statements representing desired long-term results. Mitigation objectives describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals; the described steps are usually measurable and can have a defined completion date.

Dauphin County’s 2010 HMP included 31 goals; identified as High-Priority, Medium-Priority, and Low-Priority by the 2010 HMPSC. As noted previously, PEMA released new guidance for the formatting and content of HMPs in 2013 which included the identification of both goals and objectives; therefore, the 2010 goals needed to be revised to include both goals and objectives. Upon reviewing the 2010 goals, it was concluded that each goal serves as an objective, in that each was a specific statement about a mitigation topic to address rather than a broad policy statement. Therefore, the Consultant POC drafted several goals and assigned each of the 31 2010 HMP goals (objectives under the 2015 HMP) to the 2015 draft goals. Objectives were numbered for ease of reference. During a conference call on March 11, 2015, the HMPSC then reviewed the draft goals (4 draft goals were developed) and the objectives to identify progress completed since the 2010 HMP. The results of the HMPSC’s review of the draft goals and objectives are summarized in Table 6.1-1 with a detailed accounting of HMPSC comments in *Appendix C – Meeting and Other Participation Documentation*.

Draft Goal 1	Increase education and awareness about existing and potential natural and human-made hazards in the County.	Comments
Objective 1.A	Ensure that all residents and business owners are aware of the potential hazards associated with their environment and the ways they can protect themselves.	The HMPSC proposed no changes to the wording of Draft Goal 1 . Objective 1.A will be reworded in the 2015 HMP as “ <i>Encourage awareness of the County’s hazards so that residents and business owners are prepared for future hazard events.</i> ” Awareness outreach, particularly with respect to flood hazards, has been completed and is ongoing. Objective 1.C will be consolidated with Objective 1.B . Objective 1.D will be deleted as agencies such as PA DEP and PEMA have developed handouts that can be included in education and outreach efforts. Objective 1.E will be continued in the 2015 HMP as Objective 1.C.
Objective 1.B	Ensure that property owners and potential property owners are aware of the availability and benefits of obtaining federal flood insurance.	
Objective 1.C	Improve the participation rate in federal flood insurance through education.	
Objective 1.D	Develop citizen information on natural, technological, and man-made disaster response.	
Objective 1.E	Ensure that local officials and EMA staff are well trained regarding natural hazards and appropriate prevention and mitigation activities.	

Table 6.1-1 Review of 2010 and Draft 2015 Mitigation Strategy Goals and Objectives.		
Draft Goal 2	Protect citizens and public and private property from the impacts of natural and human-made hazards.	Comments
Objective 2.A	Ensure that existing drainage systems (pipes, culverts, channels) are adequate and functioning properly.	<p>The HMPSC proposed no changes to the wording of Draft Goal 2.</p> <p>Objective 2.A will be carried forward in the 2015 HMP. The HMPSC noted this objective is the responsibility of the County's municipalities. Objectives 2.B and 2.C will be carried forward in the 2015 HMP. Objectives 2.D and 2.E will be combined and reworded to <i>“Encourage the use of retrofitting techniques for repetitive loss structures.”</i> Objective 2.F will be carried forward in the 2015 HMP as Objective 2.E. Objectives 2.G and 2.H will be combined as Objective 2.F and reworded to <i>“Investigate structural solutions to address natural and human-made hazards.”</i> Objectives 2.I, 2.J, 2.K, 2.L, and 2.M will be consolidated as Objective 2.G: <i>“Reduce threats from natural and human-made hazards.”</i></p>
Objective 2.B	Minimize future damage due to flooding of the Susquehanna River and its tributaries.	
Objective 2.C	Reduce impacts related to flash flooding and stormwater problems.	
Objective 2.D	Ensure that high-risk, pre-FIRM residential structures do not get repeatedly flooded by using retrofitting techniques to reduce the flood risk to the properties.	
Objective 2.E	Reduce the impact of flooding on commercial structures through retrofitting techniques.	
Objective 2.F	Restore degraded natural resources and open space to improve their flood control function.	
Objective 2.G	Investigate structural solutions to natural hazards.	
Objective 2.H	Investigate retrofitting alternatives to reduce impacts from other natural hazards.	
Objective 2.I	Reduce threats related to wildfires.	
Objective 2.J	Reduce threats related to hurricanes.	
Objective 2.K	Minimize crop damage due to drought situations.	
Objective 2.L	Reduce threats related to landslides.	
Objective 2.M	Evaluate the potential for improving building and infrastructure resistance to land subsidence.	
Draft Goal 3	Encourage the integration of hazard mitigation planning principles in County and Local Government regulations, plans, and policies.	
Objective 3.A	Ensure that local ordinances are consistent with FEMA and PA DCED guidelines and are properly enforced.	<p>The HMPSC proposed no changes to the wording of Draft Goal 3.</p> <p>Objectives 3.A, 3.B, and 3.C will be carried forward in the 2015 HMP. The HMPSC noted that local codes and ordinances are in place to address Objective 3.C. Objective 3.D will be deleted as it is included in Pennsylvania's UCC. Objective 3.E will be deleted as it is duplicative with Objective 3.B. Objective 3.F will be deleted as soil erosion and sediment control is addressed by DCCD. Objective 3.G will</p>
Objective 3.B	Preserve areas where natural hazard potential is high (i.e., steeply sloping areas, sinkhole areas, floodplains, wetlands, etc.).	
Objective 3.C	Regulate construction/development in the County to prevent increases in runoff and subsequent increases in flood flows.	
Objective 3.D	Ensure that new construction is resistant to natural hazards.	
Objective 3.E	Protect existing natural resources and open space, including parks and wetlands, within the floodplain.	

Table 6.1-1 Review of 2010 and Draft 2015 Mitigation Strategy Goals and Objectives.		
Objective 3.F	Ensure the adequacy of erosion and sedimentation control practices throughout the County.	be reworded to reflect the current FEMA RiskMAP project. It will be included as Objective 3.D as <i>“Support FEMA’s efforts to prepare detailed floodplain mapping in the Lower Susquehanna-Penns and Lower Susquehanna-Swatara Watersheds.”</i>
Objective 3.G	Increase the length of stream reaches mapped on FIRM maps and/or increase the occurrence of flood elevation data where this future mapping would be beneficial.	
Draft Goal 4	Plan for improved response to protect citizens and public and private property from natural and human-made hazards.	Comments
Objective 4.A	Provide residents with adequate warning of potential floods and other meteorological events.	<p>The HMPSC determined that Draft Goal 4 should be reworded to focus on infrastructure associated with response. Rewording the goal reflects the HMPSC’s desire to make sure that sufficient infrastructure is in place to improve response capabilities.</p> <p>Objective 4.A will be reworded to reflect all hazards and include businesses as <i>“Provide residents and businesses with adequate warning of natural and human-made hazard events.”</i> Objective 4.B will be deleted as it is addressed under existing emergency management plans. Objective 4.C will be moved under Goal 3 as Objective 3.D and reworded to <i>“Continue mass evacuation planning to provide safe and efficient evacuation during natural and human-made hazard events.”</i> Objective 4.D will be carried forward to the 2015 HMP as Objective 4.B. Objective 4.E will be deleted as it has been addressed in that all municipalities are on Dauphin County’s emergency response system. Objective 4.F will be deleted as reducing impacts from severe storms is addressed under Objective 2.F and improving response procedures associated with severe storms is addressed under Objective 1.A.</p>
Objective 4.B	Ensure that emergency response services and critical facilities functions are not interrupted by natural hazards.	
Objective 4.C	Provide safe and efficient evacuation routes during floods and other natural hazards.	
Objective 4.D	Provide adequate shelters during hazard events.	
Objective 4.E	Provide adequate communication systems for emergency management agencies and emergency response units.	
Objective 4.F	Reduce impacts from severe storms and/or improve response procedures.	

Mitigation actions provide more detailed descriptions of specific work tasks to help the County and its municipalities achieve identified goals and objectives. A total of 64 actions (or implementation measures as per the 2010 HMP) were included as part of the 2010 HMP mitigation strategy. Responsibility for addressing each action was assigned to the County, municipalities, and other stakeholders, or a combination thereof. Mitigation Action Evaluation forms were prepared to review the status of each action including whether the action was completed, is in-progress or ongoing, or should be discontinued. Each municipality was provided with a Mitigation Action Evaluation form customized to include each of the actions

assigned to the municipality as part of the 2010 HMP. Forms were handed to municipal representatives in attendance at the Risk Assessment and Mitigation Solutions Workshops held on March 17, 2015 and March 19, 2015. Forms were e-mailed to municipalities not able to attend the workshop on March 20, 2015. Reminders to complete the form were sent to municipalities on April 15, 2015 and additional e-mail or telephone follow up was conducted, as required to ensure maximum municipal response. The HMPSC completed a review of County-level actions in Steering Committee conference calls on March 11, 2015 and April 8, 2015. Table 6.1-2 details progress accomplished on each of these actions over the 5 year planning period from 2010 – 2014. Many actions were completed or are ongoing. The HMPSC and municipalities recommended that five actions be deleted from the 2015 HMP update and ten actions be consolidated into three actions as noted in Table 6.1-2. To augment Table 6.1-2, Section 6.1.1 summarizes mitigation successes since the 2010 HMP was completed.

Appendix C - Meeting and Other Participation Documentation includes a detailed summary of the status of each action based on completed municipal Mitigation Action Evaluation forms.

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
PM-1: Develop a new Comprehensive Plan or amend an existing Comprehensive Plan to include an assessment and associated mapping of the municipality’s vulnerability to location-specific hazards and appropriate recommendations for the use of these hazard areas.	This action should be carried forward in the 2015 HMP. The action was assigned to 27 municipalities. Five municipalities report the action is complete; seven indicated it was in-progress/ongoing, and no update was available from the remaining municipalities.
PM-2: Develop a new Zoning Ordinance or revise an existing Zoning Ordinance to include separate zones or districts with appropriate development criteria for known hazard areas.	This action should be carried forward in the 2015 HMP. The action was assigned to 17 municipalities; one municipality reported the action was complete, one reported it was in progress, and one municipality recommended discontinuing the action. An update was not available from the remaining municipalities.
PM-3: Make available for municipal use the digital natural hazard mapping files that were developed as part of this hazard vulnerability assessment and mitigation planning effort.	This action is complete and should be carried forward in the 2015 HMP. The Dauphin GIS Division made data available to municipalities. The action should reflect preparation of an all-hazards plan and be reworded to <i>“The Dauphin County Department of Information Technology will make natural and human-made hazard data available for municipal use.”</i>
PM-4: Develop a new Subdivision and Land Development Ordinance or revise an existing Subdivision and Land Development Ordinance to include municipality-specific, hazard mitigation-related development criteria and/or provisions for the mandatory use of conservation subdivision design principles in order to regulate the location and construction of buildings and other infrastructure in known hazard areas.	This action should be carried forward in the 2015 HMP. The action was assigned to 24 municipalities. Five municipalities report the action is complete; seven indicated it was in-progress/ongoing, and no update was available from the remaining municipalities. The HMPSC noted that DCPC provides SALDO assistance to municipalities, as required. Londonderry Township reports updating to TND-like standards relative to smart growth and environmental design.

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
PM-7: Ensure municipal compliance with local watershed-specific Act 167 Stormwater Management Plans and Ordinances.	The action will be carried forward in the 2015 HMP. The action was assigned to all Dauphin County municipalities and has been completed by all municipalities. DCCD reports that in 2010 DEP approved Dauphin County's Countywide Act 167 Stormwater Management Plan. After DEP approval, DCCD worked with municipalities to adopt the plan and ordinances.
PM-8: Ensure continued implementation of appropriate operations and maintenance procedures (routine inspections and regular maintenance) at the DeHart Dam in an effort to prevent a potential failure.	The action is complete and ongoing. In 1990 Capital Region Water acquired ownership of the DeHart Dam from the City of Harrisburg. As such, Capital Region Water is responsible to oversee operations and maintenance of the dam which is located in Rush Township. Annual inspections are conducted per state statute (Chapter 105 - Dam Safety and Waterway Management) and DEP regulations. The most recent dam inspection occurred in December 2014. The action plan will be updated to reflect that Capital Region Water is responsible for ensuring the action is complete.
PM-9: Revise existing zoning and/or subdivision and land development ordinances or adopt a separate, standalone ordinance to require the completion of subsurface investigations (i.e., borings, geo-physical surveys, and/or studies by a registered Professional Geologist) for all new subdivision and land development projects in known land subsidence hazard areas.	The action should be carried forward in the 2015 HMP. The action was assigned to 9 municipalities. Two municipalities report the action as complete; two determined the action should be discontinued as there are no known land subsidence hazard areas in the municipalities; and no update was available from the remaining municipalities.
PM-11: Enroll in the Pennsylvania Firewise Communities Program.	The action should be carried forward in the 2015 HMP and reworded to "Enroll in the Pennsylvania Firewise Community Program through the DCNR Fire Forester for Dauphin County." The action was assigned to 26 municipalities. Nine municipalities report the action is in-progress and DCNR reports no municipalities are enrolled in the program. Per DCNR, municipalities would contact the DCNR Fire Forester assigned to Dauphin County to start the application process. A Firewise Communities Program designation would help strengthen a Volunteer Fire Assistance Grant application. The program provides funding for wildfire mitigation projects.
PM-12: Revise or re-adopt a municipal floodplain management ordinance that is consistent with revised FEMA floodplain mapping to ensure municipal compliance with NFIP and PA Act 166 floodplain development regulations, as appropriate.	The action should be carried forward in the 2015 HMP and reworded to replace "revised FEMA floodplain mapping" with "current FEMA D-FIRMS". The action was assigned to all municipalities with the exception of Berrysburg Borough and Penbrook Borough. Twenty one municipalities report the action is complete; Londonderry Township reports the action is in-progress and notes it is working with FEMA to re-adopt the ordinance to more enforceable standards; and no update was available from the remaining municipalities.

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
ES-1: Establish a partnering relationship with the NWS Mid-Atlantic River Forecast Center to enhance the existing Susquehanna River Basin Flood Forecast and Warning System via the Advanced Hydrologic Prediction Services Program.	The action is complete and ongoing. It should be carried forward in the 2015 HMP. SRBC reports an ongoing partnership for the flood forecast and warning system with the most recent project receiving HMGP funding in May 2015. SRBC in conjunction with Dauphin, Huntingdon, and Lancaster counties will implement the Tri-County Digital Flood Warning System project. The project includes installing a digital warning system that relies on an integrated network of digital cameras, staff gages, stream and rain gages, and smartphone users to enhance warning capabilities. The HMPSC recommends that 'River Basin' be removed from the action and note that the action is a continuation of the partnership.
ES-2: Coordinate with the USGS, local watershed organizations, and/or the DCCD to increase the number of USGS and Integrated Flood Observing and Warning System (IFLOWS) rain and stream gauges in the County as a potential enhancement to the existing Susquehanna River Basin Flood Forecast and Warning System.	The action is complete and ongoing. It should be carried forward in the 2015 HMP. Rain and stream gauges along Paxton Creek and in Harrisburg have been installed using HMGP funds. The HMPSC recommends that 'River Basin' be removed from the action.
ES-6: Conduct routine inspections, regular maintenance, and annual tests on all emergency communications equipment, public address systems, and hazard alert sirens to ensure unhindered operation during an emergency event.	This action is complete, ongoing, and should be carried forward in the 2015 HMP. DEMA and local EMCs conduct inspections, maintenance, and testing.
ES-7: Ensure that a planned, coordinated, and effective public warning dissemination program exists at the local level.	This action is complete, ongoing and should be carried forward in the 2015 HMP. Public warning dissemination is provided by South Central Alert, a voluntary warning system developed by the South Central Task Force and promoted by DEMA, which serves the eight county South Central Pennsylvania region. Notifications are provided to residents who voluntarily sign up for emergency alerts via text, e-mail, home phones, or cell phones. In addition, a few municipalities suggested the use of social media to help disseminate information during a hazard event. Hummelstown Borough noted it uses Code Red as a voluntary warning system for residents.
ES-8: Adopt via resolution, and respond to hazards with actions that are consistent with, the County-level EOP.	This is an ongoing action for all municipalities in Dauphin County. It will be carried forward in the 2015 HMP.
ES-9: Conduct hazard response practice drills and emergency management training exercises on an annual basis.	This action is conducted annually and is ongoing. It will be carried forward in the 2015 HMP.
ES-11: Implement the recommendations of the Harrisburg Authority's ongoing combined sewer overflow impact study.	This action will be carried forward in the 2015 HMP.
ES-12: Develop and distribute a public informational pamphlet related to the potential	HMPSC members noted several publications prepared by other organizations such as information pamphlets

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
health and safety implications of various natural hazard events.	prepared by the PA Silver Jackets to explain Harrisburg inundation maps. FEMA and PEMA also maintain brochures pertaining to natural and human-made hazards. As DEMA conducts regular community outreach and existing information brochures are in place the HMPSC decided to reword the action to <i>“Conduct public outreach to educate Dauphin County citizens about the potential health and safety implications of various natural and human-made hazard events using existing public information materials.”</i>
ES-13: Conduct rigorous sampling and analysis of public and private drinking water supply sources immediately after an inundating flood event and issue boil water advisories as needed.	The action will be modified for the 2015 HMP. Per input from DEP, DEP regulations require Public Water Suppliers to conduct sampling and analysis of public drinking water supply sources; therefore, the portion of the action pertaining to public water suppliers will be deleted. Since DEP has no authority with private water supply sources (property owners with wells), DEP offers private well owners guidance in the form of fact sheets on disinfecting their wells and has offered free water test kits in the past to test for bacterial contamination. The action will be reworded to <i>“Encourage private well owners to conduct rigorous sampling and analysis of private drinking water supply sources immediately after an inundating flood event and boil water as needed.”</i> Dauphin County and PADEP will take the lead on the action.
ES-14: Develop a technical proficiency at the municipal level for conducting post-disaster damage assessments and regulating reconstruction activities to ensure compliance with NFIP substantial damage/ substantial improvement requirements.	This action should be carried forward in the 2015 HMP. The action was assigned to 37 municipalities. Eleven municipalities report the action is complete; seven indicated it was in-progress/ongoing, one municipality suggests discontinuing the action; and no update was available from the remaining municipalities. A few municipalities reported the EMC or community development office conducts the post disaster assessments and regulating construction activities is administered by local boards and authorities per local codes and regulations.

