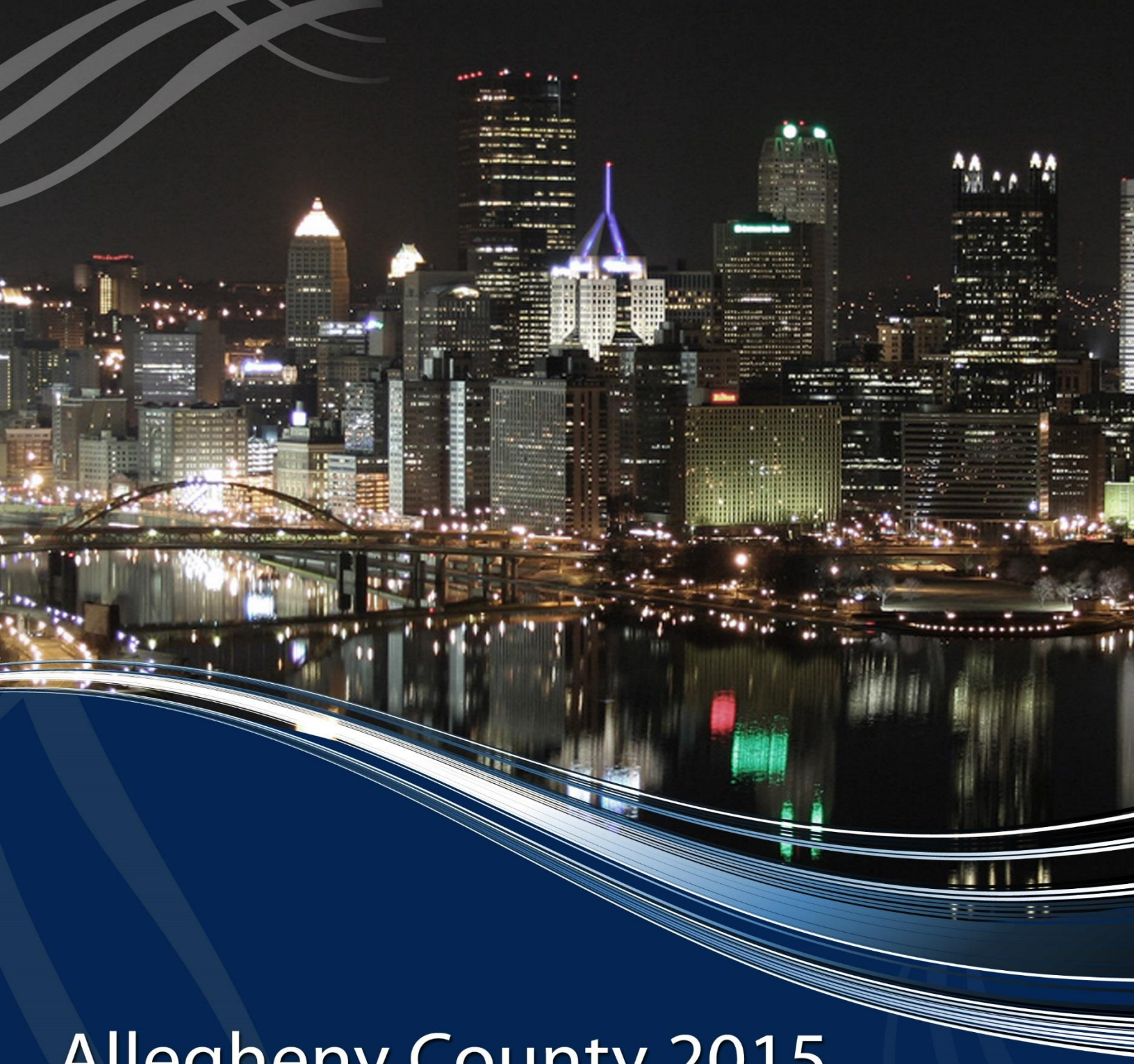

Allegheny County 2015 Hazard Mitigation Plan Update

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INTERNATIONAL

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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 a combined 57 Presidential Disaster Declarations and Emergency Declarations in Pennsylvania, 16 of which have included Allegheny County. The emergency management community, citizens, elected officials and other stakeholders in Allegheny 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 Allegheny County Hazard Mitigation Plan Steering Committee (HMPSC) and Planning Team (HMPT), government leaders from Allegheny County, in cooperation with the elected officials of the County and its municipalities, have prepared this Hazard Mitigation Plan (HMP) update. The Plan is the result of work by citizens of the County to develop a pre-disaster multi-hazard mitigation plan that will not only guide the County towards greater disaster resistance, but will also respect the character and needs of the community.

1.2 Purpose

The purpose of this All-Hazard Mitigation Plan Update is:

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

1.3 Scope

The Allegheny County 2015 Hazard Mitigation Plan update has been prepared to meet requirements set forth by the Federal Emergency Management Agency (FEMA) and Pennsylvania Emergency Management Agency (PEMA) in order for the County to be eligible for funding and technical assistance from state and federal hazard mitigation programs. It will be updated and maintained to address both natural and human-made hazards determined to be of significant risk to the County and/or its local municipalities. Updates will take place at a minimum every five years, but they will also take place following significant disaster events.

1.4 Authority and References

Authority for this plan originates from the following federal sources:

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

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

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

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

- FEMA 386-1: Getting Started. September 2002.
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA 386-3: Developing the Mitigation Plan. April 2003.
- FEMA 386-4: Bringing the Plan to Life. August 2003.
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.
- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA 386-8: Multijurisdictional Mitigation Planning. August 2006.
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.
- FEMA. Local Mitigation Planning Handbook. March 2013.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011.
- FEMA National Fire Incident Reporting System 5.0: Complete Reference Guide. January, 2008.
- FEMA Hazard Mitigation Assistance Unified Guidance. September 11, 2013.

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

The following 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.

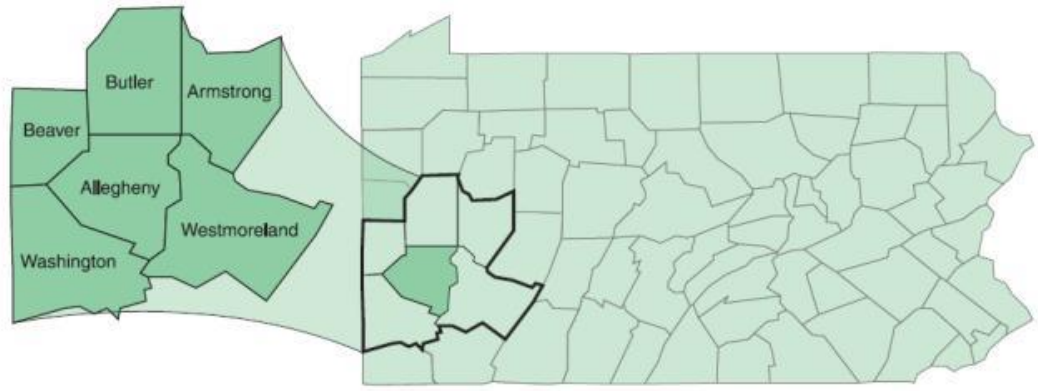
2 COMMUNITY PROFILE

2.1 Geography and Environment

Allegheny County, named after the Allegheny River, was officially created on September 24, 1788 from parts of Washington and Westmoreland Counties. The County originally extended all the way north to the shores of Lake Erie, known as the "mother county" for most of what is now northwestern Pennsylvania. By 1800, the County's borders were set. Due to iron and coal deposits and easy access to waterways for barge traffic, the area developed rapidly throughout the 19th century to become the center of steel production in the United States. Specifically, the City of Pittsburgh would be labeled as the "Steel Capital of the World." With the decline of the steel industry in the United States, the area has shifted to other industries such as its medical, educational, and industrial centers.

Today, Allegheny County is a large, mostly urban county located in southwestern Pennsylvania. As seen in Figure 2.1-1, it is bordered by Butler County to the north, Armstrong County to the northeast, Westmoreland County to the east, Washington County to the southwest and Beaver County to the northwest.

Figure 2.1-1 Geographic Location of Allegheny County and Surrounding Counties



Allegheny County is 745 square miles in size (both land and water) with 130 municipalities, the largest number of municipalities within a county in the Commonwealth. The County has four major rivers - the Allegheny, the Monongahela, and the Ohio Rivers, which meet at the center of the County in the City of Pittsburgh, and the Youghiogheny River. The Youghiogheny River flows into the Monongahela River in the City of McKeesport. Water from these rivers eventually flows into the Gulf of Mexico via the Mississippi River. Water bodies make up approximately 2% of the County's geographic area and have created flat uplands and steep, V-shaped valleys that characterize the County. Unfortunately, the historic actions of locating industrial and other large facilities next to rivers has resulted in many important facilities being located in the floodplain, increasing the County's vulnerability to flooding and other hazards. Although the County's industrial growth caused the clearcutting of forests, a significant woodland remains. Figure 2.1-2 depicts the major rivers, as well as the County's extensive transportation network of air, water, highway, railroad, and transit systems, and other major features such as state parks and state game lands.