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
ES-15: Develop a technical proficiency at the municipal level for assisting local residents and business owners in applying for hazard mitigation and assistance funds and identifying cost beneficial hazard mitigation measures to be incorporated into reconstruction activities.	This action will be continued in the 2015 HMP. It was assigned to all municipalities and the County. Eight municipalities report the action is complete; ten indicated it was in-progress/ongoing, four municipalities recommend discontinuing the action; and no update was available from the remaining municipalities. Londonderry Township and Swatara Township report significant efforts in addressing this action as discussed in Section 4.3.2. This action is also being addressed by DCDCED as part of CDBG-DR funding awarded to address impacts of Tropical Storm Lee as outreach is being conducted for municipalities, citizens, and businesses.
ES-16: Increase the number of NOAA Weather Alert radios in public places across the County which currently do not have them (such as personal care homes) above and beyond what is required of the County by the NWS's Storm Ready Program.	This action is complete, ongoing, and will be carried forward in the 2015 HMP.
ES-17: Make the Reverse 911 automated emergency alert system fully operational within the County.	This action is complete and no further action is required. The HMPSC notes that ES-7 addresses this action as well.
ES-18: Encourage the owners/operators of Yeshiva Academy, Downey Elementary School, Circle School, and the Williams Township Wastewater Treatment Plant to develop and implement an emergency response plan to mitigate potential flooding impacts.	This action is in-progress and will be carried forward in the 2015 HMP. It was assigned to three municipalities (Harrisburg, Swatara Township, and Williams Township) and Dauphin County. All three municipalities report the action is in-progress.
ES-19: Solicit funds in order to continue the operation of river gauges.	This action is complete and no further action is required per the HMPSC.
ES-20: Encourage citizens, schools, nursing homes, hospitals, etc., to sign up for AlertPA notifications.	This action is ongoing and will be continued in the 2015 HMP. It was assigned to all municipalities and the County. Eight municipalities report the action is complete; eleven indicated it was in-progress/ongoing, two municipalities report the action should be discontinued as DEMA performs this function, and no update was available from the remaining municipalities. As part of its ongoing outreach, DEMA encourages citizens to sign up for AlertPA.
ES-21: Develop flood forecasting maps for the Harrisburg area.	This action is complete as inundation maps were prepared for the Harrisburg area. Per the HMPSC, the action should be modified to reflect similar inundation maps being prepared for the Swatara Creek Watershed.

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
ES-22: Develop and/or obtain a program for the collection and identification of Special Needs populations for means of notification during an emergency, also so that proper transportation is provided to these populations in the event of an evacuation.	The action is in progress and will be carried forward in the 2015 HMP. The action was assigned to all Dauphin County municipalities and the County. Ten municipalities report the action is complete, ten municipalities report it is in progress, one municipality indicates the action should be discontinued at the local level and addressed by the County, and no update was available from the remaining municipalities. Several municipalities report that Exelon sends card on an annual basis to households with the EPZ of TMI. The cards contain information relative to special needs and residents voluntarily fill in data and send back to Exelon. Exelon forwards a spreadsheet of responses and filled in cards to municipalities within the EPZ. Steelton Borough notes that periodic surveys of residents are conducted and designed to promote self-identification of special needs populations.
ES-23: Develop or obtain software programs to aid in resource management and EOC management as well as communications to the regional and state task forces.	This action is complete and ongoing. It will be carried forward in the 2015 HMP and reworded to <i>“Work with PEMA and municipalities to fully integrate resource management and EOC management software throughout the County.”</i>
ES-24: Establish an alternate EOC location in the event the primary EOC must be evacuated. The facility should be selected to support the EOC as well as all of the County Special Teams. This facility should also be located outside of the TMI EPZ and 100-year flood- plain areas.	The action will be carried forward in the 2015 HMP. It was assigned to all municipalities and the County. Eighteen municipalities report the action is complete; two report it is in-progress, and no update was available from the remaining municipalities. The HMPSC reports the action should be completed at the County level.
ES-25: Encourage the Dauphin County EOC and municipal EOC’s (including those outside the TMI EPZ) to participate in more exercises and evacuation drills to practice and gain efficiency in emergency plan preparedness.	This action is ongoing and should be carried forward in the 2015 HMP. The HMPSC suggests rewording to reflect that DEMA will encourage municipal EOCs; not the County EOC. It was assigned to all municipalities and the County. Nine municipalities report the action is complete, twelve municipalities report the action as complete and ongoing, and no update was available from the remaining municipalities. Several municipalities noted ongoing exercises and drills such as: planning with local EMC’s in neighboring municipalities, participation in the annual PEMA/NWS weather emergency exercise, and table-top business exercises for business. The most recent County-wide exercise was the biennial TMI emergency exercise conducted in April 2015.
PP-1: Relocate and/or acquire known flood-prone structures in accordance with the general guidelines of Table 5-3.	Actions PP-1, PP-2, PP-3, and PP-4 will be combined and reworded in the 2015 HMP as suggested by several municipalities. 4
PP-2: Elevate known flood-prone structures in accordance with the general guidelines of Table 5-3.	
	Table 5.3 (included as Figure 6.1-1) is set of property protection guidelines for residential and commercial

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
PP-3: Dry floodproof known flood-prone structures in accordance with the general guidelines of Table 5-3.	structures impacted by flooding. It was included in the 2010 HMP for planning purposes only.
PP-4: Wet floodproof known flood-prone structures in accordance with the general guidelines of Table 5-3.	Since CDBG-DR funds were allocated to Dauphin County in response to Tropical Storm Lee, additional progress has been made towards completing these actions. See the mitigation summary following Table 6.1-2. The combined action will be reworded to <i>“Continue to acquire, relocate, or make structural modifications (such as elevation and dry/wet flood proofing) to minimize impact to flood prone structures in accordance with NFIP guidelines.”</i>
PP-6: Encourage property owners in potential wildfire hazard areas to remove all excess brush and shrubby plants from the immediate vicinity (i.e., 50 to 100 feet) of all buildings.	This action is ongoing and will be continued in the 2015 HMP. The action was assigned to 26 municipalities. One municipality reports the action as complete, seven report it as ongoing, one reports it is not applicable and should be discontinued as there are no wildfire hazard areas in the municipality, and no update was available from the remaining municipalities. A few municipalities suggested having the DCNR Fire Forester for Dauphin County conduct outreach on the importance of removing potential fire hazards around structures. The action will be reworded to include the DCNR Fire Forester for Dauphin County.
PP-7: Encourage local business and industry owners in known flood hazard areas to develop an emergency response plan as a potential alternative to implementing a physical property protection measure, where otherwise not technically or fiscally appropriate.	This action is in-progress and will be carried forward in the 2015 HMP. Additional progress has been made by DCDCED towards completing this action due to CDBG-DR funding received from the County to address impacts of Tropical Storm Lee. DCDCED will continue to work with municipalities and business owners as part of this action.
PP-8: Educate and encourage uninsured property owners to purchase flood insurance through the NFIP who are identified as being located within the flood hazard areas on the new FEMA 100-year floodplain mapping.	This action is in-progress and will be carried forward in the 2015 HMP. Similar to action PP-7, additional progress has been made by DCDCED towards completing this action due to CDBG-DR funding received from the County to address impacts of Tropical Storm Lee. This action was assigned to 37 municipalities and other stakeholders. Four municipalities report the action is complete, twelve report it is in progress, two report that it should be discontinued as the County provides, and no update was available from the remaining municipalities.
SP-1: Investigate the feasibility of constructing a levee/floodwall system and/or a floodwater storage reservoir along Rattling Creek, Bear Creek and/or Wiconisco Creek to minimize/eliminate Lykens Borough’s extensive flood hazard potential.	This action is complete, ongoing, and was assigned to 3 municipalities. The Borough of Lykens is in the process of completing flood related repairs and hazard mitigation work identified through the 2010 mitigation action. The action will be reworded to: <i>“Implement flood related repairs and hazard mitigation including the Reservoir, the Glen Park area, the North side of town, and the South side of town along Rattling Creek and the Wiconisco Creek.”</i>

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
SP-2: Investigate the feasibility of increasing the Lawnton Branch of Spring Creek's underground flow capacity to minimize/eliminate the Lawnton area's flood hazard potential.	This action is complete and was assigned to Swatara Township. The Township has been working with FEMA, Army Corps, and DEP to identify flood solutions. Flooding in this area has continued to impact the Lenker Manor Neighborhood. In addition to the feasibility study noted in the action, the following actions have been taken since 1999: 9 homes closed out, 2 homes moving to close out, and 7 homes are still open. Per Swatara Township the action will be replaced with <i>"Develop a plan for replacing the Derry Street Bridge."</i>
SP-3: Investigate the feasibility of constructing a levee/floodwall system along Swatara Creek between East Main Street and the Pennsylvania Turnpike to minimize Middletown Borough's flood hazard potential.	This action will be carried forward in the 2015 HMP. This action was assigned to 2 municipalities. Londonderry Township is not aware of this action and suggests the development of a watershed wide flood plan. Middletown Borough indicates the County is investigating.
SP-4: Investigate the feasibility of constructing a levee/floodwall system along the Susquehanna River to minimize Highspire Borough's backwater flood hazard potential.	This action is in progress and will be carried forward in the 2015 HMP. Highspire Borough suggests rewording the action to <i>"Investigate the feasibility of installing flood gates and pumps to prevent the backup of flood waters in Highspire Borough."</i>
SP-5: Coordinate with the local municipality and/or PennDOT on the potential feasibility of replacing, removing, or enlarging those bridge and culvert stream crossings that were identified during the Act 167 Stormwater Management Planning process as being unable to pass the 10-year frequency flood flow.	This action will be modified in the 2015 HMP. According to DCCD, attention should be given to working on problems areas and obstructions identified by municipalities during the Act 167 Stormwater Management Planning Process. Municipalities include: Derry Township, Highspire Borough, Hummelstown Borough, Lower Swatara Township, Middletown Borough, Royalton Borough, and Upper Paxton Township. The action will be replaced with <i>"Municipalities should continue to seek solutions to problem areas and obstructions identified in the April 2010 Countywide Act 167 Stormwater Management Plan."</i>
SP-6: Support the recommendations of, and assist in implementing the Lower Paxton Creek Revitalization Project.	This action is in-progress and should be reworded in the 2015 HMP to remove 'Lower'. The action was assigned to Lower Paxton Township, Susquehanna Township, the County, and additional stakeholders. No progress has been completed on the action.
SP-7: Develop and implement a community-specific channel maintenance program consisting of routine inspections and subsequent debris removal to ensure maximum hydraulic capacity of all local streams and watercourses.	This action is in-progress, ongoing, and will be continued in the 2015 HMP. The action was assigned to 38 municipalities. Two municipalities report the action is complete, ten report it is in-progress/ongoing, six recommend the action be discontinued as the action would require a DEP permit resulting in added expense, and no update was available from the remaining municipalities.

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
SP-8: Coordinate with the PA DCNR Weiser Forest District and the Pennsylvania Game Commission on the potential construction of a fire- break at the appropriate location on the south side of Peters Mountain along Route 325 in Rush Township.	This action was assigned to Rush Township. There has been no action per the DCNR Fire Forester for Dauphin County and the action will be continued to the 2015 HMP. For consistency with other wildfire related actions (PM-11, PP-6), the action will be reworded to replace 'PA DCNR Weiser Forest District and the Pennsylvania Game Commission' with 'DCNR Fire Forester for Dauphin County.'
SP-9: Implement the suggested precautionary steps when using structural abatement techniques (recommended to be identified by a registered Professional Geologist or other acceptable expert) to remedy surface-exposed sinkhole features.	As the actions are similar in outcome, the HMPSC recommends combining actions SP-9 and SP-10 in the 2015 HMP and rewording to " <i>Implement the suggested precautionary steps recommended by a registered Professional Geologist or other acceptable expert) to remedy surface-exposed sinkhole features that pose an identifiable threat to the general public.</i> "
SP-10: Require expert technical assistance and establish mandatory timeframes for structurally abating surface-exposed sinkhole features that pose an identifiable threat to the general public.	<p>Action SP-9 was assigned to 10 municipalities. Three municipalities report the action is ongoing, two municipalities report the action should be discontinued as there are no sinkhole features in the municipalities, and no update was available from the remaining municipalities.</p> <p>Action SP-10 was assigned to 10 municipalities. Three municipalities report the action is ongoing, two municipalities report the action should be discontinued as there are no surface-exposed sink holes features in the municipalities, and no update was available from the remaining municipalities.</p>
SP-12: Install easily accessible and reliable water supply dry hydrants at various bridge and culvert crossings of local streams and water- courses for emergency firefighting uses through coordination with the PA DCNR and local fire companies.	This action will be carried forward in the 2015 HMP and was assigned to 25 municipalities. Four municipalities report the action is complete, two municipalities report the action is in-progress, eight municipalities report the action is not relevant to their municipality, and no update was available from the remaining municipalities. A few municipalities reported that fire departments have sufficient equipment for drafting water from local water sources during an incident. DCNR reports no progress on working with municipalities to address this action.
NR-1: Conduct a detailed inventory and prioritization of local environmental resources via the Comprehensive Planning or similar natural resources planning process.	This action will be carried forward in the 2015 HMP and was assigned to 36 municipalities. Eight municipalities report the action is complete, eight report the action is in-progress, one reports the action will be discontinued as the action is not applicable; and no update was available from the remaining municipalities.

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
NR-2: Preserve the highest priority undeveloped floodplain areas via fee simple acquisition and/or permanent easement and retain as public open space for passive recreational uses in an effort to minimize/prevent potential flooding damages and enhance the regional environment. Less critical floodplain areas may be preserved/protected via local ordinance (see PM-2 and PM-4).	As the actions are similar in outcome, the HMPSC recommends combining actions NR-2, NR-3, NR-4, and NR-5 in the 2015 HMP and rewording to “ <i>Protect via local ordinance or acquisition, if feasible, environmentally sensitive areas (such as floodplains, steep slopes, forested areas, and wetlands) that could be impacted by hazard events</i> ”.
NR-3: Preserve the highest priority undeveloped steep slope areas via fee simple acquisition and/or permanent easement and retain as public open space for passive recreational uses in an effort to minimize/prevent potential landslide damages and enhance the regional environment. Less critical steep slope areas may be preserved/protected via local ordinance (see PM-2 and PM-4).	Action NR-2 was assigned to 33 municipalities. Five municipalities report the action is complete, seven report it is in-progress, three report the action will be discontinued as the action is not feasible, and no update was available from the remaining municipalities. One municipality notes including purchase of properties as a potential project should Dauphin County be successful in securing CDBG-DR NDRC funding.
NR-4: Preserve critical undeveloped forested areas via fee simple acquisition and/or permanent easement and retain as public open space for passive recreational uses in an effort to minimize/prevent potential wildfire damages and enhance the regional environment. Implementation of conservation subdivision design principles, as identified in PM-4, could be used to preserve other less critical forested areas as deemed appropriate by the municipality.	Action NR-3 was assigned to 31 municipalities. Four municipalities report the action is complete, six report it is in-progress, four report the action will be discontinued as the action is not applicable, and no update was available from the remaining municipalities. Action NR-4 was assigned to 29 municipalities. Four municipalities report the action is complete, four report it is in-progress, four report the action will be discontinued as the action is not applicable, and no update was available from the remaining municipalities.
NR-5: Preserve high priority wetland areas (see NR-1) via fee simple acquisition and/or permanent easement and retain as public open space for passive recreational uses in an effort to minimize potential flooding damages and enhance the regional environment.	Action NR-5 was assigned to 31 municipalities. Six municipalities report the action is complete, four report it is in-progress, four report the action will be discontinued, and no update was available from the remaining municipalities.
NR-6: Develop and implement a wetland protection program consisting of public education materials that highlight the functions and values of wetlands and local ordinance provisions that require the identification of wetlands in accordance with federal and state standards and minimize/eliminate their disturbance in accordance with federal and state laws.	The HMPSC decided to discontinue this action as it is already addressed by DEP and through the local review process.

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
NR-7: Working through the Conservation District, the County should ensure continued contractor compliance with approved Erosion and Sedimentation Pollution Control Plans and should continue to work with local farmers to implement erosion and sedimentation control BMPs.	This action is complete and ongoing. DCCD works with property owners to ensure compliance with approved plans.
NR-8: Update and implement a comprehensive water resources management plan that analyzes the County's existing water resources supply and evaluates the County's anticipated water use demand in an effort to identify suspected water supply shortages and potential new water supply sources.	No progress has been made on this action. The HMPSC and DCCD note that it is an action that should be carried forward in the 2015 HMP.
PI-2: Municipalities should store in an easily accessible location and make available for public inspection, their community's Flood Insurance Rate Mapping and associated Flood Insurance Study. Dauphin County could provide copies of these maps at the courthouse and/or conservation district offices and/or scan and post current maps on their Web site for all communities or those unable to provide information on their own Web site.	This action is ongoing and will be carried forward in the 2015 HMP. It was assigned to 39 municipalities and the County. The action will be reworded to <i>"Municipalities should continue to store and make available for public inspection, their community's FIRMs and associated Flood Insurance Study. Dauphin County should continue to provide copies of these maps at the courthouse, conservation district office, libraries, and planning commission"</i> .
PI-3: Maintain natural hazard risk assessment and mitigation publications/materials at public libraries throughout the County.	This action is complete and ongoing. It will be reworded in the 2015 HMP to include human-made hazards.
PI-5: Develop and distribute a public summary of this hazard mitigation plan including relevant information on hazard specific "do's" and "don'ts," hazard-prone areas, emergency contact information, and lists of shelters or hotels where evacuees can stay with domestic animals.	This action will be carried forward in the 2015 HMP. The HMPSC reports no progress on the action.
PI-6: Develop and implement a post-disaster recovery and mitigation training program for local officials (see ES-14 and ES-15).	The HMPSC suggests discontinuing this action as it is addressed by PEMA.
PI-7: Create a Web site links/references section on the Dauphin County and/or DEMA Web site homepage to include links to FEMA - http://www.fema.gov/ , PEMA - http://www.pema.state.pa.us/ , PA DCED - http://www.inventpa.com/ , and NWS - http://www.nws.noaa.gov/ . Additional links could also include those for watershed associations, the SRBC - http://www.srbc.net/ , DCCD - http://www.dauphincd.org/main/welcome.php , and TCRPC - http://www.tcrpc-pa.org/ .	This action is complete and ongoing and will be reworded in the 2015 HMP to <i>"Continue to provide links from Dauphin County's homepage to FEMA, PEMA, DCCD, SRBC, and DCED."</i>

Table 6.1-2 Review of 2010 Mitigation Actions.	
Action	Review
PI-8: Coordinate with FEMA, PEMA, PA DCED, NWS, the DCCD and any other appropriate entities on developing and implementing a natural hazard awareness curriculum in local schools.	The HMPSC recommends discontinuing this action as it is better addressed by PEMA, other state agencies, and local schools.
PI-9: Store in an easily accessible location and make available for public inspection, the original hazard mitigation plan, the new plan update document, and the FEMA guidance documents which were provided as part of the hazard mitigation planning program. Also make electronic files available for review.	This action is complete, ongoing, and will be carried forward in the 2015 HMPSC.
PI-10: Develop the county's GIS system to include an updated and fully attributed building/structure coverage by use and type.	This action is in-progress through Dauphin County GIS and will be carried forward in the 2015 HMP. The word 'system' will be deleted due to redundancy.

Figure 6.1-1 Table 5-3 from the 2010 Hazard Mitigation Plan.

TABLE 5-3
DAUPHIN COUNTY PROPERTY PROTECTION GUIDE

100-Year Flood Impact	Type of Structure							
	Residential						Commercial ¹	Industrial ¹
	1-2 Story Wood Frame			1-2 Story Masonry				
With Basement	Slab-On-Grade	Crawlspace	With Basement	Slab-On-Grade	Crawlspace			
High Velocity and/or Floodway	Relocation/Acquisition ²	Relocation/Acquisition ²	Relocation/Acquisition ²	Relocation/Acquisition ²	Relocation/Acquisition ²	Relocation/Acquisition ²	Relocation/Acquisition ²	Relocation/Acquisition ²
0-2' In Basement	Sump Pump ³ and/or Wet Floodproofing ⁴	N/A	N/A	Sump Pump ³ and/or Wet Floodproofing ⁴	N/A	N/A	N/A	N/A
2-8' In Basement	Wet Floodproofing ⁴	N/A	N/A	Wet Floodproofing ⁴	N/A	N/A	N/A	N/A
< 1' First Floor	Wet Floodproofing ⁴ Or Elevation ⁵	Dry Floodproofing ³	Wet Floodproofing ⁴ Or Elevation ⁵	Wet Floodproofing ⁴	Dry Floodproofing ³	Wet Floodproofing ⁴	Dry Floodproofing ³	Dry ³ or Wet ⁴ Floodproofing
1'-3' First Floor	Elevation ⁵	Dry Floodproofing ³	Elevation ⁵	Elevation ⁵	Dry Floodproofing ³	Elevation ⁵	Dry Floodproofing ³	Dry ³ or Wet ⁴ Floodproofing
3'-8' First Floor	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ or Relocation/Acquisition ⁶	Wet Floodproofing ⁴ or Relocation/Acquisition ⁶
>8'	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Elevation ⁵ Or Relocation/Acquisition ⁶	Relocation/Acquisition ⁶	Relocation/Acquisition ⁶

Notes: These recommendations are for planning purposes only. Professional expertise should be sought before taking any flood mitigation action. Some projects may not meet FEMA cost benefit requirements, thereby requiring property owner or other funding sources.

- ¹ Assuming slab-on-grade foundation.
- ² Floodway location/vulnerability to high velocity flows warrant relocation and/or acquisition.
- ³ See dry floodproofing text later in this chapter.
- ⁴ See wet floodproofing text later in this chapter.
- ⁵ See elevation text later in this chapter.
- ⁶ See relocation/acquisition text later in this chapter.
- ⁷ Only appropriate for seasonal structures.

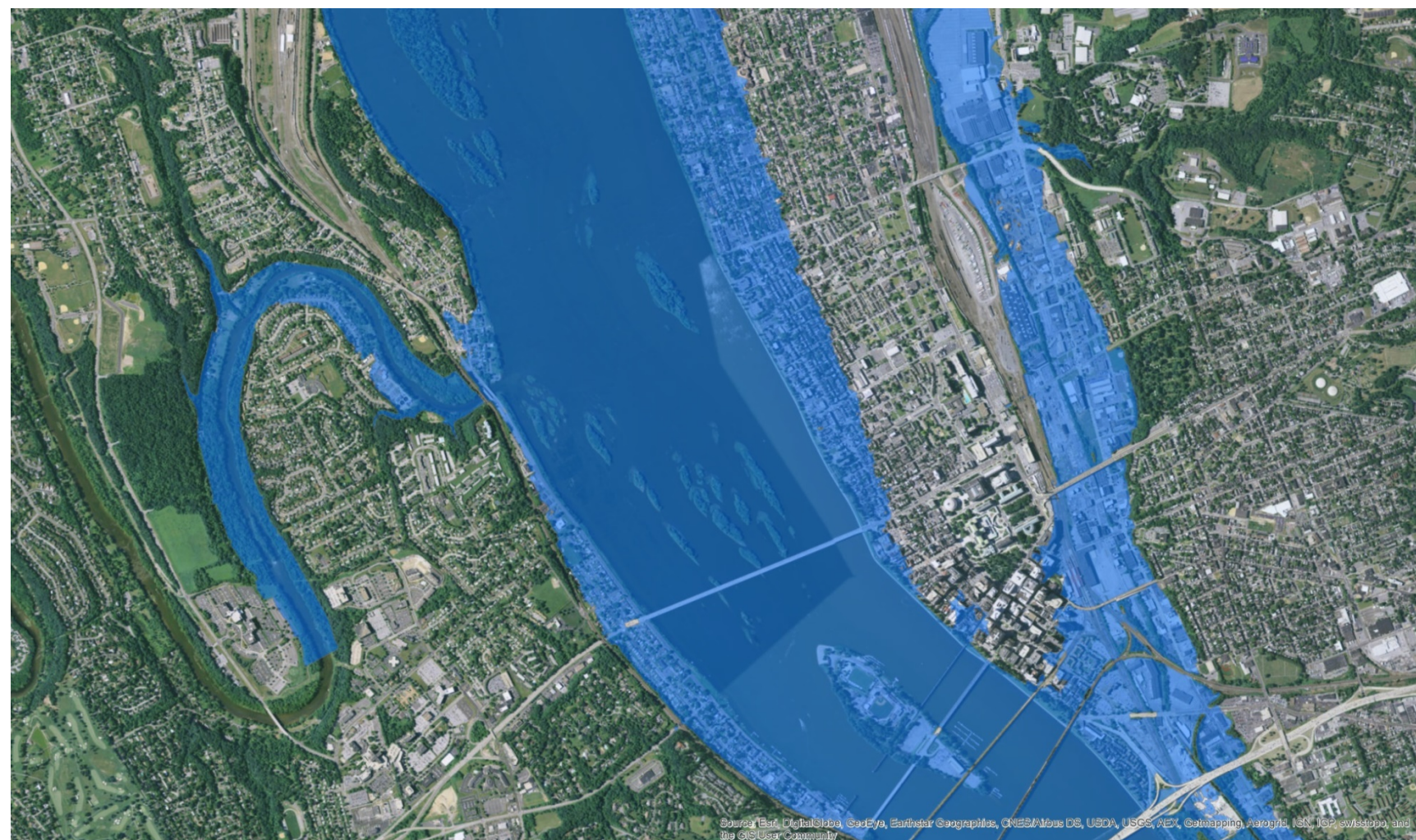
6.1.1. Mitigation Successes

The following narrative summarizes Dauphin County mitigation successes that have been accomplished since the 2010 HMP Update.

Dauphin County has been proactive and has undertaken several projects to reduce the County's vulnerability to flooding and flash flooding, the hazard which poses the greatest risk. As part of the 2010 HMP mitigation action strategy, Dauphin County and its partners have accomplished the following:

- Inundation mapping of the Susquehanna River was completed as a joint project between the Silverjackets and SRBC. Figure 6.1-2 shows a portion of the inundation mapping. The Silverjackets and SRBC will be completing a similar project for the Swatara Creek, which has been included as an action in the 2015 HMP.
- A joint partnership with the NWS Mid-Atlantic River Forecast Center and SRBC was formed to enhance the existing Susquehanna Flood Forecast and Warning System via the Advanced Hydrologic Prediction Services Program. This initiative will continue as part of the 2015 HMP.
- The number of USGS and Integrated Flood Observing and Warning System (IFLOWS) rain and stream gauges has been increased to enhance the existing Susquehanna Flood Forecast and Warning System and the initiative will continue as part of the 2015 HMP. This was completed through a partnership between SRBC and local watershed organizations and will continue as part of the 2015 HMP.
 - In May 2015, HMGP funding was awarded to Dauphin, Huntingdon, and Lancaster counties in conjunction with SRBC to implement the Tri-County Digital Flood Warning System project.
 - The project includes installing a digital warning system that relies on an integrated network of digital cameras, staff gages, stream and rain gages, and smartphone users to enhance warning capabilities.
 - Gages and cameras will be installed at the following locations in Dauphin County: Derry Township at the bridge over Swatara Creek near the confluence with Spring Creek; Middletown Borough at the bridge completed in 2010 over Swatara Creek; Hummelstown Borough at the Duke Street bridge over the Swatara Creek; and Harrisburg at I-83 John Harris bridge over the Susquehanna River.
- FEMA and the City of Harrisburg launched the Harrisburg High Water Mark Initiative in 2013. The initiative was developed to inform the public of their local flood risk by placement of high water mark signs from the City's storm event of record, Tropical Storm Agnes, at locations throughout the City.
- Working with DCCD, municipalities adopted Dauphin County's Countywide Act 167 Stormwater Management Plan and local ordinances.
- Municipal floodplain management ordinances have been revised to be consistent with current D-FIRMS and updated FIRMS have been made available for public review in all municipalities, the County courthouse and libraries, and the County Planning Commission.

Figure 6.1-2 Portion of Susquehanna River Inundation Mapping for the Harrisburg Area Completed by SRBC and PA Silver Jackets (SRBC, 2014).



- Technical proficiency has been developed in several municipalities to conduct post-disaster damage assessments and regulate construction activities to ensure compliance with the NFIP.
- The Borough of Lykens has started and is in the process of completing flood related repairs along Rattling Creek and the Wiconisco Creek.
- Swatara Township has been working with FEMA, Army Corps, and DEP to identify flood solutions to minimize impact to the Lenker Manor Neighborhood.
- Highspire Borough is in the process of investigating the feasibility of installing flood gates and pumps to prevent backup of flood waters in the Borough.
- Updated FIRMS have been made available for public review in all municipalities, the County courthouse and libraries, and the County Planning Commission.

The substantial impacts associated with Tropical Storm Lee and Hurricane Irene, which impacted the east coast in August 2011, resulted in Dauphin County receiving a direct allocation through Section 239 of the Department of Housing and Urban Development (HUD) Appropriations Act, 2012 (Pub. L. 112– 55, approved November 18, 2011) (Appropriations Act). The Appropriations Act made up to \$400 million in Community Development Block Grant (CDBG) funds available to eight states for necessary expenses related to disaster relief, long-term recovery, restoration of infrastructure and housing, and economic revitalization in the most impacted and distressed areas resulting from a major disaster declared pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1974 (42 U.S.C. 5121 et seq.). The Appropriations Act requires that funds be used only for specific disaster-related purposes. The law also requires that prior to the obligation of funds, a grantee shall submit a plan detailing the proposed use of all funds, including criteria for eligibility and how the use of these funds will address long-term recovery. Through the CDBG Recovery Assistance Program (CDBG-DR), the County received notice of a direct allocation of \$6,415,833 to address impacts related to the federally declared disasters that occurred in the summer of 2011 (Tropical Storm Lee and Hurricane Irene). In 2013, Dauphin County received an additional \$7,632,000 in CDBG-DR funds to continue to address impacts from Tropical Storm Lee.

To identify how the federal allocations would address unmet housing, infrastructure, business, and economic development needs within Dauphin County as a result of severe flooding and storm related impacts, the County prepared CDBG-DR Action Plans for each allocation to describe the proposed use of funds to address. CDBG-DR funds have been used by the County to conduct outreach and implement projects as follows.

- Dauphin County Community and Economic Development and DCPC conducted outreach and training sessions for both citizens and businesses impacted by Tropical Storm Lee. This outreach included not only information on recovery efforts and the NFIP, but also information on utilizing CDBG-DR funding.
- Dauphin County established the County CRS Program as discussed in Section 4.3.2.3.
- Londonderry Township has taken significant steps to address repetitive loss properties located on islands in the Township. The Township has been working with FEMA Region 3, PEMA, and Dauphin County officials on conducting a thorough assessment of these properties. Through CDBG-DR funding, Londonderry Township is in the process of conducting individual property assessments, identifying any and all violations, and taking enforcement actions regarding building, septic, and dock permit issues. In August 2015, a stakeholder meeting was held with residents of the islands and property owners in attendance were advised of the assessment process and follow-up enforcement actions,

if required. Two of the islands, Shelly Island and Beshore Island, are owned by York Haven Power Company. The Township met with representatives of the power company in August 2015 to discuss leased cabins located on the islands. The power company intends to have all improvements removed within approximately two years. Londonderry Township’s efforts will continue as part of the mitigation strategy for the 2015 HMP update as Action 17.

- The following municipal stormwater and transportation infrastructure improvement projects are in-progress or have been completed through the first round of CDBG-DR funding:
 - Derry Township: Locust Ave and Java Ave Drainage
 - Highspire Borough: Market Street Bridge Replacement (Box culvert), Jury Street Bridge Replacement (Box culvert)
 - Hummelstown Borough: Duke Street Bridge Replacement
 - Lower Paxton Township: Winfield Street stormwater upgrades
 - Middle Paxton Township: Potato Valley Road Bridge Replacement
 - Millersburg Borough: Union & East Streets Storm Sewer Relocation
 - Mifflin Township: Dairy Road Culvert Replacement
 - Royaltown Borough: PA Canal Drainage Improvements, Lower Ward Sanitary and Storm Sewer Improvements
 - Susquehanna Township: Roberts Valley Road drainage
 - West Hanover Township: Smith Hoffman Culvert Replacements
 - Williamstown Borough: Replace storm sewer system and roadway restoration – West Street between Broad and Market

Significant efforts have been made over the past several years to acquire properties located in the SFHA with six municipalities acquiring and demolishing residential structures impacted by Tropical Depression Ivan and Tropical Storm Lee. The following table summarizes mitigation buyouts by municipality since 2004. FEMA funding sources were used for the buyouts with the exception of two in Hummelstown Borough which were acquired using CDBG-DR funds.

MUNICIPALITY	NUMBER OF BUYOUTS
Hummelstown Borough	8
Londonderry Township	14
Lower Swatara Township	16
Middletown Borough	28
South Hanover Township	10
Swatara Township	21
TOTAL	97
<i>Source: Municipalities; Commonwealth of Pennsylvania 2013 State Standard All-Hazard Mitigation Plan; Pennsylvania Emergency Management Agency; Tri-County Regional Planning Commission.</i>	

Middletown Borough reports that in addition to the buyouts, a property owner demolished a structure on their own and another property owner donated their structure to the Borough and the Borough demolished the structure. Swatara Township has been working on strategies for thirteen additional residential structures on a street in which buyouts have already occurred. Issues associated with pursuing the buyouts include: non-qualification based on damage

percentage below 51, an unwilling property owner, and one structure not located in the SFHA but due to its location sustains repeated flood damage.