Figure 2.1-2 Allegheny County Base Map

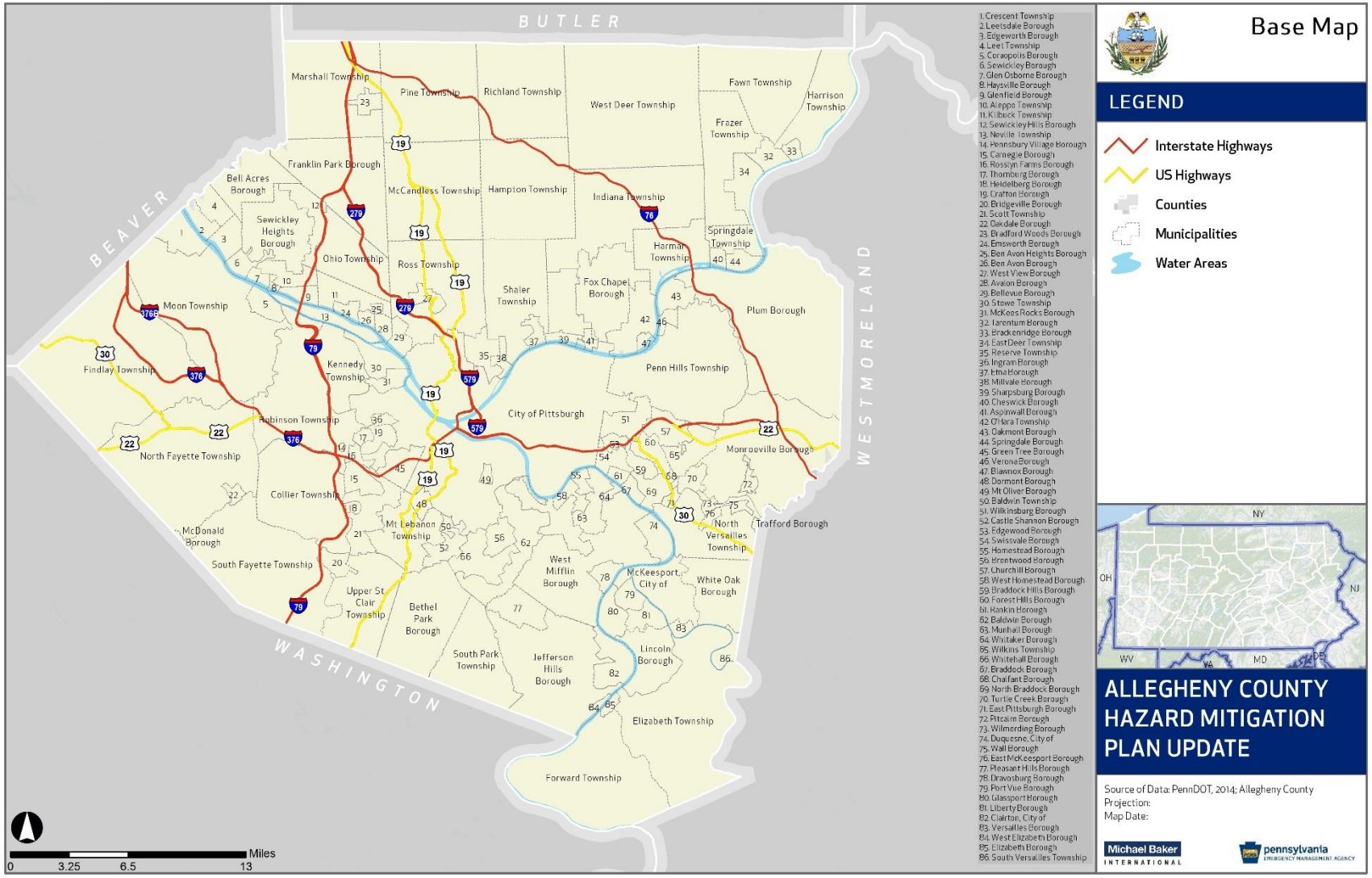
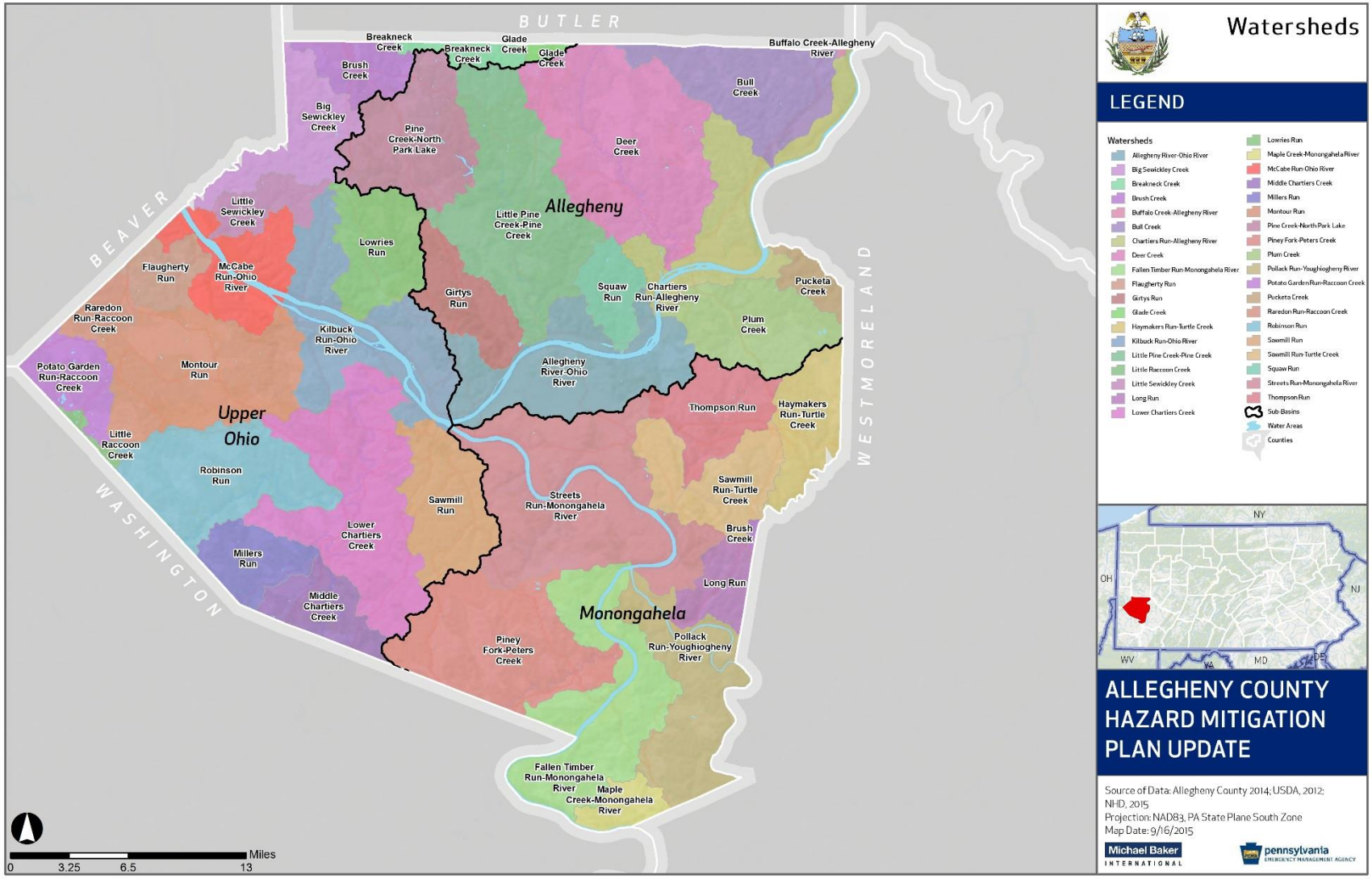


Table 2.1-2 lists the numerous water bodies that make up Allegheny County's 34 watersheds. The location of the County's watersheds are shown in Figure 2.1-3 and will be discussed in more detail in Section 4.3.2 – Flood, Flash Flood, Ice Jam.

Table 2.1-2 Allegheny County Watersheds and their receiving waters.

HUC 12 WATERSHED	SUB-BASIN	HUC 12 WATERSHED	SUB-BASIN
Allegheny River-Ohio River	Allegheny River	McCabe Run-Ohio River	Upper Ohio River
Big Sewickley Creek	Upper Ohio River	Middle Chartiers Creek	Upper Ohio River
Breakneck Creek	Upper Ohio River	Millers Run	Upper Ohio River
Buffalo Creek-Allegheny River	Allegheny River	Montour Run	Upper Ohio River
Bull Creek	Allegheny River	Pine Creek-North Park Lake	Allegheny River
Chartiers Run-Allegheny River	Allegheny River	Piney Fork-Peters Creek	Monongahela River
Deer Creek	Allegheny River	Plum Creek	Allegheny River
Fallen Timber Run-Monongahela River	Monongahela River	Pollack Run-Youghiogheny River	Monongahela River
Flaugherty Run	Upper Ohio River	Potato Garden Run-Raccoon Creek	Upper Ohio River
Girty's Run	Allegheny River	Pucketa Creek	Allegheny River
Haymakers Run-Turtle Creek	Monongahela River	Raredon Run-Raccoon Creek	Upper Ohio River
Kilbuck Run-Ohio River	Upper Ohio River	Robinson Run	Upper Ohio River
Little Pine Creek-Pine Creek	Allegheny River	Sawmill Run	Upper Ohio River
Little Sewickley Creek	Upper Ohio River	Sawmill Run-Turtle Creek	Monongahela River
Long Run	Monongahela River	Squaw Run	Allegheny River
Lower Chartiers Creek	Upper Ohio River	Streets Run-Monongahela River	Monongahela River
Maple Creek-Monongahela River	Monongahela River	Thompson Run	Monongahela River

Figure 2.1-3 Allegheny County Watersheds



2.2 Community Facts

There are seven Councils of Government (COGs) in the County, each containing 9 to 20 member municipalities, which are local planning organizations that help the municipalities organize and/or take action on various issues that arise in the County. The seven COGs are: Allegheny Valley North, Char-West, North Hills, Quaker Valley, South Hills Area, Steel Rivers, and Turtle Creek Valley. Steel Rivers was formed through a merger of two COGs, Steel Valley and Twin River, in 2015. The City of Pittsburgh is not in a COG, but in many respects provides similar functions for the many neighborhoods in the City. For more information on the capabilities of the eight COGs can be found in Section 5.2.2.

The major thoroughfares within the County are Interstate 79 running north-south, Interstate 376 (The Parkway) west-east, followed by Interstates 279 running northwest-southeast, 579 north-south, and 76 northwest-southeast. Prominent Pennsylvania Routes include Route 19 running north-south and Route 22 and 30 running west-east. Also a major factor of the transportation network are the major railroads bisecting the County from northwest to southeast and northeast to southwest.

As with most communities, Allegheny County has dealt with changes over time in its economic and physical environment. In recent times the region has responded to the decline of the steel industry by developing retraining programs, incubating new industries, and engaging universities in entrepreneurial activities, including the development of a biotech industry. The region is currently home to a number of large companies, including the Heinz/Del Monte Corporation, Alcoa, Bayer Corporation, PPG Industries, Mellon Bank, PNC Bank, US Airways, and US Steel. Allegheny County also contains world-class universities such as Carnegie Mellon, Duquesne, and the University of Pittsburgh, as well as several major cultural destinations, including the Andy Warhol Museum, the Carnegie Museum of Art, the Carnegie Museum of Natural History, and the Pittsburgh Symphony Orchestra. The County is home to the black and gold Pittsburgh Steelers, Pirates, and Penguins. All facilities (Heinz Field, PNC Park, and Consol Energy Center) are located within the City of Pittsburgh.

Table 2.2-1 breaks down Allegheny County's industry sections by the number of establishments and employees. Highlighted are the largest industries with Healthcare and Social Assistance leading with 131,104 employees with 4,543 establishments (19%), followed by Retail Trade with 4,425 establishments and 74,245 employees (11%). Accommodation and Food Services; Professional, Scientific, and Technical Services; and Education Services are also major employer sectors within the County.

Table 2.2-1 Allegheny County Industry Sections by Establishments and Employees (2013)

INDUSTRY SECTOR	NUMBER OF ESTABLISHMENTS	NUMBER OF EMPLOYEES
Agriculture, Forestry, Fishing, and Hunting	7	16
Mining, Quarrying, and Oil and Gas Extraction	78	2,397
Utilities	59	2,338
Construction	2,600	30,201
Manufacturing	1,084	36,833

Table 2.2-1 Allegheny County Industry Sections by Establishments and Employees (2013)		
INDUSTRY SECTOR	NUMBER OF ESTABLISHMENTS	NUMBER OF EMPLOYEES
Wholesale Trade	1,840	26,951
Retail Trade	4,425	74,245
Transportation and Warehousing	596	16,538
Information	727	18,452
Finance and Insurance	2,141	47,734
Real Estate and Rental/Leasing	1,286	9,686
Professional, Scientific, and Technical Services	3,898	57,345
Management of Companies and Enterprises	406	39,616
Administrative and Support and Waste Management and Remediation Services	1,781	45,205
Education Services	482	56,518
Healthcare and Social Assistance	4,543	131,104
Arts, Entertainment, and Recreation	541	12,394
Accommodation and Food Services	3,225	57,810
Other Services	3,831	30,620
Industries Not Classified	33	N/A
Source: U.S. Census Bureau, 2013 County Business Patterns.		

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 Allegheny County.

According to the 2014 Census Estimate, the population of Allegheny County was approximately 1,231,255. This is an increase of 7,907 residents since the 2010 Census and a decrease of approximately 50,411 residents since the 2000 Census. Allegheny County's population has been steadily decreasing since the 1950s as seen in Table 2.3-1.

Table 2.3-1 Allegheny County Population Trends	
YEAR	POPULATION
1950	1,515,237
1960	1,628,587
1970	1,605,016
1980	1,450,085
1990	1,336,449

Table 2.3-1 Allegheny County Population Trends	
YEAR	**POPULATION**
2000	1,281,666
2010	1,223,348
2014 (estimate)	1,231,255
Source: U.S. Census Bureau	

Table 2.3-2 shows the distribution of the County population by municipality in the 2010 Census and the 2009-2013 5-Year ACS Estimates. Some of the most populated municipalities are:

- Pittsburgh, City of;
- Penn Hills Township;
- Mount Lebanon Township;
- Bethel Park Borough;
- Ross Township;
- Shaler Township;
- Town of McCandless;
- Monroeville Borough;
- Plum Borough;
- Moon Township; and
- West Mifflin Borough.

Some of the least populated municipalities are:

- Haysville Borough;
- Trafford Borough;
- Glenfield Borough;
- Ben Avon Heights Borough;
- South Versailles Township;
- Rosslyn Farm Borough
- Thornburgh Borough
- McDonald Borough;
- Chalfant Borough;
- Glen Osbourne Borough; and
- Pennsbury Village Borough.