In an effort to continue to mitigate the devastating impacts resulting from Tropical Storm Lee, Dauphin County, in cooperation with its municipalities, submitted a Phase I CDBG-DR National Disaster Resilience Competition (NDRC) application in March 2015. In June 2015 HUD, along with its education and technical assistance partner the Rockefeller Foundation, announced that Dauphin County was one of six counties or parishes in the country selected to move on to Phase II of the competition. Phase II applications are due October 2015 and awards will be announced January 2016 (HUD, June 2015). If awarded, funding would help Dauphin County meet unmet flood recovery needs which are documented at over \$197 million and could include hazard mitigation projects such as:

- Emergency generator/redundant emergency systems;
- Bridge and culvert pipe replacement;
- Road repairs;
- Culvert and bridge scour repair;
- Roadside drainage improvements;
- Sewage pump station elevation or relocation;
- Sanitary sewer inflow and infiltration repairs;
- Combined sewer separation;
- Canal drainage improvements; and
- Dam spillway repairs.

In addition to mitigating flood impacts, Dauphin County has also been addressing the impacts of sinkholes, particularly in the City of Harrisburg. Dauphin County has approved property tax rebates for 50 homes impacted by sinkholes and has been working with the City to secure federal and state funds to repair the sinkholes, buy residents' homes, assist with relocation, and demolish condemned properties.

To help mitigate resultant impacts associated with transportation accidents, Dauphin County is in the process of updating its County Evacuation Plan. The plan will be integrated into the Harrisburg Area Transportation Study (HATS) Regional Transportation Plan (RTP) plan to ensure the most current Dauphin County hazard related information is included in regional transportation planning. In addition, HATS will provide transportation modelling assistance in the event of a transportation incident by determining alternate transportation routes.

Several mitigation actions focused on improving Dauphin County's readiness to address hazard events have been completed over the past five years.

- DEMA and local municipalities have conducted routine inspections and annual tests on emergency communications equipment and have ensured a planned, coordinated public warning dissemination system is in place including a fully operational reverse 911 automated emergency alert system and an increase in the number of NOAA Weather Alert radios.

- Hazard response practice drills and emergency management training exercises have been conducted on an annual basis.
- DEMA has been working with PEMA and local municipalities to fully integrate resource management and EOC management software throughout the County.
- Half of Dauphin County's municipalities have established alternate EOCs during the past five years.
- DEMA completed a biennial TMI emergency exercise in April 2015.
- Municipalities have been coordinating emergency management functions. Sixteen Dauphin County municipalities coordinate emergency management functions by sharing Emergency Management Coordinators (EMCs).
- Post Tropical Storm Lee, DCPC and DEMA convened After Action sessions in December 2011. In addition, the storm prompted DEMA to develop additional training for any EOC activation including lessons learned such as Resource Requests and EOC Activation Preparedness.

Additional examples of mitigation successes include update and development of regional and local planning and funding tools and the availability of 2010 HMP information for municipalities and citizens.

- Regional Growth Management Plan. Dauphin County, along with neighboring Cumberland and Perry Counties, adopted a Regional Growth Management Plan (RGMP) in 2011 to assess regional development and transportation issues. It establishes a regional planning framework, and it is anticipated that future municipal and county comprehensive plans will be compatible with the planning framework adopted through the RGMP.
- Establishment of the Dauphin County Land Bank Authority. In 2013, Dauphin County adopted an ordinance creating the Dauphin County Land Bank Authority (Land Bank). The Land Bank was established to use available resources to facilitate the return of vacant, blighted, abandoned, and tax-delinquent properties to productive use; combating community deterioration, creating economic growth and stabilizing the housing and job market. The Land Bank assists in addressing the Building or Structure Collapse hazard and twelve Dauphin County municipalities have signed an intergovernmental Cooperation Agreement/MOU with the Land Bank.
- Establishment of the Dauphin County Infrastructure Bank (DCIB). The DCIB was established in 2013 to provide low-interest loan financing to support county-wide surface transportation projects county-wide and is intended to leverage other private, local, state, and federal funding resources. Working with PennDOT, the County will provide a maximum of \$30 million through 2016 for low-interest loans for qualifying transportation projects. Program funds are administered through PennDOT's PIB Program. The program can address infrastructure deficiencies caused by flooding and was a 2014 Achievement Award Winner from the National Association of Counties (NACO).
- New or updated plans and ordinances. During the 2010 – 2014 planning period several Dauphin County municipalities either adopted new or updated existing plans and ordinances such as but not limited to comprehensive plans, subdivision and land development ordinances, and zoning ordinances. These activities strengthen the

County’s overall land use planning capability and subsequently strengthen the County’s resiliency to impacts from future hazard events.

- Hazard mapping availability. Dauphin County GIS has made digital natural hazard mapping files available to municipalities.
- HMP available for public review. All municipalities have made the 2010 HMP available for public review.

6.2. Mitigation Goals and Objectives

Based on results of the goals and objectives evaluation exercise and input from the HMPSC, four goals and 20 corresponding objectives were developed for the 2015 HMP Update. Table 6.2-1 lists these goals and objectives.

Table 6.2-1 2015 Mitigation Strategy Goals and Objectives.	
Goal 1	Increase education and awareness about existing and potential natural and human-made hazards in the County.
Objective 1.A	Encourage awareness of the County’s hazards so that residents and business owners are prepared for future hazard events.
Objective 1.B	Ensure that property owners and buyers are aware of the availability and benefits of obtaining federal flood insurance.
Objective 1.C	Ensure that local officials and EMA staff are well trained regarding natural hazards and appropriate prevention and mitigation activities.
Objective 1.D	Increase Dauphin County’s municipal participation in FEMA’s Community Rating System.
Goal 2	Protect citizens and public and private property from the impacts of natural and human-made hazards.
Objective 2.A	Ensure that existing drainage systems (pipes, culverts, channels) are adequate and functioning properly.
Objective 2.B	Minimize future damage due to flooding of the Susquehanna River and its tributaries.
Objective 2.C	Reduce impacts related to flash flooding and stormwater problems.
Objective 2.D	Encourage the use of retrofitting techniques for repetitive loss structures.
Objective 2.E	Restore degraded natural resources and open space to improve their flood control function.
Objective 2.F	Investigate structural solutions to address natural and human-made hazards.
Objective 2.G	Reduce threats from natural and human-made hazards.
Goal 3	Encourage the integration of hazard mitigation planning principles in County and Local Government regulations, plans, and policies.

Table 6.2-1 2015 Mitigation Strategy Goals and Objectives.	
Objective 3.A	Ensure that local ordinances are consistent with FEMA and PA DCED guidelines and are properly enforced.
Objective 3.B	Preserve areas where natural hazard potential is high (i.e., steeply sloping areas, sinkhole areas, floodplains, wetlands, etc.).
Objective 3.C	Regulate construction/development in the County to prevent increases in runoff and subsequent increases in flood flows.
Objective 3.D	Support FEMA's efforts to prepare detailed floodplain mapping in the Lower Susquehanna-Penns and Lower Susquehanna-Swatara Watersheds.
Objective 3.E	Continue mass evacuation planning to provide safe and efficient evacuation during natural and human-made hazard events.
Objective 3.F	Assess the impacts of pandemics and infectious diseases and radon exposure on Dauphin County's citizens.
Goal 4	Plan for improved infrastructure to protect citizens and public and private property from natural and human-made hazards.
Objective 4.A	Provide residents and businesses with adequate warning of natural and human-made hazard events.
Objective 4.B	Provide adequate shelters during hazard events.
Objective 4.C	Provide adequate communication systems for emergency management agencies and emergency response units.

6.3. Identification & Analysis of Mitigation Techniques

The mitigation strategy in the updated HMP should include analysis of a comprehensive range of specific techniques or actions. FEMA, through the March 2013 Local Mitigation Handbook, and PEMA, through the October 2013 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 preserve or restore the functions of natural systems. Examples include, but are not limited to: sediment and erosion control, stream corridor restoration, forest management, conservation easements, and wetland restoration and preservation.
- **Education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate the hazards, and may also include participation in national programs. Examples include, but are not limited to: radio or television spots, websites with maps and information, provide information and training, NFIP outreach, StormReady, and Firewise Communities.

To identify possible mitigation actions a mitigation technique matrix was developed. Refer to Table 6.3-1. The matrix identifies mitigation techniques for each hazard identified in the risk assessment. The matrix is used to help identify specific mitigation actions to be included in the mitigation action plan. The Planning Team reviewed the four types of mitigation techniques and examples of actions at the Risk Assessment and Mitigation Solutions Workshop. Municipalities were informed through the planning process that a minimum of one mitigation action needed to be developed for each municipality.

HAZARD	MITIGATION TECHNIQUES			
	LOCAL PLANS AND REGULATIONS	STRUCTURE AND INFRASTRUCTURE PROJECTS	NATURAL SYSTEMS PROTECTION	EDUCATION AND AWARENESS PROGRAMS
Building or Structure Collapse	X	X		

Table 6.3-1 Mitigation Techniques Matrix				
HAZARD	MITIGATION TECHNIQUES			
	LOCAL PLANS AND REGULATIONS	STRUCTURE AND INFRASTRUCTURE PROJECTS	NATURAL SYSTEMS PROTECTION	EDUCATION AND AWARENESS PROGRAMS
Drought	X	X	X	X
Flood, Flash Flood, Ice Jam	X	X	X	X
Dam Failure	X			X
Environmental Hazards	X		X	X
Hurricane, Tropical Storm, Nor'easter	X			X
Landslide	X	X		
Nuclear Incidents				X
Pandemic and Infectious Disease	X			X
Radon Exposure		X		X
Subsidence, Sinkhole	X			X
Tornado, Wind Storm	X	X		X
Transportation Accidents	X			X
Wildfire	X		X	X
Winter Storm	X	X		X
Utility Interruption		X		X

6.4. Mitigation Action Plan

Using the results obtained from evaluating the mitigation strategy from the 2010 HMP summarized in Table 6.1-2, as a base to start, the Planning Team identified actions for the HMP Update.

Municipalities identified actions listed on the Mitigation Action Evaluation form; they wished to continue as part of the 2015 HMP update. In addition, a new mitigation action template was available for municipalities to identify new actions they wished to pursue as part of the HMP Update.

The HMPSC developed and finalized 2015 actions during conference calls on May 6, 2015 and May 20, 2015. The HMPSC added several new actions to address human-made hazards added to the HMP.

Table 6.4-1 lists the mitigation actions for the 2015 HMP update. Sixty-five (65) mitigation actions were identified with at least one mitigation action was established for each hazard profiled, but more than one action is identified for several hazards. Each participating municipality has at least one action. Each mitigation action is intended to address one or more of the goals and objectives identified in Section 6.2 - Mitigation Goals and Objectives.

Actions carried over from the 2010 HMP were renumbered along with the new actions; numbering from 1 to 65. Underlined actions contribute toward continued compliance with and participation in the NFIP.

Table 6.4-1 2015 Mitigation Actions.	
1	Integrate hazard mitigation plan data prepared for the 2015 HMP Update into the Dauphin County Comprehensive Plan Update.
2	Develop a new Comprehensive Plan or amend an existing Comprehensive Plan to include an assessment and associated mapping of the municipality’s vulnerability to location-specific hazards and appropriate recommendations for the use of these hazard areas.
3	Develop a new Zoning Ordinance or revise an existing Zoning Ordinance to include separate zones or districts with appropriate development criteria for known hazard areas.
4	Develop a new Subdivision and Land Development Ordinance or revise an existing Subdivision and Land Development Ordinance to include municipal-specific, hazard mitigation-related development criteria and/or provisions for the mandatory use of conservation subdivision design principles in order to regulate the location and construction of buildings and other infrastructure in known hazard areas.
5	Ensure municipal compliance with local watershed-specific Act 167 Stormwater Management Plans and Ordinances.
6	Conduct a detailed inventory and prioritization of local environmental resources via the Comprehensive Planning or similar natural resources planning process.
7	Protect via local ordinance or acquisition, if feasible, environmentally sensitive areas (such as floodplains, steep slopes, forested areas, and wetlands) that could be impacted by hazard events.
8	Revise existing zoning and/or subdivision and land development ordinances or adopt a separate, standalone ordinance to require the completion of subsurface investigations (i.e., borings, geo-physical surveys, and/or studies by a registered Professional Geologist) for all new subdivision and land development projects in known land subsidence hazard areas.
9	Evaluate current land use controls using FEMA’s guidance document “Hazard Mitigation Planning: Practices for Land Use Planning and Development near Pipelines” to enhance pipeline safety and protect surrounding communities.
10	Develop language for potential inclusion in subdivision regulations requiring new power and communications (telephone, cable television) lines to be buried for new construction.
11	Update and implement a comprehensive water resources management plan that analyzes the County’s existing water resources supply and evaluates the County’s anticipated water use demand in an effort to identify suspected water supply shortages and potential new water supply sources.
<u>12</u>	<u>Revise or re-adopt a municipal floodplain management ordinance/map that is consistent with current</u>

Table 6.4-1 2015 Mitigation Actions.	
	<u>FEMA D-FIRMS to ensure municipal compliance with NFIP and PA Act 166 floodplain development regulations, as appropriate.</u>
13	Continue the partnership with the NWS Mid-Atlantic River Forecast Center to enhance the existing Susquehanna Flood Forecast and Warning System via the Advanced Hydrologic Prediction Services Program.
14	Coordinate with the USGS, local watershed organizations, and/or the DCCD to increase the number of USGS and Integrated Flood Observing and Warning System (IFLOWS) rain and stream gauges in the County as a potential enhancement to the existing Susquehanna Flood Forecast and Warning System.
15	Develop flood forecasting maps for the Swatara Creek Watershed.
16	<u>Work with municipalities to evaluate participation in the CRS and facilitate the preparation and submission of CRS applications.</u>
17	<u>Inventory and assess flood prone residential structures on islands throughout Londonderry Township.</u>
18	Encourage the owners/operators of Yeshiva Academy, Downey Elementary School, Circle School, and the Williams Township Wastewater Treatment Plant to develop and implement an emergency response plan to mitigate potential flooding impacts.
19	<u>Continue to acquire, relocate, or make structural modifications (such as elevation and dry/wet flood proofing) to minimize impact to flood prone structures in accordance with NFIP guidelines.</u>
20	<u>Develop a technical proficiency at the municipal level for conducting post-disaster damage assessments and continue to regulate through local planning and zoning reconstruction activities to ensure compliance with NFIP substantial damage/ substantial improvement requirements.</u>
21	<u>Develop a technical proficiency at the municipal level for assisting local residents and business owners in applying for hazard mitigation and assistance funds and identifying cost beneficial hazard mitigation measures to be incorporated into reconstruction activities.</u>
22	<u>Encourage local business and industry owners in known flood hazard areas to develop an emergency response plan as a potential alternative to implementing a physical property protection measure, where otherwise not technically or fiscally appropriate.</u>
23	<u>Educate and encourage uninsured property owners to purchase flood insurance through the NFIP who are identified as being located within the flood hazard areas on the 2012 FIRMs.</u>
24	Encourage private well owners to conduct rigorous sampling and analysis of private drinking water supply sources immediately after an inundating flood event and boil water as needed.
25	Implement flood related repairs and hazard mitigation including the Reservoir, the Glen Park area, the North side of town, and the South side of town along Rattling Creek and the Wiconisco Creek.
26	Develop a plan for replacing the Derry Street Bridge.
27	Investigate the feasibility of constructing a levee/floodwall system along Swatara Creek between East Main Street and the Pennsylvania Turnpike to minimize Middletown Borough's flood hazard potential.
28	Investigate the feasibility of installing flood gates and pumps to prevent the backup of flood waters in Highspire Borough.

Table 6.4-1	2015 Mitigation Actions.
29	Municipalities should continue to seek solutions to problem areas and obstructions identified in the April 2010 Countywide Act 167 Stormwater Management Plan.
30	Support the recommendations of, and assist in implementing the Paxton Creek Revitalization Project.
31	Develop and implement a community-specific channel maintenance program consisting of routine inspections and subsequent debris removal to ensure maximum hydraulic capacity of all local streams and watercourses.
32	Implement the recommendations of the Harrisburg Authority's ongoing combined sewer overflow impact study.
33	Working through the Conservation District, the County should ensure continued contractor compliance with approved Erosion and Sedimentation Pollution Control Plans and should continue to work with local farmers to implement erosion and sedimentation control BMPs.
34	Implement the suggested precautionary steps recommended by a registered Professional Geologist or other acceptable expert) to remedy surface-exposed sinkhole features that pose an identifiable threat to the general public.
35	Capital Region Water will ensure continued implementation of appropriate operations and maintenance procedures (routine inspections and regular maintenance) at the DeHart Dam in an effort to prevent a potential failure.
36	Enroll in the Pennsylvania Firewise Communities Program through the DCNR Fire Forester for Dauphin County.
37	Work with the DCNR Fire Forester for Dauphin County to encourage property owners in potential wildfire hazard areas to remove all excess brush and shrubby plants from the immediate vicinity (i.e., 50 to 100 feet) of all buildings.
38	Coordinate with the DCNR Fire Forester for Dauphin County on the potential construction of a fire- break at the appropriate location on the south side of Peters Mountain along Route 325 in Rush Township.
39	Install easily accessible and reliable water supply dry hydrants at various bridge and culvert crossings of local streams and water- courses for emergency firefighting uses through coordination with the PA DCNR and local fire companies.
40	Coordinate with Pennsylvania Department of Health on adopting the state Pandemic Plan and develop a Dauphin County Annex.
41	Encourage homeowners to test for radon and install radon mitigation systems, if needed.
42	Encourage municipalities to adopt the Radon Control Methods Appendix of the current, adopted edition of the International Residential Code to address radon in new construction.
43	Identify structures, including historic structures, at risk from the impacts of natural and human-made hazards and identify funding sources to help mitigate impacts.
44	Encourage municipalities to enter into an Intergovernmental Cooperation Agreement and Memorandum of Understanding with the Dauphin County Land Bank Authority as a way to address structures at risk from the impacts of natural and human-made hazards.