The largest positive percent population change took place in Trafford Borough (61.64%), West Elizabeth Borough (34.51%), and McDonald Borough (28.14%). Significant population loss has occurred in Wilmerding Borough, Aleppo Township, Elizabeth Borough, and East Deer Township. Although it has experienced a small percentage increase in population, the growth in the City of Pittsburgh it is a change in the overall decreasing population that the City has experienced over the last 60 years.

Figure 2.3-1 shows the projected population growth from 2010 to 2030 throughout Allegheny County; the largest increases projected occur within the City of Pittsburgh and its surrounding communities and the municipalities bordering Westmoreland County.

Table 2.3-2 List of Municipalities in Allegheny County with Associated Populations (U.S. Census, 2014).

MUNICIPALITY	POPULATION 2010	2013 ACS 5-YEAR ESTIMATE	POPULATION DIFFERENCE	PERCENT CHANGE (%)
Aleppo Township	1,916	1,671	-245	-14.66%
Aspinwall Borough	2,801	2,801	0	0.00%
Avalon Borough	4,705	4,698	-7	-0.15%
Baldwin Borough	19,767	19,777	10	0.05%
Baldwin Township	1,992	2,019	27	1.34%
Bell Acres Borough	1,388	1,405	17	1.21%
Bellevue Borough	8,370	8,352	-18	-0.22%
Ben Avon Borough	1,781	1,690	-91	-5.38%
Ben Avon Heights Borough	371	387	16	4.13%
Bethel Park Borough	32,313	32,344	31	0.10%
Blawnox Borough	1,432	1,463	31	2.12%
Brackenridge Borough	3,260	3,252	-8	-0.25%
Braddock Borough	2,159	2,436	277	11.37%
Braddock Hills Borough	1,880	1,768	-112	-6.33%
Bradford Woods Borough	1,171	1,217	46	3.78%
Brentwood Borough	9,643	9,638	-5	-0.05%
Bridgeville Borough	5,148	5,140	-8	-0.16%
Carnegie Borough	7,972	7,970	-2	-0.03%
Castle Shannon Borough	8,316	8,309	-7	-0.08%
Chalfant Borough	800	913	113	12.38%
Cheswick Borough	1,746	1,690	-56	-3.31%
Churchill Borough	3,011	3,019	8	0.26%
Clairton, City of	6,796	6,798	2	0.03%
Collier Township	7,080	7,267	187	2.57%
Coraopolis Borough	5,677	5,671	-6	-0.11%
Crafton Borough	5,951	5,947	-4	-0.07%
Crescent Township	2,640	2,628	-12	-0.46%
Dormont Borough	8,593	8,589	-4	-0.05%
Dravosburg Borough	1,792	1,838	46	2.50%
Duquesne, City of	5,565	5,581	16	0.29%
East Deer Township	1,500	1,367	-133	-9.73%
East McKeesport Borough	2,126	2,222	96	4.32%
East Pittsburgh Borough	1,822	1,800	-22	-1.22%
Edgewood Borough	3,118	3,114	-4	-0.13%
Edgeworth Borough	1,680	1,652	-28	-1.69%
Elizabeth Borough	1,493	1,358	-135	-9.94%
Elizabeth Township	13,271	13,282	11	0.08%
Emsworth Borough	2,449	2,500	51	2.04%
Etna Borough	3,451	3,447	-4	-0.12%

Table 2.3-2 List of Municipalities in Allegheny County with Associated Populations (U.S. Census, 2014).

MUNICIPALITY	POPULATION 2010	2013 ACS 5-YEAR ESTIMATE	POPULATION DIFFERENCE	PERCENT CHANGE (%)
Fawn Township	2,376	2,422	46	1.90%
Findlay Township	5,060	5,127	67	1.31%
Forest Hills Borough	6,518	6,516	-2	-0.03%
Forward Township	3,376	3,372	-4	-0.12%
Fox Chapel Borough	5,388	5,390	2	0.04%
Franklin Park Borough	13,470	13,679	209	1.53%
Frazer Township	1,157	1,124	-33	-2.94%
Glassport Borough	4,483	4,481	-2	-0.04%
Glenfield Borough	205	211	6	2.84%
Glen Osborne Borough	547	574	27	4.70%
Green Tree Borough	4,432	4,428	-4	-0.09%
Hampton Township	18,363	18,386	23	0.13%
Harmar Township	2,921	2,967	46	1.55%
Harrison Township	10,461	10,463	2	0.02%
Haysville Borough	70	87	17	19.54%
Heidelberg Borough	1,244	1,285	41	3.19%
Homestead Borough	3,165	3,164	-1	-0.03%
Indiana Township	7,253	7,277	24	0.33%
Ingram Borough	3,330	3,329	-1	-0.03%
Jefferson Hills Borough	10,619	10,844	225	2.07%
Kennedy Township	7,672	7,764	92	1.18%
Kilbuck Township	697	655	-42	-6.41%
Leet Township	1,634	1,591	-43	-2.70%
Leetsdale Borough	1,218	1,206	-12	-1.00%
Liberty Borough	2,551	2,551	0	0.00%
Lincoln Borough	1,072	988	-84	-8.50%
Marshall Township	6,915	7,105	190	2.67%
McCandless, Town of	28,457	28,686	229	0.80%
McDonald Borough	383	533	150	28.14%
McKees Rocks Borough	19,731	19,744	13	0.07%
McKeesport, City of	6,104	6,097	-7	-0.11%
Millvale Borough	3,744	3,739	-5	-0.13%
Monroeville Borough	28,386	28,361	-25	-0.09%
Moon Township	24,185	24,615	430	1.75%
Mount Lebanon Township	33,137	33,072	-65	-0.20%
Mount Oliver Borough	3,403	3,402	-1	-0.03%
Munhall Borough	11,406	11,389	-17	-0.15%
Neville Township	1,084	1,086	2	0.18%
North Braddock Borough	4,857	4,878	21	0.43%
North Fayette Township	13,934	13,966	32	0.23%
North Versailles Township	10,229	10,199	-30	-0.29%
O'Hara Township	1,459	1,357	-102	-7.52%
Oakdale Borough	6,303	6,340	37	0.58%

Table 2.3-2 List of Municipalities in Allegheny County with Associated Populations (U.S. Census, 2014).

MUNICIPALITY	POPULATION 2010	2013 ACS 5-YEAR ESTIMATE	POPULATION DIFFERENCE	PERCENT CHANGE (%)
Oakmont Borough	8,407	8,458	51	0.60%
Ohio Township	4,757	5,246	489	9.32%
Penn Hills Township	42,329	42,361	32	0.08%
Pennsbury Village Borough	661	641	-20	-3.12%
Pine Township	11,497	11,702	205	1.75%
Pitcairn Borough	3,294	3,295	1	0.03%
Pittsburgh, City of	305,704	306,062	358	0.12%
Pleasant Hills Borough	8,268	8,278	10	0.12%
Plum Borough	27,126	27,257	131	0.48%
Port Vue Borough	3,798	3,794	-4	-0.11%
Rankin Borough	2,122	2,117	-5	-0.24%
Reserve Township	3,333	3,331	-2	-0.06%
Richland Township	11,100	11,247	147	1.31%
Robinson Township	13,354	13,440	86	0.64%
Ross Township	31,105	31,120	15	0.05%
Rosslyn Farms Borough	427	498	71	14.26%
Scott Township	17,024	17,013	-11	-0.06%
Sewickley Borough	3,827	3,839	12	0.31%
Sewickley Heights Borough	810	791	-19	-2.40%
Sewickley Hills Borough	639	720	81	11.25%
Shaler Township	28,757	28,768	11	0.04%
Sharpsburg Borough	3,446	3,440	-6	-0.17%
South Fayette Township	14,416	14,677	261	1.78%
South Park Township	13,416	13,469	53	0.39%
South Versailles Township	351	417	66	15.83%
Springdale Borough	3,405	3,409	4	0.12%
Springdale Township	1,636	1,643	7	0.43%
Stowe Township	6,362	6,347	-15	-0.24%
Swissvale Borough	8,983	8,975	-8	-0.09%
Tarentum Borough	4,530	4,532	2	0.04%
Thornburg Borough	455	510	55	10.78%
Trafford Borough	61	159	98	61.64%
Turtle Creek Borough	5,349	5,350	1	0.02%
Upper St. Clair Township	19,229	19,272	43	0.22%
Verona Borough	2,474	2,285	-189	-8.27%
Versailles Borough	1,515	1,557	42	2.70%
Wall Borough	580	685	105	15.33%
West Deer Township	11,771	11,799	28	0.24%
West Elizabeth Borough	518	791	273	34.51%
West Homestead Borough	1,929	1,780	-149	-8.37%
West Mifflin Borough	20,313	20,307	-6	-0.03%
West View Borough	6,771	6,768	-3	-0.04%
Whitaker Borough	1,271	1,311	40	3.05%

Table 2.3-2 List of Municipalities in Allegheny County with Associated Populations (U.S. Census, 2014).				
MUNICIPALITY	POPULATION 2010	2013 ACS 5-YEAR ESTIMATE	POPULATION DIFFERENCE	PERCENT CHANGE (%)
White Oak Borough	13,944	13,943	-1	-0.01%
Whitehall Borough	7,862	7,864	2	0.03%
Wilkins Township	6,357	6,356	-1	-0.02%
Wilkinsburg Borough	15,930	15,943	13	0.08%
Wilmerding Borough	2,190	1,896	-294	-15.51%
TOTAL	**1,223,348**	**1,226,933**	**3,585**	**0.29%**

Recent demographic trends in Allegheny County are summarized in Table 2.3-3 based on the census data available. While population is increasing, the increase is not as significant as the overall population decrease.

Table 2.3-3 Allegheny County Demographic Summary (US Census Bureau, 2014)		
DEMOGRAPHIC DATA POINT	**2010**	**2013 ACS ESTIMATE**
Total Population	1,223,348	1,226,933
Male/Female	585,650/637,698	588,464/638,469
Median Age (Years)	41.3	41.1
Under 5	63,640	63,881
5 to 19 years	212,674	210,018
20 to 59 years	669,137	669,448
60 years and older	277,897	283,586

The percentage of the County population under 19 years old is lower than the national average, at 22.3% compared to 26.6%. Conversely, the percentage of the County population over 60 years old is higher than the national average, at 23.2% compared to 19%. This high percent population signals the need to address hazard mitigation actions that take the increasing number of senior citizens into account. As senior citizens may not be able to drive, special evacuation plans may be required. Further, hearing or vision impairments could make receiving emergency instructions difficult. Since 2010, there has been a decrease in the number of residents aged five to 19 years old and an increase in those over 60 years.

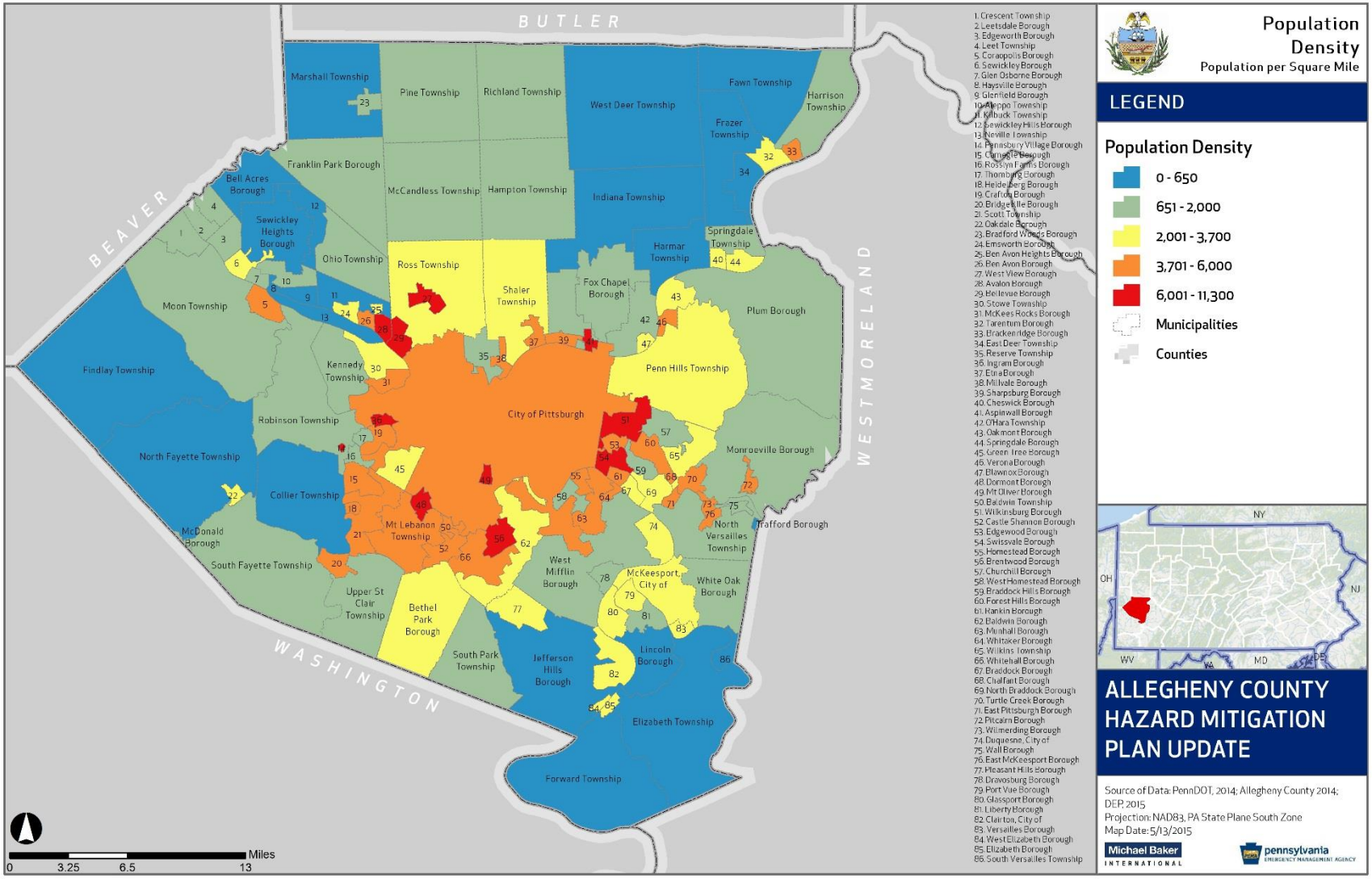
Figure 2.3-2 describes the population density throughout Allegheny County. As it can be predicted, the densest part of the County occurs within the City of Pittsburgh, and in particular the smaller geographical Boroughs of:

- Brentwood Borough;
- Mount Oliver Borough;
- Dormont Borough;
- Ingram Borough;
- Pennsbury Village Borough;
- Bellevue Borough;

- Avalon Borough;
- West View Borough;
- Aspinwall Borough;
- Wilkinsburg Borough; and
- Swissvale Borough.

These areas have a population density of 6,000 to 11,300 people per square mile. The City of Pittsburgh and the majority of its neighboring communities have a population density of 3,700 to 6,000 people per square mile.

Figure 2.3-1 Allegheny County Population Density



Consideration should also be given to address hazard mitigation actions for citizens with disabilities. According to the U.S. Census, American Community Survey 2013 Estimates, 13% (157,995 out of 1,211,855) of Allegheny County residents have a disability. Of this population 7% are under 18, 49% are ages 18 to 64 years old, and 44% are 65 years or over (U.S. Census, American Community Survey, 2013 Estimates).

From a race and ethnic perspective, Allegheny County citizens are predominantly white, followed by black or African American. As seen in Table 2.3-4, from 2010 to the 2013 there has been an increase in all races and ethnicities except for black or African Americans and American Indians and Alaska Natives.

Table 2.3-4 Race and Ethnicity Profile

DEMOGRAPHIC INDICATOR	2010	2013 ESTIMATE
One Race	1,200,749	1,201,208
White	997,295	998,456
Black or African American	161,861	159,750
American Indian and Alaska Native	1,702	1,515
Asian	34,090	36,286
Pacific Islander	278	352
Some Other Race	5,523	4,749
Two or More Races	22,599	25,825
Hispanic or Latino of any Race	19,070	20,358
Source: U.S. Census Bureau		

Median household income and median family income in Allegheny County are $51,366 and $70,380 respectively. The median household income is slightly less than Pennsylvania's, but the median family income is $4,034 higher. Per capita income is also slightly higher than the state.

Table 2.3-5 Income Levels and Wage Statistics

INCOME	ALLEGHENY COUNTY	PENNSYLVANIA
	2009-2013 ESTIMATE	2009-2013 ESTIMATE
Median Household Income	$51,366	$52,548
Median Family Income	$70,380	$66,646
Per Capita Income	$31,593	$28,502
Source: U.S. Census Bureau, American Community Survey		

According to the U.S. Census 2013 Estimate, 64% of the population 16 years of age and older are in the labor force (36% are not in the labor force). Of this population, 99.9% are in the civilian labor force, and 92% are employed. This translates to an unemployment rate of 8%, about the same as the Pennsylvania's unemployment rate.

As seen in Table 2.3-6, U.S. Census data shows a decrease in the number of housing units in Allegheny County between 2010 and 2013. However, the number of vacant housing units has increased, and the

correlating number of owner and renter-occupied houses has decreased. Vacant buildings are particularly vulnerable to arson and criminal activity. Since vacant properties are often not maintained, many may be structurally deficient. Citizens renting homes are typically more transient than homeowners, therefore communicating with citizens who are renters may be more difficult than communicating with homeowners. Communication strategies should be developed to make certain that citizens who rent housing units are given proper notification relate to hazard mitigation actions.

According to the 2013 Estimate, of the 588,644 housing units, 181,835 units (31%) were built in 1939 or earlier. Second to 1939, 110,651 units (19%) were built sometime between 1950 and 1959. This means half of the housing was built before 1960 and should be consider when planning for hazard mitigation, especially urban fire and explosion.

Table 2.3-6 Housing Characteristics

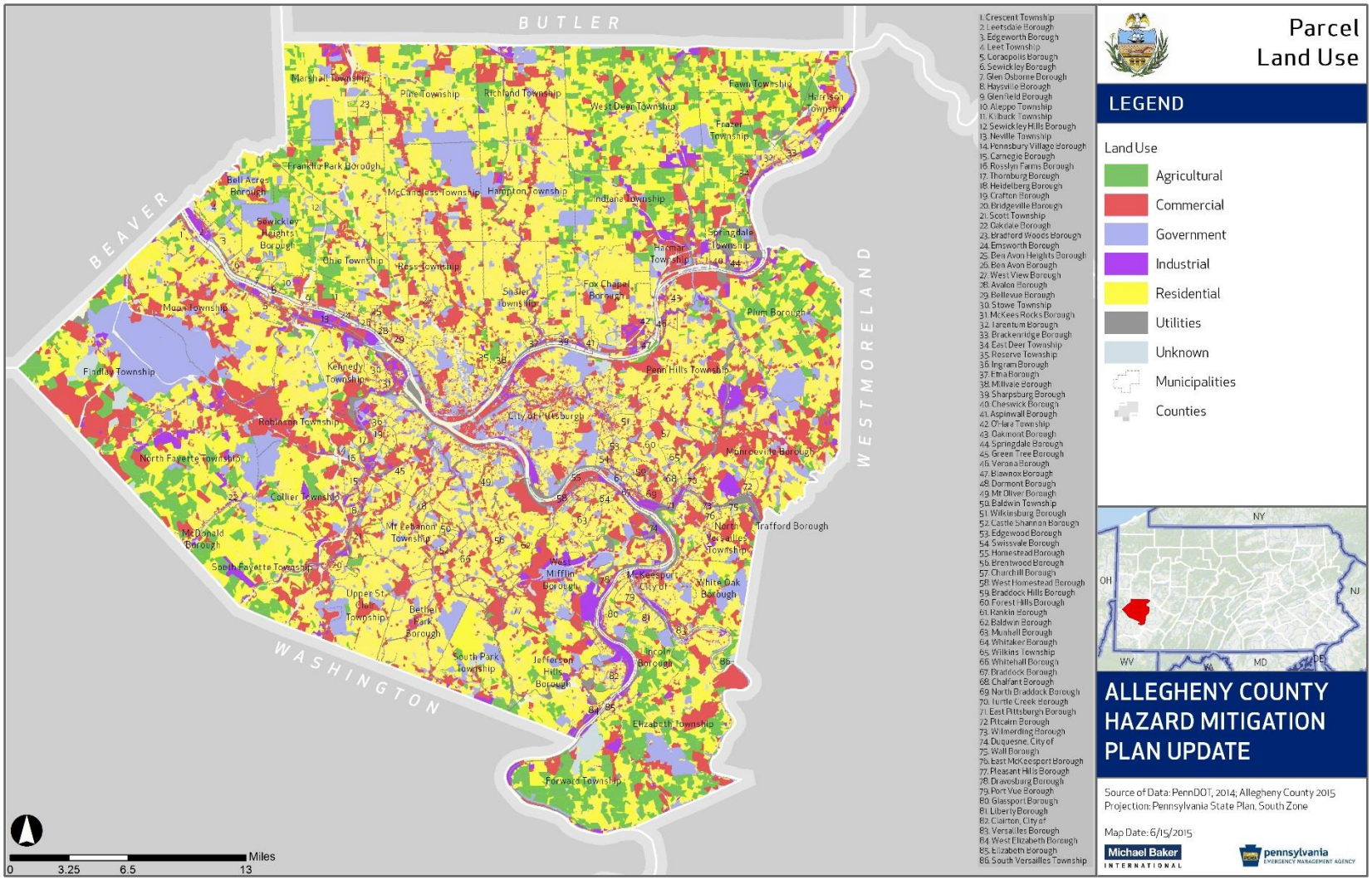
HOUSING CHARACTERISTIC	2010	2013 ESTIMATE
Total Housing Units	589,201	588,644
Occupied Housing Units	533,960	526,004
Vacant Housing Units	55,241	62,640
Owner-Occupied Housing Units	345,393	344,618
Renter-Occupied Housing Units	188,567	181,366
Median Home Value	N/A	$122,400

Source: U.S. Census Bureau, American Community Survey, 2013 Estimates

2.4 Land Use and Development

Nearly half of the County's total land area is considered developed. The remaining undeveloped land consists of forested, open space, or agricultural land. Despite population losses, the number of acres of developed land continues to increase rapidly, and sprawl strains the fiscal and environmental conditions in the County. The Allegheny Land Trust, funded in part by the County, has preserved over 1,500 acres of land in Allegheny and Washington Counties. The County Conservation District employs state funds to preserve land for agriculture. Figure 2.4-1 shows current land use for Allegheny County.

Figure 2.4-1 2015 Land Use for Allegheny County



The 2007 Census of Agriculture by the United States Department of Agriculture indicated that there were 534 farms in 2007 with the average size being 71 acres. In 2007, the total market value of agricultural products sold was $9,514,000. Eighty-six percent of the total products come from crop sales. In comparison, the 2012 Census of Agriculture recorded a decrease in the number of farms to 428; each an increasing average size of 81 acres. The market value of products sold increased to $10,397,000, and the average per farm was $24,291. This ranked the County 58th within Pennsylvania.

There have also been many efforts in recent years, specifically with the Urban Redevelopment Authority (URA) of Pittsburgh, to rehabilitate brownfield sites and to create mixed-use developments within the City of Pittsburgh and the bordering municipalities. Examples include Duquesne City Center, Carrie Furnace, Leetsdale Industrial Park, Somerset at Frick Park, the South Side Works, and Pittsburgh Technology Center.

Regional shopping centers, industrial parks, and business districts are mostly located along the County's major roadways. Allegheny County has an extensive transportation network of air, water, highway, railroad, and transit systems. The Port Authority of Allegheny County operates one of the nation's largest public transportation service networks. In 2013, there were 5,844.74 total miles of highway in Allegheny County. Of the total miles of highway in the County, 79% are local/municipal and 21% are PennDOT and other State and Federal highways. Within the Commonwealth, Allegheny County ranks number one with the most miles of local roads and streets and number two in the number of miles of state highways.