Table 6.4-1	2015 Mitigation Actions.
45	Identify the need and requirements for emergency generators by agency, municipal, or critical facilities and identify potential funding sources to acquire.
46	Improve coordination with the LEPC and conduct training to prepare for hazardous materials incidents.
47	Review the County's evacuation routes to ensure alternate transportation routes are available in the event of major roadway closures.
48	Ensure that a planned, coordinated, and effective public warning dissemination program exists at the local level.
49	Conduct public outreach to educate Dauphin County citizens about the potential health and safety implications of various natural and human-made hazard events using existing public information materials.
50	Encourage citizens, schools, nursing homes, hospitals, etc., to sign up for AlertPA notifications.
51	Develop and/or obtain a program for the collection and identification of Special Needs populations for means of notification during an emergency, also so that proper transportation is provided to these populations in the event of an evacuation.
52	Work with PEMA and municipalities to fully integrate resource management and EOC management software throughout the County.
53	Increase the number of NOAA Weather Alert radios in public places across the County which currently do not have them (such as personal care homes) above and beyond what is required of the County by the NWS's Storm Ready Program.
54	Adopt via resolution, and respond to hazards with actions that are consistent with, the County-level EOP.
55	Conduct hazard response practice drills and emergency management training exercises on an annual basis.
56	Encourage municipal EOC's (including those outside the TMI EPZ) to participate in more County EOC exercises and evacuation drills to practice and gain efficiency in emergency plan preparedness.
57	Conduct routine inspections, regular maintenance, and annual tests on all emergency communications equipment, public address systems, and hazard alert sirens to ensure unhindered operation during an emergency event.
58	Establish an alternate EOC location in the event the primary EOC must be evacuated. The facility should be selected to support the EOC as well as all of the County Special Teams. This facility should also be located outside of the TMI EPZ and the 1% Annual Chance Flood Zone.
59	Municipalities should continue to store and make available for public inspection, their community's FIRMs and associated Flood Insurance Study. Dauphin County should continue to provide copies of these maps at the courthouse, conservation district office, libraries, and planning commission.
60	Maintain natural hazard and human-made hazard risk assessment and mitigation publications/materials at public libraries throughout the County.

Table 6.4-1 2015 Mitigation Actions.	
61	Develop and distribute a public summary of this hazard mitigation plan including relevant information on hazard specific “do’s” and “don’ts,” hazard-prone areas, emergency contact information, and lists of shelters or hotels where evacuees can stay with domestic animals.
62	Continue to provide links from Dauphin County’s homepage to FEMA, PEMA, DCCD, SRBC, and DCED.
63	Store in an easily accessible location and make available for public inspection, the original hazard mitigation plan, the new plan update document, and the FEMA guidance documents which were provided as part of the hazard mitigation planning program. Also make electronic files available for review.
64	The Dauphin County Department of Information Technology will make natural and human-made hazard data available for municipal use.
65	Develop the county’s GIS to include an updated and fully attributed building/structure coverage by use and type.

Table 6.4-1 lists 65 mitigation actions, many of which will require substantial time commitments from municipalities, DEMA, and other Dauphin County agencies. The HMPSC believes these actions are attainable and can be implemented over the next five-years. While all activities will be pursued over the next five years, the reality of limited time and resources requires the evaluation and prioritization of mitigation actions.

Evaluating mitigation actions involves judging each action against certain criteria to determine whether or not it can be executed. The HMPSC evaluated the feasibility of mitigation actions using the ten evaluation criteria set forth in the Mitigation Action Evaluation methodology. The methodology solicits input on whether each action is highly effective or feasible and ineffective or not feasible for the criteria. These criteria are listed below and aid in determining the feasibility of implementing one action over another.

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

To evaluate the mitigation actions, the HMPSC identified each action as highly effective or feasible and ineffective or not feasible using the Mitigation Action Evaluation form. Results are included in Table 6.4-2.

Table 6.4-2 Evaluation of Mitigation Actions.													
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE	
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives		
1	Integrate hazard mitigation plan data prepared for the 2015 HMP Update into the Dauphin County Comprehensive Plan Update.	+	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
2	Develop a new Comprehensive Plan or amend an existing Comprehensive Plan to include an assessment and associated mapping of the municipality's vulnerability to location-specific hazards and appropriate recommendations for the use of these hazard areas.	+	+	+	N	+	+	+	N	+	N	N	7 (+) 0 (-) 3 (N)
3	Develop a new Zoning Ordinance or revise an existing Zoning Ordinance to include separate zones or districts with appropriate development criteria for known hazard areas.	+	+	+	N	+	+	+	N	+	N	N	7 (+) 0 (-) 3 (N)

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
Action No.	Action	(+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										
		Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
4	Develop a new Subdivision and Land Development Ordinance or revise an existing Subdivision and Land Development Ordinance to include municipal-specific, hazard mitigation-related development criteria and/or provisions for the mandatory use of conservation subdivision design principles in order to regulate the location and construction of buildings and other infrastructure in known hazard areas.	+	+	+	N	+	+	+	N	+	N	7 (+) 0 (-) 3 (N)
5	Ensure municipal compliance with local watershed-specific Act 167 Stormwater Management Plans and Ordinances.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
6	Conduct a detailed inventory and prioritization of local environmental resources via the Comprehensive Planning or similar natural resources planning process.	+	+	+	N	+	+	+	N	+	N	7 (+) 0 (-) 3 (N)
7	Protect via local ordinance or acquisition, if feasible, environmentally sensitive areas (such as floodplains, steep slopes, forested areas, and wetlands) that could be impacted by hazard events.	+	+	+	N	+	+	+	N	+	+	8 (+) 0 (-) 2 (N)

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
8	Revise existing zoning and/or subdivision and land development ordinances or adopt a separate, standalone ordinance to require the completion of subsurface investigations (i.e., borings, geo- physical surveys, and/or studies by a registered Professional Geologist) for all new subdivision and land development projects in known land subsidence hazard areas.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
9	Evaluate current land use controls using FEMA's guidance document "Hazard Mitigation Planning: Practices for Land Use Planning and Development near Pipelines" to enhance pipeline safety and protect surrounding communities.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
10	Develop language for potential inclusion in subdivision regulations requiring new power and communications (telephone, cable television) lines to be buried for new construction.	+	+	+	N	+	+	+	N	+	N	7 (+) 0 (-) 3 (N)

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
11	Update and implement a comprehensive water resources management plan that analyzes the County's existing water resources supply and evaluates the County's anticipated water use demand in an effort to identify suspected water supply shortages and potential new water supply sources.	+	+	+	+	+	+	+	N	N	+	8 (+) 0 (-) 2 (N)
12	Revise or re-adopt a municipal floodplain management ordinance/map that is consistent with current FEMA D-FIRMS to ensure municipal compliance with NFIP and PA Act 166 floodplain development regulations, as appropriate.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)
13	Continue the partnership with the NWS Mid-Atlantic River Forecast Center to enhance the existing Susquehanna Flood Forecast and Warning System via the Advanced Hydrologic Prediction Services Program.	+	+	+	+	N	+	+	+	+	+	9 (+) 0 (-) 1 (N)

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
14	Coordinate with the USGS, local watershed organizations, and/or the DCCD to increase the number of USGS and Integrated Flood Observing and Warning System (IFLOWS) rain and stream gauges in the County as a potential enhancement to the existing Susquehanna Flood Forecast and Warning System.	+	+	+	+	N	+	+	+	+	+	9 (+) 0 (-) 1 (N)
15	Develop flood forecasting maps for the Swatara Creek Watershed.	+	+	+	+	N	+	+	+	+	+	9 (+) 0 (-) 1 (N)
16	Work with municipalities to evaluate participation in the CRS and facilitate the preparation and submission of CRS applications.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)
17	Inventory and assess flood prone residential structures on islands throughout Londonderry Township.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)
18	Encourage the owners/operators of Yeshiva Academy, Downey Elementary School, Circle School, and the Williams Township Wastewater Treatment Plant to develop and implement an emergency response plan to mitigate potential flooding impacts.	+	+	+	N	N	+	+	N	N	N	5 (+) 0 (-) 5 (N)

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
19	Continue to acquire, relocate, or make structural modifications (such as elevation and dry/wet flood proofing) to minimize impact to flood prone structures in accordance with NFIP guidelines.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
20	Develop a technical proficiency at the municipal level for conducting post-disaster damage assessments and continue to regulate through local planning and zoning reconstruction activities to ensure compliance with NFIP substantial damage/ substantial improvement requirements.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)
21	Develop a technical proficiency at the municipal level for assisting local residents and business owners in applying for hazard mitigation and assistance funds and identifying cost beneficial hazard mitigation measures to be incorporated into reconstruction activities.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)

Dauphin County 2015 All-Hazard Mitigation Plan Update

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
		(+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
22	Encourage local business and industry owners in known flood hazard areas to develop an emergency response plan as a potential alternative to implementing a physical property protection measure, where otherwise not technically or fiscally appropriate.	+	+	+	N	+	+	+	N	N	+	7 (+) 0 (-) 3 (N)
23	Educate and encourage uninsured property owners to purchase flood insurance through the NFIP who are identified as being located within the flood hazard areas on the 2012 FIRMs.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
24	Encourage private well owners to conduct rigorous sampling and analysis of private drinking water supply sources immediately after an inundating flood event and boil water as needed.	+	+	+	N	N	+	+	N	N	N	5 (+) 0 (-) 5 (N)
25	Implement flood related repairs and hazard mitigation including the Reservoir, the Glen Park area, the North side of town, and the South side of town along Rattling Creek and the Wiconisco Creek.	+	+	+	N	+	+	+	N	+	+	8 (+) 0 (-) 2 (N)
26	Develop a plan for replacing the Derry Street Bridge.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
27	Investigate the feasibility of constructing a levee/floodwall system along Swatara Creek between East Main Street and the Pennsylvania Turnpike to minimize Middletown Borough's flood hazard potential.	+	+	+	N	+	+	+	N	N	+	7 (+) 0 (-) 3 (N)
28	Investigate the feasibility of installing flood gates and pumps to prevent the backup of flood waters in Highspire Borough.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
29	Municipalities should continue to seek solutions to problem areas and obstructions identified in the April 2010 Countywide Act 167 Stormwater Management Plan.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)
30	Support the recommendations of, and assist in implementing the Paxton Creek Revitalization Project.	+	+	+	N	+	+	+	N	N	+	7 (+) 0 (-) 3 (N)
31	Develop and implement a community-specific channel maintenance program consisting of routine inspections and subsequent debris removal to ensure maximum hydraulic capacity of all local streams and watercourses.	+	+	+	N	N	+	+	N	N	+	6 (+) 0 (-) 4 (N)

Dauphin County 2015 All-Hazard Mitigation Plan Update

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Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
		(+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
32	Implement the recommendations of the Harrisburg Authority's ongoing combined sewer overflow impact study.	+	+	+	N	+	+	+	N	N	+	7 (+) 0 (-) 3 (N)
33	Working through the Conservation District, the County should ensure continued contractor compliance with approved Erosion and Sedimentation Pollution Control Plans and should continue to work with local farmers to implement erosion and sedimentation control BMPs.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
34	Implement the suggested precautionary steps recommended by a registered Professional Geologist or other acceptable expert) to remedy surface-exposed sinkhole features that pose an identifiable threat to the general public.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
35	Capital Region Water will ensure continued implementation of appropriate operations and maintenance procedures (routine inspections and regular maintenance) at the DeHart Dam in an effort to prevent a potential failure.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)

Dauphin County 2015 All-Hazard Mitigation Plan Update

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Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
		(+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
36	Enroll in the Pennsylvania Firewise Communities Program through the DCNR Fire Forester for Dauphin County.	+	+	+	+	+	+	+	N	+	N	8 (+) 0 (-) 2 (N)
37	Work with the DCNR Fire Forester for Dauphin County to encourage property owners in potential wildfire hazard areas to remove all excess brush and shrubby plants from the immediate vicinity (i.e., 50 to 100 feet) of all buildings.	+	+	+	N	+	+	+	N	+	N	7 (+) 0 (-) 3 (N)
38	Coordinate with the DCNR Fire Forester for Dauphin County on the potential construction of a fire- break at the appropriate location on the south side of Peters Mountain along Route 325 in Rush Township.	+	+	+	N	+	+	+	N	+	+	8 (+) 0 (-) 2 (N)
39	Install easily accessible and reliable water supply dry hydrants at various bridge and culvert crossings of local streams and water-courses for emergency firefighting uses through coordination with the PA DCNR and local fire companies.	+	+	+	N	+	+	+	N	+	+	8 (+) 0 (-) 2 (N)
40	Coordinate with Pennsylvania Department of Health on adopting the state Pandemic Plan and develop a Dauphin County Annex.	+	+	+	+	+	N	+	+	+	+	9 (+) 0 (-) 1 (N)

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
Action No.	Action	(+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										
		Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
41	Encourage homeowners to test for radon and install radon mitigation systems, if needed.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)
42	Encourage municipalities to adopt the Radon Control Methods Appendix of the current, adopted edition of the International Residential Code to address radon in new construction.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)
43	Identify structures, including historic structures, at risk from the impacts of natural and human-made hazards and identify funding sources to help mitigate impacts.	+	+	+	N	+	N	+	N	N	+	6 (+) 0 (-) 4 (N)
44	Encourage municipalities to enter into an Intergovernmental Cooperation Agreement and Memorandum of Understanding with the Dauphin County Land Bank Authority as a way to address structures at risk from the impacts of natural and human-made hazards.	+	+	+	N	+	N	+	N	N	+	6 (+) 0 (-) 4 (N)
45	Identify the need and requirements for emergency generators by agency, municipal, or critical facilities and identify potential funding sources to acquire.	+	+	+	+	+	N	+	N	+	+	8 (+) 0 (-) 2 (N)

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
Action No.	Action	(+) highly effective or feasible	(-) ineffective or not feasible	(N) neutral or not applicable								
		Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
46	Improve coordination with the LEPC and conduct training to prepare for hazardous materials incidents.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
47	Review the County's evacuation routes to ensure alternate transportation routes are available in the event of major roadway closures.	+	+	+	+	+	N	+	+	+	+	9 (+) 0 (-) 1 (N)
48	Ensure that a planned, coordinated, and effective public warning dissemination program exists at the local level.	+	+	+	+	+	+	+	N	+	+	9 (+) 0 (-) 1 (N)
49	Conduct public outreach to educate Dauphin County citizens about the potential health and safety implications of various natural and human-made hazard events using existing public information materials.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
50	Encourage citizens, schools, nursing homes, hospitals, etc., to sign up for AlertPA notifications.	+	+	+	N	+	N	+	N	+	+	7 (+) 0 (-) 3 (N)

Dauphin County 2015 All-Hazard Mitigation Plan Update

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Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
		(+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
51	Develop and/or obtain a program for the collection and identification of Special Needs populations for means of notification during an emergency, also so that proper transportation is provided to these populations in the event of an evacuation.	+	+	+	N	+	N	+	N	+	+	7 (+) 0 (-) 3 (N)
52	Work with PEMA and municipalities to fully integrate resource management and EOC management software throughout the County.	+	+	+	N	+	N	+	N	+	+	7 (+) 0 (-) 3 (N)
53	Increase the number of NOAA Weather Alert radios in public places across the County which currently do not have them (such as personal care homes) above and beyond what is required of the County by the NWS's Storm Ready Program.	+	+	+	+	+	N	+	+	+	+	9 (+) 0 (-) 1 (N)
54	Adopt via resolution, and respond to hazards with actions that are consistent with, the County-level EOP.	+	+	+	N	+	N	+	N	+	+	7 (+) 0 (-) 3 (N)
55	Conduct hazard response practice drills and emergency management training exercises on an annual basis.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)

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Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
56	Encourage municipal EOC's (including those outside the TMI EPZ) to participate in more County EOC exercises and evacuation drills to practice and gain efficiency in emergency plan preparedness.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
57	Conduct routine inspections, regular maintenance, and annual tests on all emergency communications equipment, public address systems, and hazard alert sirens to ensure unhindered operation during an emergency event.	+	+	+	+	+	N	+	+	+	+	9 (+) 0 (-) 1 (N)
58	Establish an alternate EOC location in the event the primary EOC must be evacuated. The facility should be selected to support the EOC as well as all of the County Special Teams. This facility should also be located outside of the TMI EPZ and the 1% Annual Chance Flood Zone.	+	+	+	+	+	N	+	+	+	+	9 (+) 0 (-) 1 (N)

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Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA										TOTAL SCORE
Action No.	Action	(+) highly effective or feasible	(-) ineffective or not feasible	(N) neutral or not applicable								
		Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
59	Municipalities should continue to store and make available for public inspection, their community's FIRMs and associated Flood Insurance Study. Dauphin County should continue to provide copies of these maps at the courthouse, conservation district office, libraries, and planning commission.	+	+	+	+	+	N	+	+	+	+	9 (+) 0 (-) 1 (N)
60	Maintain natural hazard and human-made hazard risk assessment and mitigation publications/materials at public libraries throughout the County.	+	+	+	+	+	N	+	+	+	N	8 (+) 0 (-) 2 (N)
61	Develop and distribute a public summary of this hazard mitigation plan including relevant information on hazard specific "do's" and "don'ts," hazard-prone areas, emergency contact information, and lists of shelters or hotels where evacuees can stay with domestic animals.	+	+	+	N	+	N	+	N	N	+	6 (+) 0 (-) 4 (N)
62	Continue to provide links from Dauphin County's homepage to FEMA, PEMA, DCCD, SRBC, and DCED.	+	+	+	+	+	N	+	+	+	N	8 (+) 0 (-) 2 (N)

Table 6.4-2 Evaluation of Mitigation Actions.												
Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
63	Store in an easily accessible location and make available for public inspection, the original Hazard Mitigation Plan, the new plan update document, and the FEMA guidance documents which were provided as part of the hazard mitigation planning program. Also make electronic files available for review.	+	+	+	+	+	N	+	+	+	N	8 (+) 0 (-) 2 (N)
64	The Dauphin County Department of Information Technology will make natural and human-made hazard data available for municipal use.	+	+	+	+	+	+	+	N	+	N	8 (+) 0 (-) 2 (N)
65	Develop the county's GIS to include an updated and fully attributed building/structure coverage by use and type.	+	+	+	+	+	+	+	N	+	N	8 (+) 0 (-) 2 (N)

Actions were then compared with one another to determine a ranking or priority by applying the Multi-Objective Mitigation Action Prioritization criteria. The HMPSC used the Mitigation Action Prioritization form to assign scores to each criterion using the following weighted, multi-objective mitigation action prioritization criteria.