The Future Land Use Plan of the Allegheny County Comprehensive Plan, *Allegheny Places*, is a guide for development and redevelopment through the year 2025. It is based on the projected growth population of approximately 1.3 million people, including a net gain of 32,000 housing units and 190,000 new jobs. The term "Places" used throughout the Plan references eight different types of Places, each with a unique identity. These include:

1. Airport-Industry
2. The Core
3. Corridors
4. Urban Neighborhoods
5. Community Downtowns
6. Villages
7. Rural Places
8. Transit-Oriented Developments (TODs)

The Plan hopes to provide an efficient and economical way to allow for both new growth and revitalization, meet a diversity of needs, support transit, reduce consumption of open space, and protect environmentally sensitive areas. Key challenges identified within the Plan include sprawl in the northern and western portions of the County, a declining population in the core area particularly, disinvestment in older communities, brownfields, a large number of local governments (the most in Pennsylvania), and poor condition of housing stock in older areas.

The Plan not only includes a Future Land Use Plan but also:

- Agricultural Resource Plan consisting of conservation easements and regulations;
- Transportation Plan outlining future projects and objectives;
- Utilities Plan touching on water supply, public water, pubic sewer systems, wastewater collection systems, stormwater management, and electric, natural gas, and telecommunication systems; and
- Environmental Resource Plan focusing on improving air and water quality.

Further discussion of how future land development patterns impact vulnerability to hazards is included in Section 4.4.4.

2.5 Data Sources and Limitations

The Allegheny County address point and parcel databases were used as an inventory of properties throughout the County. The address points included just the point locations of addresses countywide, and did not include additional attributes. The addresses did not have a value assigned to them. In order to evaluate the type of structures vulnerable to individual hazards, the consultant team used a spatial join to assign land use type to each address using the County's parcel database. The land use categories are unaltered from the County's assigned categories of agricultural, commercial, government, industrial, mixed-use, residential, unknown, and utilities. However, apartment buildings and other rental housing, which is considered to be commercial property in the County's tax rolls, has been reclassified to residential for this plan to more accurately reflect structures where people live. In addition, since a spatial join was used to derive land use, if a parcel had more than one structure on it, both would be given the same underlying land use. As a result, the structure types used throughout this HMP should be considered estimates. The actual structure and land use may differ than information contained in the database.

The list of critical facilities provided in Appendix E was developed based on information provided by the Allegheny County GIS Department, Allegheny County Emergency Services, PEMA, FEMA, the Pennsylvania Department of Health, and the National Atlas; selection of categories was led by the Allegheny County HMPSC leadership.

Flood hazard data used in this plan is Allegheny County's effective DFIRM database from 2014, which is a digital representation of features of Flood Insurance Rate Maps (FIRMs). In addition, this plan makes use of the non-regulatory Risk MAP products produced for Allegheny County, namely the 1-percent annual chance depth grid. Allegheny County GIS provided other GIS datasets including transportation infrastructure, boundaries, public buildings, and natural features like steep slopes and wooded areas. Additional data for the base map was provided by the Pennsylvania Department of Transportation, Pennsylvania Game Commission, and the Pennsylvania Department of Conservation and Natural Resources.

Additional information used to complete the risk assessment for this plan was taken from various government agency and non-government agency sources. Those sources are cited where appropriate throughout the plan and on each map with full references listed in Appendix A – Bibliography. It should be noted that numerous GIS datasets were obtained from the Pennsylvania Spatial Data Access (PASDA) website (http://www.pasda.psu.edu/). PASDA is the official public access geospatial information

clearinghouse for the Commonwealth of Pennsylvania. PASDA was developed by the Pennsylvania State University as a service to the citizens, governments, and businesses of the Commonwealth. PASDA is a cooperative project of the Governor's Office of Administration, Office for Information Technology, Geospatial Technologies Office and the Penn State Institutes of Energy and the Environment of the Pennsylvania State University.

In order to assess the vulnerability of different jurisdictions to the hazards, data on past occurrences of damaging hazard events was gathered. For a number of historic natural-hazard events, the National Climatic Data Center (NCDC) database was utilized. NCDC is a division of the US Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Information on hazard events is compiled by NCDC from data gathered by the National Weather Service (NWS), another division of NOAA. NCDC then presents it on their website in various formats. The data used for this plan came the US Storm Events database, which "documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce" (NOAA, 2006).

When applicable, PEIRS incident data spanning 1/1/2002 through 6/1/2009 was used in the 2011 plan update and kept in the 2015 update. However, the Commonwealth of Pennsylvania ceased using PEIRS as its incident reporting system in 2009 and was unable to provide more recent comprehensive incident reports. Although PEIRS data proved valuable, primarily in the human-made hazards section where few records of past occurrences exist, data limitations exist in that the reporting system is not mandatory. As a result, while PEIRS reports provide important information on the frequency of past events, because it is a voluntary reporting system, the number and frequency of events may be under-reported. PEIRS information was used in the following hazard profile sections: Urban Fire/Explosion, Transportation Accidents, and Civil Disturbance.

HAZUS-MH is a powerful risk assessment methodology for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH, current scientific and engineering knowledge is coupled with the latest GIS technology to produce estimates of hazard-related damage before, or after, a disaster occurs. HAZUS version 2.2 was used to estimate losses for floods in Allegheny County; this plan incorporates an enhanced analysis. County-specific essential facilities data was incorporated into the model to make it more precise, and the model used the 1% annual-chance depth grid developed as one of the non-regulatory products in the county's Risk MAP study. For more information on the enhanced analysis methodology used for this plan's flood model, please see Appendix F.

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. Table 2.5-1 summarizes the critical facilities in Allegheny County by type and by municipality. For a complete listing of critical facilities and their vulnerability to individual hazards, please see Appendix E.

Table 2.5-1 Critical facilities by municipality and type

MUNICIPALITY	AIRPORTS AND HELIPORTS	COLLEGES/UNIVERSITIES	COMMUNICATION TOWERS	COUNTY JAIL	DAY CARE CENTERS	EMS	EOCS	FIRE DEPARTMENTS	HOSPITALS	MUNICIPAL BUILDING	NURSING HOMES	OTHER PUBLIC BUILDINGS	PERSONAL CARE HOMES	POLICE DEPARTMENTS	PUBLIC WORKS	SARA FACILITIES	SCHOOL	SEWER AUTHORITIES	WATER AUTHORITIES	WWTPS/STPS	GRAND TOTAL
Aleppo Township	0	0	0	0	0	0	0	0	0	1	1	0	1	2	0	0	0	0	0	1	**6**
Aspinwall Borough	0	0	0	0	2	0	0	1	0	1	0	1	0	1	0	0	1	0	0	0	**7**
Avalon Borough	0	0	0	0	0	0	0	1	0	1	0	0	1	1	0	1	1	0	0	0	**6**
Baldwin Borough	0	0	4	0	3	1	0	3	0	1	1	0	3	1	0	1	6	0	0	0	**24**
Baldwin Township	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	**2**
Bell Acres Borough	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	2	**6**
Bellevue Borough	0	0	0	0	0	0	0	0	1	1	1	0	3	1	0	1	3	0	0	0	**11**
Ben Avon Borough	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**3**
Ben Avon Heights Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Bethel Park, Municipality of	1	0	0	0	4	1	0	1	0	1	2	0	2	1	1	6	13	0	0	0	**33**
Blawnox Borough	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	1	0	1	1	0	**7**
Brackenridge Borough	0	0	0	0	0	1	0	1	0	1	1	0	1	1	0	2	1	0	1	0	**10**
Braddock Borough	0	0	1	0	2	0	0	1	0	1	0	0	1	1	0	3	1	1	1	0	**13**
Braddock Hills Borough	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Bradford Woods Borough	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	**3**
Brentwood Borough	0	0	2	0	0	1	0	1	0	1	0	0	1	1	0	2	4	1	0	0	**14**
Bridgeville Borough	0	0	0	0	1	0	0	2	0	1	0	0	1	1	0	1	1	0	0	0	**8**
Carnegie Borough	0	0	1	0	2	1	0	2	0	1	0	0	0	1	1	5	2	0	0	1	**17**
Castle Shannon Borough	0	0	0	0	2	0	0	1	0	1	0	0	1	1	0	1	2	0	0	0	**9**
Chalfant Borough	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
Cheswick Borough	0	0	0	0	0	0	0	2	0	1	0	0	0	1	0	0	1	1	1	0	**7**
Churchill Borough	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	0	5	0	0	0	**9**
Clairton City	0	0	0	0	1	2	0	1	0	1	0	0	1	1	0	4	2	1	0	0	**14**
Collier Township	0	0	0	0	0	2	0	3	0	1	0	0	2	1	0	6	4	1	0	1	**21**

Table 2.5-1 Critical facilities by municipality and type

MUNICIPALITY	AIRPORTS AND HELIPORTS	COLLEGES/UNIVERSITIES	COMMUNICATION TOWERS	COUNTY JAIL	DAY CARE CENTERS	EMS	EOCS	FIRE DEPARTMENTS	HOSPITALS	MUNICIPAL BUILDING	NURSING HOMES	OTHER PUBLIC BUILDINGS	PERSONAL CARE HOMES	POLICE DEPARTMENTS	PUBLIC WORKS	SARA FACILITIES	SCHOOL	SEWER AUTHORITIES	WATER AUTHORITIES	WWTPS/STPS	GRAND TOTAL
Coraopolis Borough	0	0	0	0	0	0	0	1	0	1	0	0	2	1	0	3	2	1	1	1	**13**
Crafton Borough	0	0	1	0	1	0	0	1	0	1	0	0	0	2	0	1	2	0	0	0	**9**
Crescent Township	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	1	**4**
Dormont Borough	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2	2	0	0	0	**8**
Dravosburg Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	**4**
Duquesne, City of	0	0	0	0	1	1	0	1	0	1	0	0	2	1	0	3	4	0	0	1	**15**
East Deer Township	0	0	0	0	0	1	0	2	0	1	0	0	1	1	0	4	0	0	1	1	**12**
East McKeesport Borough	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	0	**5**
East Pittsburgh Borough	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	1	**5**
Edgewood Borough	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	0	2	0	0	0	**6**
Edgeworth Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2	0	1	0	**5**
Elizabeth Borough	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	1	2	0	0	1	**8**
Elizabeth Township	0	0	1	0	0	0	0	7	0	1	0	0	1	2	1	6	5	0	0	2	**26**
Emsworth Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	**3**
Etna Borough	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	1	0	1	1	**7**
Fawn Township	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	3	1	0	1	1	**9**
Findlay Township	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	15	2	0	0	0	**20**
Forest Hills Borough	0	0	1	0	2	1	0	1	0	2	0	0	1	2	0	0	3	0	0	0	**13**
Forward Township	0	0	2	0	0	1	0	4	0	1	0	0	0	0	0	3	1	0	0	5	**17**
Fox Chapel Borough	0	0	0	0	0	1	0	1	0	2	0	0	1	1	0	2	3	0	0	0	**11**
Franklin Park Borough	0	0	0	0	2	0	0	1	0	2	0	0	1	1	0	0	3	0	0	0	**10**
Frazer Township	0	0	0	0	0	0	0	2	0	1	0	0	0	1	0	7	0	0	0	1	**12**
Glassport Borough	0	0	1	0	0	0	0	1	0	1	0	0	1	1	0	4	1	0	0	1	**11**
Glen Osborne Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	**2**