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

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

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

Cumulative results of the HMPSC's prioritization of mitigation actions are included in Table 6.4-3 with HMPSC member forms included in *Appendix C - Meeting and Other Participation Documentation*.

Dauphin County 2015 All-Hazard Mitigation Plan Update

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
1	Integrate hazard mitigation plan data prepared for the 2015 HMP Update into the Dauphin County Comprehensive Plan Update.	2.0	3.0	3.0	3.0	3.0	2.8
2	Develop a new Comprehensive Plan or amend an existing Comprehensive Plan to include an assessment and associated mapping of the municipality's vulnerability to location-specific hazards and appropriate recommendations for the use of these hazard areas.	3.0	3.0	3.0	3.0	2.0	2.9
3	Develop a new Zoning Ordinance or revise an existing Zoning Ordinance to include separate zones or districts with appropriate development criteria for known hazard areas.	3.0	3.0	3.0	3.0	2.0	2.9
4	Develop a new Subdivision and Land Development Ordinance or revise an existing Subdivision and Land Development Ordinance to include municipal-specific, hazard mitigation-related development criteria and/or provisions for the mandatory use of conservation subdivision design principles in order to regulate the location and construction of buildings and other infrastructure in known hazard areas.	3.0	3.0	3.0	3.0	2.0	2.9
5	Ensure municipal compliance with local watershed-specific Act 167 Stormwater Management Plans and Ordinances.	2.0	3.0	2.0	3.0	1.0	2.3
6	Conduct a detailed inventory and prioritization of local environmental resources via the Comprehensive Planning or similar natural resources planning process.	2.0	2.0	3.0	3.0	1.0	2.2
7	Protect via local ordinance or acquisition, if feasible, environmentally sensitive areas (such as floodplains, steep slopes, forested areas, and wetlands) that could be impacted by hazard events.	3.0	3.0	3.0	3.0	1.0	2.7

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MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
8	Revise existing zoning and/or subdivision and land development ordinances or adopt a separate, standalone ordinance to require the completion of subsurface investigations (i.e., borings, geo- physical surveys, and/or studies by a registered Professional Geologist) for all new subdivision and land development projects in known land subsidence hazard areas.	3.0	3.0	2.0	3.0	1.0	2.5
9	Evaluate current land use controls using FEMA's guidance document "Hazard Mitigation Planning: Practices for Land Use Planning and Development near Pipelines" to enhance pipeline safety and protect surrounding communities.	2.0	3.0	3.0	3.0	1.0	2.5
10	Develop language for potential inclusion in subdivision regulations requiring new power and communications (telephone, cable television) lines to be buried for new construction.	2.0	3.0	2.0	1.0	1.0	2.0
11	Update and implement a comprehensive water resources management plan that analyzes the County's existing water resources supply and evaluates the County's anticipated water use demand in an effort to identify suspected water supply shortages and potential new water supply sources.	2.0	2.0	2.0	3.0	1.0	2.0
12	Revise or re-adopt a municipal floodplain management ordinance/map that is consistent with current FEMA D-FIRMS to ensure municipal compliance with NFIP and PA Act 166 floodplain development regulations, as appropriate.	2.0	3.0	3.0	3.0	1.0	2.5
13	Continue the partnership with the NWS Mid-Atlantic River Forecast Center to enhance the existing Susquehanna Flood Forecast and Warning System via the Advanced Hydrologic Prediction Services Program.	3.0	3.0	2.0	3.0	2.0	2.7

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MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
14	Coordinate with the USGS, local watershed organizations, and/or the DCCD to increase the number of USGS and Integrated Flood Observing and Warning System (IFLOWS) rain and stream gauges in the County as a potential enhancement to the existing Susquehanna Flood Forecast and Warning System.	3.0	3.0	2.0	3.0	2.0	2.7
15	Develop flood forecasting maps for the Swatara Creek Watershed.	3.0	3.0	3.0	3.0	1.0	2.7
16	Work with municipalities to evaluate participation in the CRS and facilitate the preparation and submission of CRS applications.	2.0	3.0	3.0	3.0	1.0	2.5
17	Inventory and assess flood prone residential structures on islands throughout Londonderry Township.	2.0	2.0	2.0	3.0	1.0	2.0
18	Encourage the owners/operators of Yeshiva Academy, Downey Elementary School, Circle School, and the Williams Township Wastewater Treatment Plant to develop and implement an emergency response plan to mitigate potential flooding impacts.	3.0	2.0	3.0	3.0	3.0	2.7
19	Continue to acquire, relocate, or make structural modifications (such as elevation and dry/wet flood proofing) to minimize impact to flood prone structures in accordance with NFIP guidelines.	3.0	3.0	3.0	3.0	1.0	2.7
20	Develop a technical proficiency at the municipal level for conducting post-disaster damage assessments and continue to regulate through local planning and zoning reconstruction activities to ensure compliance with NFIP substantial damage/ substantial improvement requirements.	3.0	2.0	2.0	3.0	1.0	2.2

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MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
21	Develop a technical proficiency at the municipal level for assisting local residents and business owners in applying for hazard mitigation and assistance funds and identifying cost beneficial hazard mitigation measures to be incorporated into reconstruction activities.	2.0	2.0	2.0	3.0	1.0	2.0
22	Encourage local business and industry owners in known flood hazard areas to develop an emergency response plan as a potential alternative to implementing a physical property protection measure, where otherwise not technically or fiscally appropriate.	2.0	2.0	3.0	3.0	1.0	2.2
23	Educate and encourage uninsured property owners to purchase flood insurance through the NFIP who are identified as being located within the flood hazard areas on the 2012 FIRMs.	2.0	3.0	3.0	3.0	1.0	2.5
24	Encourage private well owners to conduct rigorous sampling and analysis of private drinking water supply sources immediately after an inundating flood event and boil water as needed.	2.0	2.0	2.0	3.0	1.0	2.0
25	Implement flood related repairs and hazard mitigation including the Reservoir, the Glen Park area, the North side of town, and the South side of town along Rattling Creek and the Wiconisco Creek.	3.0	3.0	2.0	3.0	3.0	2.8
26	Develop a plan for replacing the Derry Street Bridge.	3.0	3.0	2.0	3.0	3.0	2.8
27	Investigate the feasibility of constructing a levee/floodwall system along Swatara Creek between East Main Street and the Pennsylvania Turnpike to minimize Middletown Borough's flood hazard potential.	2.0	3.0	3.0	3.0	3.0	2.8

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MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
28	Investigate the feasibility of installing flood gates and pumps to prevent the backup of flood waters in Highspire Borough.	2.0	3.0	3.0	3.0	3.0	2.8
29	Municipalities should continue to seek solutions to problem areas and obstructions identified in the April 2010 Countywide Act 167 Stormwater Management Plan.	2.0	3.0	2.0	3.0	3.0	2.6
30	Support the recommendations of, and assist in implementing the Paxton Creek Revitalization Project.	2.0	2.0	2.0	3.0	2.0	2.2
31	Develop and implement a community-specific channel maintenance program consisting of routine inspections and subsequent debris removal to ensure maximum hydraulic capacity of all local streams and watercourses.	3.0	3.0	3.0	3.0	1.0	2.7
32	Implement the recommendations of the Harrisburg Authority's ongoing combined sewer overflow impact study.	3.0	2.0	2.0	3.0	3.0	2.5
33	Working through the Conservation District, the County should ensure continued contractor compliance with approved Erosion and Sedimentation Pollution Control Plans and should continue to work with local farmers to implement erosion and sedimentation control BMPs.	2.0	3.0	3.0	3.0	1.0	2.5
34	Implement the suggested precautionary steps recommended by a registered Professional Geologist or other acceptable expert) to remedy surface-exposed sinkhole features that pose an identifiable threat to the general public.	3.0	3.0	2.0	3.0	1.0	2.5
35	Capital Region Water will ensure continued implementation of appropriate operations and maintenance procedures (routine inspections and regular maintenance) at the DeHart Dam in an effort to prevent a potential failure.	3.0	3.0	2.0	2.0	3.0	2.7

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MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
36	Enroll in the Pennsylvania Firewise Communities Program through the DCNR Fire Forester for Dauphin County.	2.0	3.0	2.0	2.0	1.0	2.2
37	Work with the DCNR Fire Forester for Dauphin County to encourage property owners in potential wildfire hazard areas to remove all excess brush and shrubby plants from the immediate vicinity (i.e., 50 to 100 feet) of all buildings.	3	3	2	2	1	2.35
38	Coordinate with the DCNR Fire Forester for Dauphin County on the potential construction of a fire- break at the appropriate location on the south side of Peters Mountain along Route 325 in Rush Township.	3.0	3.0	2.0	2.0	3.0	2.65
39	Install easily accessible and reliable water supply dry hydrants at various bridge and culvert crossings of local streams and water- courses for emergency firefighting uses through coordination with the PA DCNR and local fire companies.	3	3	2	2	3	2.65
40	Coordinate with Pennsylvania Department of Health on adopting the state Pandemic Plan and develop a Dauphin County Annex.	3	2	2	2	1	2.05
41	Encourage homeowners to test for radon and install radon mitigation systems, if needed.	3	3	2	2	1	2.35
42	Encourage municipalities to adopt the Radon Control Methods Appendix of the current, adopted edition of the International Residential Code to address radon in new construction.	3	3	2	2	1	2.35
43	Identify structures, including historic structures, at risk from the impacts of natural and human-made hazards and identify funding sources to help mitigate impacts.	2	3	2	2	1	2.15

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MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
44	Encourage municipalities to enter into an Intergovernmental Cooperation Agreement and Memorandum of Understanding with the Dauphin County Land Bank Authority as a way to address structures at risk from the impacts of natural and human-made hazards.	2	3	2	2	1	2.15
45	Identify the need and requirements for emergency generators by agency, municipal, or critical facilities and identify potential funding sources to acquire.	3	3	3	3	3	3
46	Improve coordination with the LEPC and conduct training to prepare for hazardous materials incidents.	3	3	3	3	3	3
47	Review the County's evacuation routes to ensure alternate transportation routes are available in the event of major roadway closures.	3	3	3	3	3	3
48	Ensure that a planned, coordinated, and effective public warning dissemination program exists at the local level.	3	3	3	3	2	2.85
49	Conduct public outreach to educate Dauphin County citizens about the potential health and safety implications of various natural and human-made hazard events using existing public information materials.	2	3	3	3	1	2.5
50	Encourage citizens, schools, nursing homes, hospitals, etc., to sign up for AlertPA notifications.	2	3	3	3	1	2.5
51	Develop and/or obtain a program for the collection and identification of Special Needs populations for means of notification during an emergency, also so that proper transportation is provided to these populations in the event of an evacuation.	2	3	3	3	1	2.5

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MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
52	Work with PEMA and municipalities to fully integrate resource management and EOC management software throughout the County.	3	3	3	3	3	3
53	Increase the number of NOAA Weather Alert radios in public places across the County which currently do not have them (such as personal care homes) above and beyond what is required of the County by the NWS's Storm Ready Program.	3	3	3	3	3	3
54	Adopt via resolution, and respond to hazards with actions that are consistent with, the County-level EOP.	2	3	3	3	2	2.65
55	Conduct hazard response practice drills and emergency management training exercises on an annual basis.	3	3	3	3	3	3
56	Encourage municipal EOC's (including those outside the TMI EPZ) to participate in more County EOC exercises and evacuation drills to practice and gain efficiency in emergency plan preparedness.	3	3	3	3	3	3
57	Conduct routine inspections, regular maintenance, and annual tests on all emergency communications equipment, public address systems, and hazard alert sirens to ensure unhindered operation during an emergency event.	3	3	3	3	3	3
58	Establish an alternate EOC location in the event the primary EOC must be evacuated. The facility should be selected to support the EOC as well as all of the County Special Teams. This facility should also be located outside of the TMI EPZ and the 1% Annual Chance Flood Zone.	2	3	3	3	3	2.8

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MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
59	Municipalities should continue to store and make available for public inspection, their community's FIRMs and associated Flood Insurance Study. Dauphin County should continue to provide copies of these maps at the courthouse, conservation district office, libraries, and planning commission.	2	3	3	3	1	2.5
60	Maintain natural hazard and human-made hazard risk assessment and mitigation publications/materials at public libraries throughout the County.	2	3	3	3	2	2.65
61	Develop and distribute a public summary of this hazard mitigation plan including relevant information on hazard specific "do's" and "don'ts," hazard-prone areas, emergency contact information, and lists of shelters or hotels where evacuees can stay with domestic animals.	2	3	3	3	2	2.65
62	Continue to provide links from Dauphin County's homepage to FEMA, PEMA, DCCD, SRBC, and DCED.	2	3	3	3	1	2.5
63	Store in an easily accessible location and make available for public inspection, the original hazard mitigation plan, the new plan update document, and the FEMA guidance documents which were provided as part of the hazard mitigation planning program. Also make electronic files available for review.	2	3	3	3	2	2.65
64	The Dauphin County Department of Information Technology will make natural and human-made hazard data available for municipal use.	2	3	3	3	2	2.65
65	Develop the county's GIS to include an updated and fully attributed building/structure coverage by use and type.	2	3	3	3	2	2.65

Forty-eight actions were ranked high and seventeen actions were ranked medium. No actions were ranked low priority.

Table 6.4-4 is a Mitigation Action Plan that was developed for each action and included, to the extent available, the following information:

- **Community(ies):** Communities assisted by implementing the mitigation action. For some actions, this includes all 40 Dauphin County municipalities. Many actions were carried over from the 2010 HMP and only those municipalities working on the action are listed under 'Community(ies)'.
- **Mitigation Technique Category:** The mitigation action category (local plans and regulations, structure and infrastructure projects, natural systems protection, and education and awareness programs).
- **Hazard(s) Addressed:** Hazard or hazards addressed by the action.
- **Priority:** High, Medium, or Low priority based on the mitigation action prioritization.
- **Estimated Cost:** An informal cost estimate or credible source from which to develop a cost estimate.
- **Potential Funding Sources:** The programs and/or agencies or entities that could fund the mitigation action.
- **Lead Agency or Department:** The active leader in implementing the action. The lead agency is listed first and for many actions, additional agencies providing support have been identified.
- **Implementation Schedule:** An approximate time frame for completion.

As noted above actions from the 2010 HMP were combined with new actions developed for the 2015 HMP and renumbered from 1 to 65. At least one mitigation action was established for each hazard profiled, but more than one action is identified for several hazards. Each participating municipality has at least one action. Each mitigation action is intended to address one or more of the goals and objectives identified in Section 6.2 - Mitigation Goals and Objectives.

Table 6.4-4 2015 Mitigation Action Plan.	
Action No: 1	Action: Integrate hazard mitigation plan data prepared for the 2015 HMP Update into the Dauphin County Comprehensive Plan Update.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	

Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	Dauphin County (funding sources identified for Dauphin County's Comprehensive Plan Update)
Lead Agency/Department	DCPC
Implementation Schedule	2 years
Action No: 2	Action: Develop a new Comprehensive Plan or amend an existing Comprehensive Plan to include an assessment and associated mapping of the municipality's vulnerability to location-specific hazards and appropriate recommendations for the use of these hazard areas.
<p>Community(ies): Berrysburg Borough, Dauphin Borough, Derry Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lykens Borough, Lykens Township, Middle Paxton Township, Mifflin Township, Pillow Borough, Rush Township, South Hanover Township, Susquehanna Township, Wayne Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	\$80,000
Potential Funding Sources	Municipal general fund, grant funding (if available)
Lead Agency/Department	Municipality
Implementation Schedule	5 years
Action No: 3	Action: Develop a new Zoning Ordinance or revise an existing Zoning Ordinance to include separate zones or districts with appropriate development criteria for known hazard areas.

<p>Community(ies): Elizabethville Borough, Halifax Township, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Township, Mifflin Township, Reed Township, Rush Township, Wayne Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
<p>Mitigation Technique Category</p>	<p>Local Plans and Regulations</p>
<p>Hazard(s) Addressed</p>	<p>All</p>
<p>Priority (High, Medium, Low)</p>	<p>High</p>
<p>Estimated Cost</p>	<p>\$50,000</p>
<p>Potential Funding Sources</p>	<p>Municipal general fund, grant funding (if available)</p>
<p>Lead Agency/Department</p>	<p>Municipality</p>
<p>Implementation Schedule</p>	<p>5 years</p>
<p>Action No: 4</p>	<p>Action: Develop a new Subdivision and Land Development Ordinance or revise an existing Subdivision and Land Development Ordinance to include municipal-specific, hazard mitigation-related development criteria and/or provisions for the mandatory use of conservation subdivision design principles in order to regulate the location and construction of buildings and other infrastructure in known hazard areas.</p>
<p>Community(ies): Berrysburg Borough, Dauphin Borough, Elizabethville Borough, Gratz Borough, Halifax Borough, Harrisburg City, Jefferson Township, Londonderry Township, Lykens Borough, Lykens Township, Mifflin Township, Millersburg Borough, Paxtang Borough, Pillow Borough, Rush Township, Upper Paxton Township, Wayne Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
<p>Mitigation Technique Category</p>	<p>Local Plans and Regulations</p>
<p>Hazard(s) Addressed</p>	<p>All</p>
<p>Priority (High, Medium, Low)</p>	<p>High</p>
<p>Estimated Cost</p>	<p>\$50,000</p>
<p>Potential Funding Sources</p>	<p>Municipal general fund, County general fund, grant funding (if available)</p>

Lead Agency/Department	Municipality, DCPC
Implementation Schedule	5 years
Action No: 5	Action: Ensure municipal compliance with local watershed-specific Act 167 Stormwater Management Plans and Ordinances.
Community(ies): Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam,
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund
Lead Agency/Department	Municipality
Implementation Schedule	Ongoing
Action No: 6	Action: Conduct a detailed inventory and prioritization of local environmental resources via the Comprehensive Planning or similar natural resources planning process.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Elizabethville Borough, Halifax Township, Harrisburg City, Jackson Township, Jefferson Township, Lower Paxton Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations

Hazard(s) Addressed	All
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	Municipality, DCPC
Implementation Schedule	5 years
Action No: 7	Action: Protect via local ordinance or acquisition, if feasible, environmentally sensitive areas (such as floodplains, steep slopes, forested areas, and wetlands) that could be impacted by hazard events.
Community(ies): Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Township, Harrisburg City, Jefferson Township, Londonderry Township, Lower Paxton Township, Lykens Township, Middle Paxton Township, Mifflin Township, Millersburg Borough, Paxtang Borough, Reed Township, Rush Township, South Hanover Township, Susquehanna Township, Swatara Township, Upper Paxton Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund, FEMA HMGP
Lead Agency/Department	Municipality, Dauphin County
Implementation Schedule	5 years
Action No: 8	Action: Revise existing zoning and/or subdivision and land development ordinances or adopt a separate, standalone ordinance to require the completion of subsurface investigations (i.e., borings, geo- physical surveys, and/or studies by a registered Professional Geologist) for all new subdivision and land development projects in known land subsidence hazard areas.

Community(ies): Derry Township, East Hanover Township, Harrisburg City, Lower Paxton Township, Lower Swatara Township, Paxtang Borough, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, West Hanover Township	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Subsidence/Sinkhole
Priority (High, Medium, Low)	Medium
Estimated Cost	\$5,000
Potential Funding Sources	Municipal general fund, grant funding (if available)
Lead Agency/Department	Municipality
Implementation Schedule	5 years
Action No: 9	Action: Evaluate current land use controls using FEMA’s guidance document “Hazard Mitigation Planning: Practices for Land Use Planning and Development near Pipelines” to enhance pipeline safety and protect surrounding communities.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Environmental Hazards, Transportation Accidents
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	Municipality, DCPC

Implementation Schedule	5 years
Action No: 10	Action: Develop language for potential inclusion in subdivision regulations requiring new power and communications (telephone, cable television) lines to be buried for new construction.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Utility Interruption
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	Municipality, DCPC
Implementation Schedule	5 years
Action No: 11	Action: Update and implement a comprehensive water resources management plan that analyzes the County's existing water resources supply and evaluates the County's anticipated water use demand in an effort to identify suspected water supply shortages and potential new water supply sources.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations

Hazard(s) Addressed	Drought, Wildfire, Utility Interruption
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	General funds, Dauphin County Local Share Gaming Fund
Lead Agency/Department	DCCD, SRBC, PA DEP
Implementation Schedule	5 years
Action No: 12	Action: Revise or re-adopt a municipal floodplain management ordinance/map that is consistent with current FEMA D-FIRMS to ensure municipal compliance with NFIP and PA Act 166 floodplain development regulations, as appropriate.
<p>Community(ies): Elizabethville Borough, Halifax Township, Harrisburg City, Jefferson Township, Londonderry Township, Lykens Township, Mifflin Township, Millersburg Borough, Paxtang Borough, Rush Township, South Hanover Township, Susquehanna Township, Upper Paxton Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund
Lead Agency/Department	Municipality
Implementation Schedule	2 years
Action No: 13	Action: Continue the partnership with the NWS Mid-Atlantic River Forecast Center to enhance the existing Susquehanna Flood Forecast and Warning System via the Advanced Hydrologic Prediction Services Program.

<p>Community(ies): Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
<p>Mitigation Technique Category</p>	<p>Structure and Infrastructure Projects</p>
<p>Hazard(s) Addressed</p>	<p>Flood/Flash Flood/Ice Jam</p>
<p>Priority (High, Medium, Low)</p>	<p>High</p>
<p>Estimated Cost</p>	<p>TBD</p>
<p>Potential Funding Sources</p>	<p>County general fund, FEMA HMGP</p>
<p>Lead Agency/Department</p>	<p>Dauphin County, DEMA, NWS, PEMA, SRBC</p>
<p>Implementation Schedule</p>	<p>2 years</p>
<p>Action No: 14</p>	<p>Action: Coordinate with the USGS, local watershed organizations, and/or the DCCD to increase the number of USGS and Integrated Flood Observing and Warning System (IFLOWS) rain and stream gauges in the County as a potential enhancement to the existing Susquehanna Flood Forecast and Warning System.</p>
<p>Community(ies): Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
<p>Mitigation Technique Category</p>	<p>Structure and Infrastructure Projects</p>
<p>Hazard(s) Addressed</p>	<p>Flood/Flash Flood/Ice Jam</p>
<p>Priority (High, Medium, Low)</p>	<p>High</p>
<p>Estimated Cost</p>	<p>TBD</p>

Potential Funding Sources	County general fund, FEMA HMGP
Lead Agency/Department	Dauphin County, DEMA, PEMA, SRBC
Implementation Schedule	2 years
Action No: 15	Action: Develop flood forecasting maps for the Swatara Creek Watershed.
Community(ies): Conewago Township, Derry Township, East Hanover Township, Hummelstown Borough, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Middletown Borough, Royalton Borough, South Hanover Township, Swatara Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County general fund, FEMA HMGP
Lead Agency/Department	Dauphin County, NWS, SRBC, Army Corps
Implementation Schedule	5 years
Action No: 16	Action: Work with municipalities to evaluate participation in the CRS and facilitate the preparation and submission of CRS applications.
Community(ies): Derry Township, East Hanover Township, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Royalton Borough, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, West Hanover Township	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	TBD

Potential Funding Sources	CDBG-DR, Municipal general fund
Lead Agency/Department	DCDCED, Municipality
Implementation Schedule	1 year
Action No: 17	Action: Inventory and assess flood prone residential structures on islands throughout Londonderry Township.
Community(ies): Londonderry Township	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	County general fund, CDBG-DR NDRC
Lead Agency/Department	Dauphin County
Implementation Schedule	5 years
Action No: 18	Action: Encourage the owners/operators of Yeshiva Academy, Downey Elementary School, Circle School, and the Williams Township Wastewater Treatment Plant to develop and implement an emergency response plan to mitigate potential flooding impacts.
Community(ies): Harrisburg City, Swatara Township, Williams Township	
Mitigation Technique Category	Local Plans and Regulations, Education and Awareness
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund

Lead Agency/Department	Municipality, Dauphin County
Implementation Schedule	2 years
Action No: 19	Action: Continue to acquire, relocate, or make structural modifications (such as elevation and dry/wet flood proofing) to minimize impact to flood prone structures in accordance with NFIP guidelines.
Community(ies): Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Halifax Township, Harrisburg City, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Reed Township, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	FEMA, Municipal general fund
Lead Agency/Department	PEMA, CDBG-DR, Municipality
Implementation Schedule	5 years
Action No: 20	Action: Develop a technical proficiency at the municipal level for conducting post-disaster damage assessments and continue to regulate through local planning and zoning reconstruction activities to ensure compliance with NFIP substantial damage/substantial improvement requirements.
Community(ies): Conewago Township, Derry Township, East Hanover Township, Elizabethville Borough, Halifax Township, Harrisburg City, Highspire Borough, Jefferson Township, Londonderry Township, Lower Paxton Township, Lykens Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Susquehanna Township, Swatara Township, Upper Paxton Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations

Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund
Lead Agency/Department	Municipality
Implementation Schedule	Ongoing
Action No: 21	Action: Develop a technical proficiency at the municipal level for assisting local residents and business owners in applying for hazard mitigation and assistance funds and identifying cost beneficial hazard mitigation measures to be incorporated into reconstruction activities.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Elizabethville Borough, Halifax Township, Harrisburg City, Highspire Borough, Jefferson Township, Londonderry Township, Lower Paxton Township, Lykens Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Susquehanna Township, Swatara Township, Upper Paxton Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	Municipality, Dauphin County
Implementation Schedule	Ongoing
Action No: 22	Action: Encourage local business and industry owners in known flood hazard areas to develop an emergency response plan as a potential alternative to implementing a physical property protection measure, where otherwise not technically or fiscally appropriate.

<p>Community(ies): Derry Township, East Hanover Township, Elizabethville Borough, Halifax Township, Harrisburg City, Hummelstown Borough, Jackson Township, Jefferson Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Mifflin Township, Millersburg Borough, Paxtang Borough, Reed Township, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	Municipality, Dauphin County
Implementation Schedule	Ongoing
Action No: 23	Action: Educate and encourage uninsured property owners to purchase flood insurance through the NFIP who are identified as being located within the flood hazard areas on the 2012 FIRMs.
<p>Community(ies): Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Reed Township, Rush Township, South Hanover Township, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund

Lead Agency/Department	Municipality, Dauphin County, FEMA, PEMA, DCED, SRBC
Implementation Schedule	Ongoing
Action No: 24	Action: Encourage private well owners to conduct rigorous sampling and analysis of private drinking water supply sources immediately after an inundating flood event and boil water as needed.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	County general fund
Lead Agency/Department	Dauphin County
Implementation Schedule	Ongoing
Action No: 25	Action: Implement flood related repairs and hazard mitigation including the Reservoir, the Glen Park area, the North side of town, and the South side of town along Rattling Creek and the Wiconisco Creek.
Community(ies): Jackson Township, Lykens Borough, Wiconisco Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	High

Estimated Cost	
Potential Funding Sources	FEMA HMGP, CFA/DCED Flood Mitigation Program, Dauphin County Local Share Gaming Fund
Lead Agency/Department	Municipality
Implementation Schedule	5 years
Action No: 26	Action: Develop a plan for replacing the Derry Street Bridge over Spring Creek.
Community(ies): Swatara Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	Dauphin County Infrastructure Bank, CDBG-DR, FEMA HMGP, PennDOT PIB Loan, Municipal general fund, County general fund
Lead Agency/Department	Municipality, PennDOT, Dauphin County
Implementation Schedule	5 years
Action No: 27	Action: Investigate the feasibility of constructing a levee/floodwall system along Swatara Creek between East Main Street and the Pennsylvania Turnpike to minimize Middletown Borough's flood hazard potential.
Community(ies): Londonderry Township, Middletown Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	FEMA HMGP, CFA/DCED Flood Mitigation Program, CDBG-DR, Dauphin County Local Share Gaming Fund, Municipal general fund

Lead Agency/Department	Municipality, FEMA, PEMA, PA DEP, Army Corps
Implementation Schedule	5 years
Action No: 28	Action: Investigate the feasibility of installing flood gates and pumps to prevent the backup of flood waters in Highspire Borough.
Community(ies): Highspire Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	FEMA HMGP, CFA/DCED Flood Mitigation Program, Dauphin County Local Share Gaming Fund, Municipal general fund
Lead Agency/Department	Municipality, FEMA, PEMA, PA DEP, Army Corps
Implementation Schedule	5 years
Action No: 29	Action: Municipalities should continue to seek solutions to problem areas and obstructions identified in the April 2010 Countywide Act 167 Stormwater Management Plan.
Community(ies): Derry Township, Highspire Borough, Hummelstown Borough, Lower Swatara Township, Middletown Borough, Royalton Borough, Upper Paxton Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	Dauphin County Infrastructure Bank, CDBG-DR, FEMA HMGP, PennDOT PIB Loan
Lead Agency/Department	Municipality, DCCD
Implementation Schedule	5 years

Action No: 30	Action: Support the recommendations of, and assist in implementing the Paxton Creek Revitalization Project.
Community(ies): , Lower Paxton Township, Susquehanna Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	DEP Growing Greener, FEMA HMGP, Municipal general fund, County general fund
Lead Agency/Department	Municipality, Dauphin County, DCCD, FEMA, PEMA, PA DEP
Implementation Schedule	5 years
Action No: 31	Action: Develop and implement a community-specific channel maintenance program consisting of routine inspections and subsequent debris removal to ensure maximum hydraulic capacity of all local streams and watercourses.
Community(ies): Conewago Township, Elizabethville Borough, Gratz Borough, Halifax Township, Harrisburg City, Highspire Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Reed Township, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund
Lead Agency/Department	Municipality
Implementation Schedule	Ongoing

Action No: 32	Action: Implement the recommendations of the Harrisburg Authority's ongoing combined sewer overflow impact study.
Community(ies): Harrisburg City	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam, Utility Interruption
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund
Lead Agency/Department	Municipality
Implementation Schedule	3 years
Action No: 33	Action: Working through the Conservation District, the County should ensure continued contractor compliance with approved Erosion and Sedimentation Pollution Control Plans and should continue to work with local farmers to implement erosion and sedimentation control BMPs.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	Drought, Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	DCCD

Implementation Schedule	Ongoing
Action No: 34	Action: Implement the suggested precautionary steps recommended by a registered Professional Geologist or other acceptable expert to remedy surface-exposed sinkhole features that pose an identifiable threat to the general public.
Community(ies): Derry Township, Harrisburg City, Hummelstown Borough, South Hanover Township, Steelton Borough, Swatara Township, West Hanover Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Subsidence/Sinkhole
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	CDBG, FEMA HMGP, Municipal general fund
Lead Agency/Department	Municipality
Implementation Schedule	Ongoing
Action No: 35	Action: Capital Region Water will ensure continued implementation of appropriate operations and maintenance procedures (routine inspections and regular maintenance) at the DeHart Dam in an effort to prevent a potential failure.
Community(ies): Harrisburg City, Middle Paxton Township, Rush Township, Steelton Borough, Susquehanna Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Dam Failure
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	Capital Region Water, CDBG-DR NDRC
Lead Agency/Department	Capital Region Water, PA DEP, FEMA, PEMA

Implementation Schedule	Ongoing
Action No: 36	Action: Enroll in the Pennsylvania Firewise Communities Program through the DCNR Fire Forester for Dauphin County.
<p>Community(ies): Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Halifax Township, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lykens Borough, Lykens Township, Middle Paxton Township, Mifflin Township, Millersburg Borough, Reed Township, Rush Township, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund
Lead Agency/Department	Municipality, DCNR
Implementation Schedule	5 years
Action No: 37	Action: Work with the DCNR Fire Forester for Dauphin County to encourage property owners in potential wildfire hazard areas to remove all excess brush and shrubby plants from the immediate vicinity (i.e., 50 to 100 feet) of all buildings.
<p>Community(ies): Conewago Township, Dauphin Borough, East Hanover Township, Elizabethville Borough, Halifax Township, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lykens Borough, Lykens Township, Middle Paxton Township, Mifflin Township, Millersburg Borough, Reed Township, Rush Township, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Low

Estimated Cost	TBD
Potential Funding Sources	Municipal general fund
Lead Agency/Department	Municipality, DCNR
Implementation Schedule	2 years
Action No: 38	Action: Coordinate with the DCNR Fire Forester for Dauphin County on the potential construction of a fire-break at the appropriate location on the south side of Peters Mountain along Route 325 in Rush Township
Community(ies): Rush Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	DCNR Volunteer Fire Assistance Grants, Municipal general fund
Lead Agency/Department	Municipality, DCNR
Implementation Schedule	5 years
Action No: 39	Action: Install easily accessible and reliable water supply dry hydrants at various bridge and culvert crossings of local streams and water- courses for emergency firefighting uses through coordination with the PA DCNR and local fire companies.
Community(ies): Elizabethville Borough, Gratz Borough, Halifax Township, Londonderry Township, Lykens Borough, Lykens Township, Middle Paxton Township, Mifflin Township, Reed Township, Rush Township, South Hanover Township, Susquehanna Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium

Estimated Cost	TBD
Potential Funding Sources	DCNR Volunteer Fire Assistance Grants, Municipal general fund
Lead Agency/Department	Municipality, DCNR
Implementation Schedule	5 years
Action No: 40	Action: Coordinate with Pennsylvania Department of Health on adopting the state Pandemic Plan and develop a Dauphin County Annex.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Pandemic and Infectious Disease
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	County general fund
Lead Agency/Department	DEMA, PADOH
Implementation Schedule	3 years
Action No: 41	Action: Encourage homeowners to test for radon and install radon mitigation systems, if needed.