Table 2.5-1 Critical facilities by municipality and type

MUNICIPALITY	AIRPORTS AND HELIPORTS	COLLEGES/UNIVERSITIES	COMMUNICATION TOWERS	COUNTY JAIL	DAY CARE CENTERS	EMS	EOCS	FIRE DEPARTMENTS	HOSPITALS	MUNICIPAL BUILDING	NURSING HOMES	OTHER PUBLIC BUILDINGS	PERSONAL CARE HOMES	POLICE DEPARTMENTS	PUBLIC WORKS	SARA FACILITIES	SCHOOL	SEWER AUTHORITIES	WATER AUTHORITIES	WWTPS/STPS	GRAND TOTAL
Glenfield Borough	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Green Tree Borough	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	1	2	0	0	0	**7**
Hampton Township	0	0	0	0	4	1	0	2	0	1	0	1	3	1	1	5	11	1	1	3	**35**
Harmar Township	1	0	0	0	1	1	0	0	1	1	2	0	1	1	0	11	1	1	1	1	**24**
Harrison Township	1	0	0	0	3	2	0	3	2	1	0	0	0	1	0	2	6	0	1	0	**22**
Haysville Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Heidelberg Borough	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	**4**
Homestead Borough	0	0	0	0	1	1	0	0	0	2	0	0	0	1	0	1	1	0	0	0	**7**
Indiana Township	2	0	0	0	0	1	0	4	0	1	1	0	2	1	0	11	5	0	0	0	**28**
Ingram Borough	0	0	1	0	1	1	0	1	0	1	0	0	0	1	0	0	1	0	0	0	**7**
Jefferson Hills Borough	0	0	0	0	0	1	0	3	1	1	2	0	1	1	0	8	5	1	0	0	**24**
Kennedy Township	1	0	0	0	0	0	0	2	1	0	1	0	1	0	0	4	3	0	0	1	**14**
Kilbuck Township	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	**3**
Leet Township	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	**4**
Leetsdale Borough	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	7	1	1	0	0	**12**
Liberty Borough	0	0	0	0	0	1	0	1	0	1	0	0	1	1	0	0	3	0	0	0	**8**
Lincoln Borough	0	0	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**4**
Marshall Township	1	0	0	0	0	0	0	2	0	1	0	0	0	0	0	5	2	0	0	2	**13**
McCandless, Town of	2	2	1	0	1	1	0	3	1	1	4	2	4	1	0	3	12	1	0	1	**40**
McDonald Borough	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**2**
McKees Rocks Borough	0	0	0	0	3	0	0	0	0	1	0	0	1	1	0	2	1	0	0	0	**9**
McKeesport, City of	0	0	1	0	5	1	0	1	2	2	3	3	10	1	0	5	8	1	0	0	**43**
Millvale Borough	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	1	1	0	0	0	**5**
Monroeville, Municipality of	3	1	2	0	3	6	0	5	2	2	4	0	5	2	0	17	11	0	2	1	**66**

Table 2.5-1 Critical facilities by municipality and type

MUNICIPALITY	AIRPORTS AND HELIPORTS	COLLEGES/UNIVERSITIES	COMMUNICATION TOWERS	COUNTY JAIL	DAY CARE CENTERS	EMS	EOCS	FIRE DEPARTMENTS	HOSPITALS	MUNICIPAL BUILDING	NURSING HOMES	OTHER PUBLIC BUILDINGS	PERSONAL CARE HOMES	POLICE DEPARTMENTS	PUBLIC WORKS	SARA FACILITIES	SCHOOL	SEWER AUTHORITIES	WATER AUTHORITIES	WWTPS/STPS	GRAND TOTAL
Moon Township	0	0	0	0	2	2	0	2	0	1	1	0	2	1	0	8	7	1	1	3	**31**
Mount Lebanon, Municipality of	1	0	2	0	0	1	0	2	1	1	4	0	7	1	0	0	17	1	0	0	**38**
Mount Oliver Borough	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	**4**
Munhall Borough	0	0	0	0	1	1	0	4	0	1	1	0	1	1	0	1	5	0	0	1	**17**
Neville Township	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	19	0	0	0	0	**22**
North Braddock Borough	0	0	0	0	1	1	0	4	0	2	0	0	0	2	0	3	1	0	0	0	**14**
North Fayette Township	0	1	0	0	2	0	0	2	1	3	0	0	1	2	0	6	5	1	0	5	**29**
North Versailles Township	0	0	0	0	1	2	0	3	0	1	0	0	0	1	0	2	4	0	0	0	**14**
Oakdale Borough	0	0	0	0	1	1	0	4	0	0	0	0	1	1	0	14	3	0	0	0	**25**
Oakmont Borough	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	**3**
O'Hara Township	0	0	0	0	0	0	0	2	0	1	2	0	2	1	0	3	3	1	1	1	**17**
Ohio Township	1	0	1	0	0	0	0	1	0	1	0	0	1	1	0	4	4	0	0	1	**15**
Penn Hills, Municipality of	0	0	2	0	12	1	0	6	0	1	1	2	2	1	1	8	11	0	0	4	**52**
Pennsbury Village Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	**3**
Pine Township	0	0	0	0	1	0	0	2	0	1	1	0	1	1	0	2	4	0	0	1	**14**
Pitcairn Borough	0	0	0	0	0	1	0	2	0	1	0	0	0	1	0	0	1	0	0	0	**6**
Pittsburgh, City of	9	13	4	2	47	19	2	1	12	0	18	84	22	7	16	99	145	1	0	4	**505**
Pleasant Hills Borough	0	0	0	0	0	0	0	2	0	1	1	0	1	1	0	1	2	1	0	0	**10**
Plum Borough	1	0	0	0	2	1	0	3	0	1	1	0	2	1	0	14	11	2	0	3	**42**
Port Vue Borough	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	2	0	0	0	**5**
Rankin Borough	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	**3**
Reserve Township	0	0	0	0	0	1	0	2	0	1	0	0	0	1	0	0	1	1	1	0	**8**
Richland Township	0	1	0	0	1	2	0	2	0	1	1	0	2	1	0	1	4	1	0	0	**17**

Table 2.5-1 Critical facilities by municipality and type

MUNICIPALITY	AIRPORTS AND HELIPORTS	COLLEGES/UNIVERSITIES	COMMUNICATION TOWERS	COUNTY JAIL	DAY CARE CENTERS	EMS	EOCS	FIRE DEPARTMENTS	HOSPITALS	MUNICIPAL BUILDING	NURSING HOMES	OTHER PUBLIC BUILDINGS	PERSONAL CARE HOMES	POLICE DEPARTMENTS	PUBLIC WORKS	SARA FACILITIES	SCHOOL	SEWER AUTHORITIES	WATER AUTHORITIES	WWTPS/STPS	GRAND TOTAL
Robinson Township	0	0	0	0	1	2	0	3	0	2	0	0	1	1	0	11	7	0	0	1	**29**
Ross Township	0	0	0	0	1	1	0	7	0	0	2	1	4	1	0	4	13	0	0	1	**35**
Rosslyn Farms Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	**3**
Scott Township	0	0	1	0	2	1	0	4	0	1	3	2	2	1	0	1	3	0	0	0	**21**
Sewickley Borough	0	0	0	0	0	0	0	1	1	2	0	0	0	1	0	3	3	0	0	1	**12**
Sewickley Heights	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	**3**
Sewickley Hills Borough	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	**3**
Shaler Township	0	0	0	0	1	1	0	5	0	1	0	0	0	1	0	5	10	0	0	0	**24**
Sharpsburg Borough	0	0	0	0	0	1	0	0	0	1	0	0	2	1	0	1	1	0	0	0	**7**
South Fayette Township	0	0	0	0	0	1	0	3	0	1	1	0	3	1	0	7	5	0	0	1	**23**
South Park Township	0	0	0	0	1	0	0	3	0	1	0	0	1	1	0	1	7	1	0	1	**17**
South Versailles Township	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	**3**
Springdale Borough	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	7	2	0	1	0	**14**
Springdale Township	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	0	**4**
Stowe Township	0	0	0	0	0	1	0	3	0	1	0	0	0	1	0	5	2	0	0	0	**13**
Swissvale Borough	0	0	1	0	3	0	0	1	0	1	0	0	0	1	0	1	3	1	0	0	**12**
Tarentum Borough	0	0	0	0	1	1	0	5	0	1	0	0	1	1	0	6	1	1	1	0	**19**
Thornburg Borough	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	**3**
Trafford Borough	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
Turtle Creek Borough	0	0	0	0	0	1	0	1	0	1	1	1	1	1	0	3	2	0	0	1	**13**
Upper St. Clair Township	0	0	0	0	0	0	0	1	1	1	1	0	2	1	0	2	10	0	0	0	**19**
Verona Borough	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	1	2	0	0	0	**7**
Versailles Borough	0	0	0	0	0	1	0	2	0	1	0	0	0	1	0	0	0	0	0	0	**5**
Wall Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	**2**

Table 2.5-1 Critical facilities by municipality and type

MUNICIPALITY	AIRPORTS AND HELIPORTS	COLLEGES/UNIVERSITIES	COMMUNICATION TOWERS	COUNTY JAIL	DAY CARE CENTERS	EMS	EOCS	FIRE DEPARTMENTS	HOSPITALS	MUNICIPAL BUILDING	NURSING HOMES	OTHER PUBLIC BUILDINGS	PERSONAL CARE HOMES	POLICE DEPARTMENTS	PUBLIC WORKS	SARA FACILITIES	SCHOOL	SEWER AUTHORITIES	WATER AUTHORITIES	WWTPS/STPS	GRAND TOTAL
West Deer Township	2	0	0	0	0	1	0	2	0	1	1	0	2	1	0	4	6	1	0	1	**22**
West Elizabeth Borough	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	1	0	0	**5**
West Homestead Borough	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	2	0	0	0	0	**5**
West Mifflin Borough	2	1	0	0	1	3	0	7	0	1	0	0	2	1	1	21	10	0	0	4	**54**
West View Borough	0	0	0	0	0	0	0	3	0	2	0	0	1	1	0	1	2	2	1	0	**13**
Whitaker Borough	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
White Oak Borough	0	0	1	0	0	1	0	2	0	2	0	0	0	1	0	1	3	0	0	0	**11**
Whitehall Borough	0	0	0	0	1	0	0	1	0	1	1	0	1	1	0	3	7	0	0	0	**16**
Wilkins Township	0	1	2	0	0	0	0	3	0	1	0	1	0	1	0	3	1	0	0	0	**13**
Wilkinsburg Borough	1	0	1	0	2	0	0	0	1	1	1	2	4	1	0	2	7	1	1	0	**25**
Wilmerding Borough	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	**4**
GRAND TOTAL	**30**	**20**	**36**	**2**	**138**	**88**	**2**	**203**	**29**	**129**	**65**	**100**	**131**	**117**	**22**	**468**	**500**	**35**	**22**	**71**	**2208**

3 PLANNING PROCESS

3.1 Update Process and Participation Summary

The Allegheny County Hazard Mitigation Steering Committee was responsible for preparing the County's 2011 HMP, which was adopted on February 8, 2012. The 2011 HMP was an update to the County's 2005 HMP spearheaded by the Allegheny County Councils of Government. To facilitate the update of the 2015 HMP, PEMA contracted Michael Baker International.

The 2015 effort was led by the Allegheny County Department of Emergency Services with Allegheny County Economic Development and the Allegheny County municipalities. It is crucial to note although Allegheny County has in total 130 municipalities, two municipalities are only partially located in Allegheny County. Trafford Borough is a borough both Allegheny and Westmoreland Counties and McDonald Borough is a borough of both Allegheny and Washington Counties; these two communities do not conduct their emergency management services and training as a part of Allegheny County and participated in their respective other county's hazard mitigation plan updates. As a result, for the purposes of this plan, the total number of communities within this plan is 128. However, Trafford and McDonald Boroughs were not excluded from the risk assessment and vulnerability assessment in the plan so that the structure, population, and critical facility vulnerability is accurately reflected in the Allegheny County portions of these municipalities.

The first meeting of the Allegheny County Hazard Mitigation Plan Steering Committee (HMPSC) to discuss the 2015 HMP Update was held as an Internal County Kick-off teleconference on January 27, 2015. In addition to an overview of the Hazard Mitigation Planning process, changes to the HMP planning process promoted by FEMA's release of updated planning guidance in March 2013 and PEMA's Standard Operating Guide issued in October 2013, were discussed. The consultant POC reviewed PEMA priorities for the current plan update which include: focus on the Planning Process including full municipal participation, enhanced Hazus analysis for flooding, the Capability Assessment Survey including new NFIP capability review, an implementable Mitigation Strategy, and an extensive focus on Plan Integration.

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

The HMPSC and the Planning Team of local municipalities and stakeholders completed an Evaluation of Identified Hazards and Risk Worksheet as part of the Planning Team Kick-Off meeting on February 24, 2015. This survey, included in Appendix C – Meeting and Other Participation Documentation, listed hazards profiled in the 2011 HMP and prompted the team to identify the frequency of occurrence, magnitude of impact, and/or the geographic extent of each hazard as increased, decreased, or did not change since the 2011 HMP preparation. This 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. In total, 19 hazards were identified to be profiled as part of the HMP Update, including 10 natural hazards and seven human-made hazards.

The HMPSC conducted a detailed review of draft Goals, Objectives, and Actions for the 2015 HMP Update and developed the final hazard mitigation strategy. A Mitigation Action Plan developed by the HMPSC is included in Section 6.4 – Mitigation Action Plan.

Allegheny 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. One hundred twenty-six (126) of the 128 municipalities met the participation requirements. With this level of participation, over 99% of Allegheny County's population will be covered by this 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 report format is structured in accordance with the most current planning guidance from FEMA, Local Mitigation Handbook (2013), and PEMA, Standard Operating Guide (October 2013). While the overall format between the 2015 HMP Update and the 2011 HMP Update has not changed, there are a few content changes stemming from guidance changes.

Hazard Definitions. Based on new and changing concerns, some of the hazard definitions changed in this plan update. The definition of Dam Failure hazards in this plan also includes failures of the lock and dam systems on the Allegheny, Monongahela, and Ohio Rivers. In addition, discussion of hazardous material releases in transit has been moved from the Environmental Hazards profile to Transportation Accidents. This change occurred because the US Department of Transportation is the overseeing agency for hazardous material releases in transit. For more information, see Section 4.1.

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

Table 3.1-1 Mitigation Techniques Categories

PRE-2013 LOCAL MITIGATION HANDBOOK	2013 LOCAL MITIGATION HANDBOOK
Prevention	Plans and Regulations
Property Protection	Structural and Infrastructure Projects
Emergency Services Measures	Natural Systems Protection
Structural Projects	Education and Awareness Programs
Natural Resource Protection	
Public Education/Awareness Programs	

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

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

3.2 The Planning Team

The Planning Team assembled for the 2015 HMP Update included representatives from Allegheny County Emergency Management Services, Allegheny County Economic Development-Planning Division, the Allegheny County COGs, the Southwestern Pennsylvania Planning Commission (SPC), Allegheny County Housing Authority, Allegheny County Conservation District, Pennsylvania Emergency Management Agency (PEMA), University of Pittsburgh's Center for Disaster Management, Duquesne University, and Allegheny County's local 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 Baker Team.

The HMPSC assembled for the 2015 HMP Update included essentially the same organizations as the HMPSC assembled for the 2011 HMP Update with the addition of Trisha Crowe, Allegheny County Economic Development-Planning Division. HMPSC members for the 2015 HMP Update are listed in Table 3.2-1.

Table 3.2-1 Allegheny County HMP Steering Committee (HMPSC) Members

NAME	ORGANIZATION
Steven Wilharm	Allegheny County EMS
David Gagetta	Allegheny County EMS
Trisha Crowe	Allegheny County Economic Development Planning Division
Christine Caggiano, AICP/PP	Michael Baker International, Consultant Point of Contact (POC)
Madeleine Fincham	Michael Baker International

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

The stakeholders listed in Table 3.2-2 served on the Planning Team, demonstrating their commitment to actively participate in the planning process by attending meetings, completing assessments, surveys, and worksheets, and/or submitting comments. The Planning Team consisted of County and local officials including municipal Supervisors and Council Members, Emergency Management Coordinators, and other identified stakeholders.

Table 3.2-2 Participants in the 2015 Allegheny County HMP Update	
MUNICIPALITY	**PARTICIPANT(S)**
Aleppo Township	Judith Haluka
Aspinwall Borough	Melissa Lang
Avalon Borough	Lorraine Makatura and Harry Dilmore
Baldwin Borough	Kenneth Guerra
Baldwin Township	Robert Zahorchak
Bell Acres Borough	Commander William Bender
Bellevue Borough	Michael Bookser
Ben Avon Borough	Sam Diana
Ben Avon Heights Borough	Denise Raves
Bethel Park, Municipality of	Jerry Duke and Bill Spagnol
Blawnox Borough	Scott Krause
Brackenridge Borough	Richard Jones
Braddock Borough	Joseph Dursa
Braddock Hills Borough	Jack Brown, Chuck Arthrell, and David Checchio
Bradford Woods Borough	Colby Howe
Brentwood Borough	Martin Ritter
Bridgeville Borough	Lori Collins and Joe Sites
Carnegie Borough	Stephen Beauter
Castle Shannon Borough	Ken Truver
Chalfant Borough	Mark Swinney
Cheswick Borough	Bruno Moretti
Churchill Borough	Ralph Zatlin
Clairton, City of	John Lattan
Collier Township	Thomas Plietz
Coraopolis Borough	Raymond McCutcheon
Crafton Borough	Mark Sumpter
Crescent Township	Jerry Keller
Dormont Borough	Mathew Davis
Dravosburg Borough	Brenda Honick
Duquesene, City of	Frank Piccolino
East Deer Township	Paul Duffer
East McKeesport Borough	Stacy Mays
East Pittsburgh Borough	***Not participating***
Edgewood Borough	Julie Bastianini
Edgeworth Borough	John Schwend
Elizabeth Borough	Tim Butler
Elizabeth Township	Harry Faulk
Emsworth Borough	Dan Lenz and Tom Kachinko
Etna Borough	Mary Ellen Ramage and Peter Ramage
Fawn Township	David Montanari, Patricia Bryant, and Julie Pater
Findlay Township	Chris Caruso
Forest Hills Borough	Keith Morse
Forward Township	***Not participating***
Fox Chapel Borough	David Laux
Franklin Park Borough	Ambrose Rocca
Frazer Township	Lori Ziencik
Glassport Borough	Wayne Lewis and Ken Carroll
Glenfield Borough	Connie Klauck

Table 3.2-2 Participants in the 2015 Allegheny County HMP Update	
MUNICIPALITY	**PARTICIPANT(S)**
Glen Osborne Borough	Diane Vierling
Green Tree Borough	David Montz
Hampton Township	Christopher Lochner
Harmar Township	Donna Piper
Harrison Township	James Erb and Michael Krzeminski
Haysville Borough	Amy Paff
Heidelberg Borough	Amanda Loutitt
Homestead Borough	Ian McMeans
Indiana Township	Jeff Curti and Al Kohan
Ingram Borough	Karen Dixon and Rick Smith
Jefferson Hills Borough	Doug Pascoe and Eugene Roach
Kennedy Township	Justin Gutt
Kilbuck Township	Russell Hardiman
Leet Township	Ron Wilson
Leetsdale Borough	Ernest Logan and Jeffery Weatherby
Liberty Borough	William Roper
Lincoln Borough	Richard Bosco, Tammy Firda, and William Roper
Marshall Township	Nicole Zimsky, AICP
McCandless, Town of	Bruce Betty
McDonald Borough	*N/A – Participates with Washington County*
McKees Rocks Borough	Derek Carlins and Don Baird
McKeesport, City of	William Miller
Millvale Borough	James Machajewski and Eddie Figas
Monroeville, Municipality of	Kenneth Cole and Doug Cole
Moon Township	Lora Dombrowski, John Scott, and Jim Henkemeyer
Mount Lebanon, Municipality of	Kevin Abbott
Mount Oliver Borough	Steve Wilharm
Munhall Borough	Darryl Hunt and Richard Votedian
Neville Township	David Kerr
North Braddock Borough	Brian Kelly and Robert Monroe
North Fayette Township	Patrick Felton, James Morosetti, and Chad Slovick
North Versailles Township	Patricia Logo and Allen Wagner
O'Hara Township	James Farringer
Oakdale Borough	William Hartman, Jr.
Oakmont Borough	Ryan Jeroski, Lisa Cooper Jensen
Ohio Township	Tom Larkins
Penn Hills, Municipality of	Chuck Miller and Moe Rayan
Pennsbury Village Borough	Maureen
Pine Township	Tim Flaherty
Pitcairn Borough	Annette Dietz
Pittsburgh, City of	Ray DeMichiei and Jonathan Henry
Pleasant Hills Borough	Tom Bonnra and Dan Federico
Plum Borough	Brian Turpin
Port Vue Borough	Frank Cortazzo
Rankin Borough	Henry Martone
Reserve Township	Frederick Boory, Jr.
Richland Township	Joe Pillart
Robinson Township	Brian Jazvdek

Table 3.2-2 Participants in the 2015 Allegheny County HMP Update	
MUNICIPALITY	**PARTICIPANT(S)**
Ross Township	John Reubi and John Sponcer
Rosslyn Farms Borough	Samuel Maccarone
Scott Township	Denise Fitzgerald and Jerry Butts
Sewickley Borough	Kevin Flannery
Sewickley Heights Borough	Robert Wright
Sewickley Hills Borough	Norbert Micklos
Shaler Township	Sean Frank
Sharpsburg Borough	Leo Rudzki, Jr.
South Fayette Township	Daniel Dernosek, Ryan Eggleston, and John Phoennik
South Park Township	Dennis McDonough
South Versailles Township	David Stockett and Larry Robertson
Springdale Borough	Kim McAfoose and Bruno Moretti
Springdale Township	Dawn Bierly
Stowe Township	Dino DeAngelis and Ralph Gallagher
Swissvale Borough	Clyde Wilhelm
Tarentum Borough	Carl Magnetta, William Rossey, Tim Firko, and Timothy Cornuet
Thornburg Borough	Mark Sumpter and Meg Alarcon
Trafford Borough	*N/A - Participates with Westmoreland County*
Turtle Creek Borough	Julie Pantalone and Louis Lantzy
Upper St. Clair Township	Ronald Fleischer and Scott Brilhart
Verona Borough	Bonnie Conway
Versailles Borough	James Fleckenstein and Charles Roka
Wall Borough	John Dusak
West Deer Township	Jonathan Lape and William Payne
West Elizabeth Borough	William Wolfgang
West Homestead Borough	Daniel Churma and Justin Churma
West Mifflin Borough	Craig McDivett
West View Borough	Bruce Fromlak and Matt Holland
Whitaker Borough	Jean Warren
Whitehall Borough	James Leventry
White Oak Borough	Mark Jones
Wilkins Township	N. Leonard Hill
Wilkinsburg Borough	Joseph Dursa and Pamela Macklue
Wilmerding Borough	Stephen Shurgot
NEIGHBORING COUNTIES, NON-PROFITS, AND OTHER INTERESTED PARTIES	
Allegheny County Conservation District	Jan Lauer
Allegheny County Conservation District	Kelly McLaughlin
Allegheny County Council	Joe Catanese
Allegheny County Emergency Management Services	Craig Lockhart
Allegheny County Economic Development	Trisha Crowe
Allegheny County Housing Authority	Edward Mogus
Allegheny County Housing Authority	Paul Reiber
Beaver County EMA	Jeffrey Bolland
Hope Community Connections Center	Debbie Julian
North Hills COG	Wayne Roller
Pennsylvania Emergency Management Agency (PEMA)	Darlene Bracken
Quaker Valley COG	John Jakiela
Southwestern Pennsylvania Planning Commission (SPC)	Ryan Gordon

Table 3.2-2 Participants in the 2015 Allegheny County HMP Update	
MUNICIPALITY	**PARTICIPANT(S)**
Steel Valley COG	An Lewis
University of Pittsburgh Center for Disaster Management	Dr. Louise Comfort
University of Pittsburgh Center for Disaster Management	Dr. Suleyman Celik
Michael Baker International (Philadelphia)	Sarah Bowen, AICP, CFM
Michael Baker International (Pittsburgh)	Madeleine Fincham

3.3 Meetings and Documentation

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

January 27, 2015: The Steering Committee Kick-Off Meeting was conducted as a conference call on Tuesday, January 27, 2015. The meeting included discussion of the following: review of the updated planning process and project schedule, review of the Risk Assessment Hazard Descriptions, identification of stakeholders, methods for stakeholder outreach, and collection of relevant data and documents.