<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	Radon Exposure
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	County general fund
Lead Agency/Department	DEMA
Implementation Schedule	3 years
Action No: 42	Action: Encourage municipalities to adopt the Radon Control Methods Appendix of the current, adopted edition of the International Residential Code to address radon in new construction.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Local Plans and Regulations, Education and Awareness
Hazard(s) Addressed	Radon Exposure
Priority (High, Medium, Low)	Low
Estimated Cost	TBD

Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	Municipality, DEMA, PADEP, DCPC
Implementation Schedule	5 years
Action No: 43	Action: Identify structures, including historic structures, at risk from the impacts of natural and human-made hazards and identify funding sources to help mitigate impacts.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Building or Structure Collapse
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund, PHMC Keystone Historic Preservation Grant Program
Lead Agency/Department	Municipality, Dauphin County, PHMC
Implementation Schedule	3 years
Action No: 44	Action: Encourage municipalities to enter into an Intergovernmental Cooperation Agreement and Memorandum of Understanding with the Dauphin County Land Bank Authority as a way to address structures at risk from the impacts of natural and human-made hazards.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Jackson Township, Jefferson Township, Lower Paxton Township, Lower Swatara Township, Lykens Township, Middle Paxton Township, Mifflin Township, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Rush Township, South Hanover Township, Swatara Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	

Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Building or Structure Collapse
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	Municipality, Dauphin County Land Bank Authority
Implementation Schedule	5 years
Action No: 45	Action: Identify the need and requirements for emergency generators by agency, municipal, or critical facilities and identify potential funding sources to acquire.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam, Hurricane/Tropical Storm/Nor'easter, Tornado/Windstorm; Winter Storm, Utility Interruption
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	FEMA HMGP, FEMA Pre-Disaster Mitigation (PDM), explore utilization of existing PEMA generators, Municipal general fund, County general fund
Lead Agency/Department	Municipality, DEMA
Implementation Schedule	3 years
Action No: 46	Action: Improve coordination with the LEPC and conduct training to prepare for hazardous materials incidents.

Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	Environmental Hazards
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	County general fund
Lead Agency/Department	DEMA
Implementation Schedule	2 years
Action No: 47	Action: Review the County's evacuation routes to ensure alternate transportation routes are available in the event of major roadway closures.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Transportation Accidents
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund

Lead Agency/Department	DEMA, Municipality, HATS incorporate into regional transportation plan
Implementation Schedule	1 year
Action No: 48	Action: Ensure that a planned, coordinated, and effective public warning dissemination program exists at the local level.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations, Education and Awareness
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	DEMA, municipality
Implementation Schedule	Ongoing
Action No: 49	Action: Conduct public outreach to educate Dauphin County citizens about the potential health and safety implications of various natural and human-made hazard events using existing public information materials.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	

Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County general fund
Lead Agency/Department	DEMA
Implementation Schedule	Ongoing
Action No: 50	Action: Encourage citizens, schools, nursing homes, hospitals, etc., to sign up for AlertPA notifications.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	DEMA, Municipality
Implementation Schedule	Ongoing
Action No: 51	Action: Develop and/or obtain a program for the collection and identification of Special Needs populations for means of notification during an emergency, also so that proper transportation is provided to these populations in the event of an evacuation.

<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	DEMA, Municipality
Implementation Schedule	Ongoing
Action No: 52	Action: Work with PEMA and municipalities to fully integrate resource management and EOC management software throughout the County.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Education and Awareness
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	High
Estimated Cost	TBD

Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	DEMA, PEMA, Municipality
Implementation Schedule	Ongoing
Action No: 53	Action: Increase the number of NOAA Weather Alert radios in public places across the County which currently do not have them (such as personal care homes) above and beyond what is required of the County by the NWS's Storm Ready Program.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood/Flash Flood/Ice Jam, Hurricane/Tropical Storm/Nor'easter, Tornado/Windstorm; Winter Storm, Utility Interruption
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	DCED Municipal Assistance Program
Lead Agency/Department	DEMA
Implementation Schedule	Ongoing
Action No: 54	Action: Adopt via resolution, and respond to hazards with actions that are consistent with, the County-level EOP.
Community(ies): Conewago Township, Derry Township, Elizabethville Borough, Halifax Township, Harrisburg City, Highspire Borough, Jefferson Township, Lower Paxton Township, Lykens Township, Mifflin Township, Millersburg Borough, Paxtang Borough, Rush Township, South Hanover Township, Susquehanna Township, Upper Paxton Township, Washington Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations

Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	Municipality, DMA
Implementation Schedule	1 year
Action No: 55	Action: Conduct hazard response practice drills and emergency management training exercises on an annual basis.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Local Plans and Regulations, Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	DEMA, Municipality
Implementation Schedule	Annually
Action No: 56	Action: Encourage municipal EOC's (including those outside the TMI EPZ) to participate in more County EOC exercises and evacuation drills to practice and gain efficiency in emergency plan preparedness.

Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations, Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	County general fund, Municipal general fund
Lead Agency/Department	DEMA, Municipality
Implementation Schedule	Every 2 years
Action No: 57	Action: Conduct routine inspections, regular maintenance, and annual tests on all emergency communications equipment, public address systems, and hazard alert sirens to ensure unhindered operation during an emergency event.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	County general fund, Municipal general fund

Lead Agency/Department	DEMA, Municipality
Implementation Schedule	Ongoing
Action No: 58	Action: Establish an alternate EOC location in the event the primary EOC must be evacuated. The facility should be selected to support the EOC as well as all of the County Special Teams. This facility should also be located outside of the TMI EPZ and the 1% Annual Chance Flood Zone.
Community(ies): East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Township, Harrisburg City, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lykens Township, Mifflin Township, Millersburg Borough, Paxtang Borough, Reed Township, Rush Township, South Hanover Township, Susquehanna Township, Upper Paxton Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations, Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	County general fund, Municipal general fund
Lead Agency/Department	DEMA, Municipality
Implementation Schedule	Ongoing
Action No: 59	Action: Municipalities should continue to store and make available for public inspection, their community's FIRMs and associated Flood Insurance Study. Dauphin County should continue to provide copies of these maps at the courthouse, conservation district office, libraries, and planning commission.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Local Plans and Regulations, Education and Awareness Programs

Hazard(s) Addressed	Flood/Flash Flood/Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund,
Lead Agency/Department	Municipality, DCPC, DCCD
Implementation Schedule	Ongoing
Action No: 60	Action: Maintain natural hazard and human-made hazard risk assessment and mitigation publications/materials at public libraries throughout the County.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Local Plans and Regulations, Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County general fund
Lead Agency/Department	DEMA
Implementation Schedule	Ongoing
Action No: 61	Action: Develop and distribute a public summary of this hazard mitigation plan including relevant information on hazard specific “do’s” and “don’ts,” hazard-prone areas, emergency contact information, and lists of shelters or hotels where evacuees can stay with domestic animals.

Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County general fund
Lead Agency/Department	DEMA
Implementation Schedule	1 year
Action No: 62	Action: Continue to provide links from Dauphin County's homepage to FEMA, PEMA, DCCD, SRBC, and DCED.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County general fund

Dauphin County 2015 All-Hazard Mitigation Plan Update

Lead Agency/Department	Dauphin County
Implementation Schedule	Ongoing
Action No: 63	Action: Store in an easily accessible location and make available for public inspection, the original hazard mitigation plan, the new plan update document, and the FEMA guidance documents which were provided as part of the hazard mitigation planning program. Also make electronic files available for review.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	Municipal general fund, County general fund
Lead Agency/Department	Municipality, DEMA
Implementation Schedule	Ongoing
Action No: 64	Action: The Dauphin County Department of Information Technology will make natural and human-made hazard data available for municipal use.
Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough	
Mitigation Technique Category	Education and Awareness Programs

Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County general fund
Lead Agency/Department	Dauphin County GIS
Implementation Schedule	Ongoing
Action No: 65	Action: Develop the county's GIS to include an updated and fully attributed building/structure coverage by use and type.
<p>Community(ies): Berrysburg Borough, Conewago Township, Dauphin Borough, Derry Township, East Hanover Township, Elizabethville Borough, Gratz Borough, Halifax Borough, Halifax Township, Harrisburg City, Highspire Borough, Hummelstown Borough, Jackson Township, Jefferson Township, Londonderry Township, Lower Paxton Township, Lower Swatara Township, Lykens Borough, Lykens Township, Middle Paxton Township, Middletown Borough, Mifflin Township, Millersburg Borough, Paxtang Borough, Penbrook Borough, Pillow Borough, Reed Township, Royalton Borough, Rush Township, South Hanover Township, Steelton Borough, Susquehanna Township, Swatara Township, Upper Paxton Township, Washington Township, Wayne Township, West Hanover Township, Wiconisco Township, Williams Township, Williamstown Borough</p>	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County general fund
Lead Agency/Department	Dauphin County GIS
Implementation Schedule	3 years

7. Plan Maintenance

7.1. *Update Process Summary*

Monitoring, evaluating and updating this plan, is critical to maintaining its value and success in Dauphin County's hazard mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continued basis.

The plan maintenance procedures proposed herein are quite similar to those discussed in the 2010 HMP. The primary difference is the elimination of Project Opportunity Forms, as PEMA is moving towards using letters of interest and pre-application forms to gather projects. The HMPSC recognizes the importance of monitoring, evaluating, and updating the plan and will strive for yearly progress reports with each municipality providing information as needed. The 2015 HMP update builds on the spirit of the 2010 plan maintenance procedures, stating that the County will conduct both an annual review and a review of the plan within 30 days of a disaster event to help identify mitigation opportunities. This HMP update also defines the municipalities' role in updating and evaluating the plan. Finally, the 2015 HMP update elaborates upon continued public involvement.

To the best knowledge of the HMPSC, there were no HMP progress reports submitted from municipalities for the period from 2010-2014, though the public had continual access to the HMP through the County's website and though some mitigation actions had been accomplished in the interim.

7.2. *Monitoring, Evaluating and Updating the Plan*

The plan maintenance procedures established for the 2015 HMP update are designated to administer the plan maintenance processes of monitoring, evaluation and updating with support and representation from all 40 participating municipalities. The HMPSC (listed in Section 3.2), under the direction of DEMA will be responsible for maintaining this Multi-Jurisdictional HMP. The HMPSC will meet annually and following each emergency declaration, with the purpose of reviewing the Plan. The Director of Dauphin County Emergency Management Agency will lead the Steering Committee for annual reviews of the HMP.

The HMPSC will coordinate maintenance efforts, but the input needed for effective periodic evaluations will come from community representatives, local emergency management coordinators and planners, the general public and other important stakeholders. The HMPSC will oversee progress made on the implementation of action items identified in the 2015 HMP update and modify actions, as needed, to reflect changing conditions. The HMPSC will meet annually on or around the anniversary of plan adoption to discuss specific coordination efforts that may be needed with other stakeholders. Should a significant disaster occur within the County, the HMPSC will reconvene within 30 days of the disaster to review and update the HMP.

Each review process will ensure that the Hazard Vulnerability Analysis and Risk Assessment reflect current conditions in the County and the municipalities, the Capability Assessment accurately reflects local circumstances, and the hazard mitigation strategies are updated based on the County's damage assessment reports and local mitigation project priorities. The HMPSC will complete a Progress Report to evaluate the status and accuracy of the HMP and record the HMPSC's findings. DEMA will maintain a copy of these records.

Each municipality will designate a community representative to monitor mitigation activities and hazard events within their respective communities. The local emergency management coordinator would be suitable for this role. This individual will be asked to work with the HMPSC to provide updates on applicable mitigation actions and feedback on changing hazard vulnerabilities within their community.

Upon each HMP evaluation, the HMPSC will consider whether applications should be submitted for existing mitigation grant programs. A decision to apply for funding will be based on appropriate eligibility and financial need requirements. The HMPSC will also support local and county officials in applying for post-disaster mitigation funds when they are available. All state and federal mitigation funding provided to the County or local municipalities will be reported in subsequent plan updates. In addition, new plans and programs being developed within the County will be evaluated as to the ability and necessity to incorporate the 2015 HMP update into them. For example, portions of the HMP will be useful for the County's Comprehensive Plan update which was underway when the 2015 HMP was prepared. Similarly, HMP update information will be helpful when updating the County Emergency Operations Plan and Act 167 Stormwater Management Plan.

The 2015 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 Dauphin County HMP.

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

Issues that arise during monitoring and evaluation which require changes to the risk assessment, mitigation strategy and other components of the plan will be incorporated during future updates.

7.3. Continued Public Involvement

DEMA will ensure that the HMP is posted and maintained on the County Web site, and will continue to encourage public review and comment on the Plan.

The citizens of Dauphin County were encouraged to submit their comments on this plan, both during the plan update process and moving forward. The project team collected comments beginning on June 25, 2015, 2014 via the project website, www.pennsylvaniahmp.com/dauphin-hmp. Comments may also be submitted after the plan has been adopted and approved by FEMA to elected officials and/or members of the HMPSC. All comments received will be maintained and considered by the Hazard Mitigation Steering Committee when updating the HMP.

Dauphin County will continue to reach out via telephone, email, and mail to municipalities regarding mitigation projects. Any additional hazard mitigation actions received during the life of this five-year HMP will be incorporated into the Plan as an interim, and will be updated and included in the next five-year Plan update. Stakeholders will be informed of the location and time of review meetings through public notice in the newspapers, and information posted to the County Web site.

The Multi-Jurisdictional HMP will continue to have a permanent home online at: <http://www.dauphincounty.org/government/EMA-911>.

8. Plan Adoption

The Plan was submitted to the Pennsylvania Emergency Management Agency on August 20, 2015. It was forwarded to FEMA for final review and approval-pending-adoption on XXXX, 2015. FEMA granted approval-pending-adoption on October 20, 2015. Dauphin County adopted the plan on XXXX, 2015. Full approval from FEMA was received on XXXX, 2015.

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

Dauphin County 2015 Hazard Mitigation Plan
County Adoption Resolution

Resolution No. _____
Dauphin County, Pennsylvania

WHEREAS, the municipalities of Dauphin 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, Dauphin 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 Dauphin County 2015 Hazard Mitigation Plan has been developed by the Dauphin County Emergency Management Agency and the Dauphin County Planning Commission in cooperation with other county departments, local municipal officials, non-profit and institutional stakeholders, and the citizens of Dauphin County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Dauphin County 2015 Hazard Mitigation Plan, and

WHEREAS, the Dauphin County 2015 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the County of Dauphin that:

- The Dauphin County 2015 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the County, and
The respective officials and agencies identified in the implementation strategy of the Dauphin County 2015 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2015

ATTEST:

DAUPHIN COUNTY COMMISSIONERS

By _____

By _____

By _____

Dauphin County 2015 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. _____

<Borough/City/Township of Municipality Name>, Dauphin County, Pennsylvania

WHEREAS, the <Borough/City/Township of Municipality Name>, Dauphin 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/City/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 Dauphin County 2015 Hazard Mitigation Plan has been developed by the Dauphin County Emergency Management Agency and the Dauphin County Planning Commission in cooperation with other county departments, and officials and citizens of <Borough/City/Township of Municipality Name>, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Dauphin County 2015 Hazard Mitigation Plan, and

WHEREAS, the Dauphin County 2015 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the <Borough/City/Township of Municipality Name>:

- The Dauphin County 2015 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the <Borough/City/Township>, and
The respective officials and agencies identified in the implementation strategy of the Dauphin County 2015 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2015

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

_____ By _____

By _____

9. Appendices

- Appendix A – Bibliography*
- Appendix B – Local Mitigation Plan Review Tool*
- Appendix C – Meeting and Other Participation Documentation*
- Appendix D – Local Municipality Flood Vulnerability Maps*
- Appendix E – Critical Facilities*
- Appendix F – HAZUS Methodology and Results Reports*
- Appendix G – Dam Failure Profile*