February 24, 2015 and February 25, 2015: A Hazard Mitigation Planning (HMP Workshop) was held with local municipalities and stakeholders identified by the HMPSC during the Steering Committee Kick-Off Meeting. The workshop was held at the Allegheny County Emergency Services Center from 10:00 AM – 12:00 PM, 1:00 PM – 3:00 PM, and 7:00 PM – 9:00 PM on Tuesday, February 24th and from 10:00 AM – 12:00 PM and 1:00 PM – 3:00 PM on Wednesday, February 25th. Having a variety of meeting times throughout the two days ensured maximum participation and flexibility for the 128 municipalities. The workshop provided an opportunity for participants to review the hazard mitigation process; discuss capabilities; offer risk assessment input on hazards identified by the HMPSC; suggest the inclusion of additional hazards; review and provide input on existing Goals, Objectives, and Actions.

As part of the workshop, municipalities and stakeholders were asked to complete a Hazard Risk Evaluation Worksheet (Hazards in Your Community). The form included the hazards profiled in the 2010 HMP and requested attendees to rank hazards' relative spatial extent, probable impact, possibility of future events, and overall significance. Results of the Hazard Risk Evaluation were used to prepare the Risk Factor (RF) ranking. This form was asked to be completed by the end of the workshop.

The HMP Workshop also provided the opportunity for municipalities to ask questions and complete the Capability Assessment Survey. Responses from Capability Assessment Surveys completed by each municipality for the 2010 HMP Update were pre-populated in the 2015 Capability Assessment Survey template, and each municipality was asked to review previous responses, update responses, and complete new fields. In order to receive as much information as possible, stakeholders were asked to return the form no later than the next workshop. This allowed participants to return to their municipality to collect information from other knowledgeable staff members.

Forty-eight (48) of Allegheny County's 128 municipalities were represented at the workshop. Seven stakeholder organizations representing the University of Pittsburgh Center for Disaster Management, Southwestern PA Planning Commission, Allegheny County EMS, Allegheny County COGs, Allegheny County Conservation District, and the Allegheny County Housing Authority attended the workshop.

April 14, 2015 and April 15, 2015: A Risk Assessment/Mitigation Solutions Meeting was held at the Allegheny County Emergency Services Center with local municipalities and stakeholders on Tuesday, April 14th from 10:00 AM – 12:00 PM, 1:00 PM – 3:00 PM, and 6:30 PM – 8:00 PM and on Wednesday, April 15th from 10:00 AM – 12:00 PM. As with the previous meeting, having a variety of meeting times throughout the two days ensured maximum participation and flexibility for the 128 municipalities. The workshop provided an opportunity for participants to review the hazard mitigation process; review the profiled hazards for the 2015 HMP Update; discuss the NFIP worksheet; review the 2015 Goals, Objectives, and Actions; and begin the selection of each municipality's Actions.

The meeting started with a discussion of the basic outline of the Hazard Mitigation Plan, as well as the requirements for participations by each municipality: *One Meeting*, *One Form*, and *One Action*. The results from the Hazard Risk Evaluation were presented, revealing the 20 hazards to be profiled in the 2015 HMP Update. A discussion of each of the hazards was conducted to collect information from municipalities as to which hazard(s) had a major impact on their community. This was done through a facilitated exercise asking participants to document as many impacts made by each hazard as possible, each impact written on a separate slip of paper. The goal was to brainstorm the specific risks and impacts each municipality might experience. Participants were broken into groups to profile each hazard and its impacts with a tally of slips for each impact. Each group briefed the results and provided an understanding of what and why the major impacts tallied for each hazard were. Participants were also able to share past occurrences during the discussion to gain an understanding of what hazards were more severe in different municipalities.

Overall, the majority of the discussions focused on the hazards that were high-ranked: Flood, Flash Flood, and Ice Jam; Winter Storm; Environmental Hazards; Tornado and Wind Storm; and Transportation Accidents.

The NFIP worksheet, distributed during the Flood, Flash Flood, and Ice Jam discussion, was pre-populated with community specific information from FEMA's Community Information System (CIS) database. Fields that were not pre-populated were to be completed by each municipality. Municipalities were asked to return the forms no later than mid-May, and 43 communities returned the completed form.

The Mitigation Strategy was the last element to review and discuss with participants. What constitutes Goals, Objectives, and Actions were first went over with participants. After this, the Goals selected with the HMPSC for the 2015 HMP Update were briefed, as well as prominent Objectives. When discussing Actions, the appropriate mitigation techniques were reviewed. Mitigation Strategy Evaluations were distributed to all municipality representatives. Pre-populated Mitigation Strategy Evaluations were given to municipalities who had records of selected actions from the 2010 HMP Update. They were asked to decide whether to continue, cancel, or defer each action, as well as report on any progress. All other

communities were presented with existing municipality Actions. Municipalities could also create new Actions that were not in the current Strategy. Similarly to the NFIP worksheet, participants were able to return the forms no later than mid-May. This allowed an opportunity for participants to discuss their needs and Goals with the rest of the municipality staff. A total of 66 communities returned either the mitigation strategy form or submitted a new mitigation action form.

Eighty-three (83) of Allegheny County's 128 municipalities were represented at the workshop. Seven stakeholder organizations representing Duquesne University; Beaver County EMA; Southwestern PA Planning Commission; Allegheny County EMS; Allegheny County COGs; Allegheny County Conservation District; and the Allegheny County Housing Authority attended the workshop.

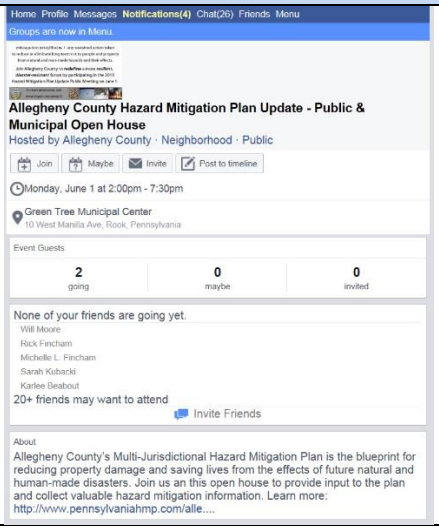
June 2015: In-Person Meeting and Teleconferences were held to accommodate schedules for those municipalities unable to attend the Hazard Mitigation Planning Workshops and Meetings. Consultant POC Christine Caggiano and Madeleine Fincham held teleconferences throughout the month of June with 11 municipalities. Christine facilitated an in-person meeting with Fawn Township.

For these municipalities unable to attend the Workshops, the purpose of the teleconference was to discuss information presented throughout the planning process; complete the Capability Assessment Survey and/or NFIP worksheet; review and comment on the Goals, Objectives, and Actions using the 5-Year Mitigation Strategy Evaluation Form; as well as to discuss and develop new mitigation actions.

An in-person meeting was held with Fawn Township on June 4th, and teleconferences were conducted the mornings of June 8th and 10th and the afternoons of June 10th and 11th.

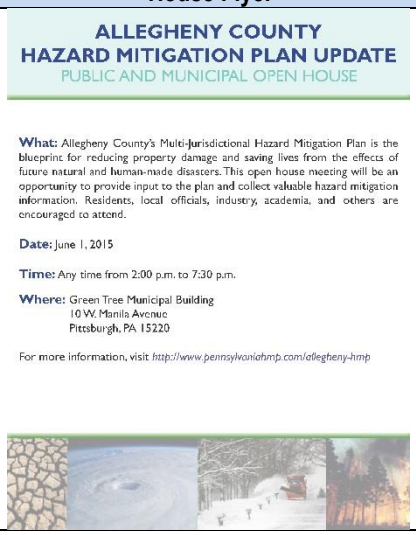
June 1, 2015: A Draft Plan Review Public and Municipal Open House was held to review the draft Plan at the Green Tree Municipal Building from 2:00 PM to 7:30 PM. In addition to the public, municipalities and other stakeholders were invited to attend. This meeting was advertised via Allegheny County's Facebook and Twitter as seen in Figure 3.3-1. Flyers (Figure 3.3-2) were also attached to e-mails for municipalities to distribute and post.

Figure 3.3-1 Draft Plan Open House Facebook Announcement



The open house allowed attendees to come and go as they pleased, ask questions, and participate in activity stations. A presentation played throughout the workshop including a review of the HMP process; 2015 hazards and risk assessment; outreach information; and the Mitigation Strategy. A participation table was available for municipalities to meet with the consultant planners to ensure their participation requirements had been met. Three activity stations were also available to attendees. The first station showcased Risk Assessment mapping, found within the draft HMP, of high-ranked hazards. Attendees were able to get an understanding of their community's vulnerability and location, as well as the rest of the County. Another station allowed attendees to mark problem areas in terms of hazards on a giant map

Figure 3.3-2 Draft Plan Open House Flyer



ALLEGHENY COUNTY
HAZARD MITIGATION PLAN UPDATE
PUBLIC AND MUNICIPAL OPEN HOUSE

What: Allegheny County's Multi-Jurisdictional Hazard Mitigation Plan is the blueprint for reducing property damage and saving lives from the effects of future natural and human-made disasters. This open house meeting will be an opportunity to provide input to the plan and collect valuable hazard mitigation information. Residents, local officials, industry, academia, and others are encouraged to attend.

Date: June 1, 2015

Time: Any time from 2:00 p.m. to 7:30 p.m.

Where: Green Tree Municipal Building
10 W. Manila Avenue
Pittsburgh, PA 15220

For more information, visit *http://www.pennsylvaniahmp.com/allegheny-hmp*

of the County. Attendees used numbers to mark vulnerable areas on the map with a description corresponding to that number on a piece of paper. The last station was available for attendees to rank hazards based on their likelihood versus impact. Hazards were written on post-it notes and placed along a graphed line comparing their likelihood versus impact.

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 22, 2015 until July 22, 2015 at http://www.pennsylvaniahmp.com/allegheny-hmp. Comments and information received from the Draft Plan Open House were incorporated into the Draft HMP Update before posting to the project website.

Twenty (20) people attended the open house, mostly consisting of municipalities.

June 2, 2015: A Draft Plan Municipal Meeting was held at the Allegheny County Emergency Services Center with local municipalities on June 2, 2015 from 10:00 AM to 12:00 PM. This meeting was more formal than the open house that had occurred the previous day. The workshop provided an opportunity for participants to review the hazard mitigation process; review the profiled hazards for the 2015 HMP Update; review the 2015 Goals, Objectives, and Actions; fulfill participation requirements; and receive a final update on the upcoming schedule.

Each of the sections within the draft HMP were briefed to the municipalities, as well as the high-ranked hazards profiled. A summary of the resources common among the municipalities was provided based on the Capability Assessment Surveys. Specific actions that were continued from the 2010 HMP or created for the 2015 HMP Update were shared with municipalities. From this, mitigation success stories were shared with the municipalities such as the Etna Borough Municipal Building floodproofing, Shaler Township and Hampton Township acquisitions, three CRS Communities, the 2014 floodplain map and ordinance update, and numerous education and outreach programs.

The upcoming submittal schedule was shared with municipalities. This included a Public Comment Period from June 22, 2015 to July 22, 2015, Delivery to PEMA/FEMA around July 23, 2015, and Distribution to Municipalities for Adoption in September 2015.

Thirty-two (32) people attended the Draft Plan Municipal Meeting, including Darlene Bracken from PEMA.

3.4 Public and Other Stakeholder Participation

The HMPSC identified at the January 27 Steering Committee Kick-Off Meeting, stakeholders to engage in order to obtain comprehensive input about hazards impacting, or with the potential to impact, Allegheny County. The following table lists stakeholders who participated in meetings and/or provided data to assist in the HMP Update. A list of stakeholders identified and invited to the HMP Update process can be found in Appendix C.

Table 3.4-1 Allegheny County HMP Update Stakeholders	
Allegheny County Emergency Management Services (EMS)	Department of Public Works
Allegheny County Economic Development Planning Division	Beaver County Emergency Management Agency (EMA)
Allegheny County Council of Governments (COGs)	Pennsylvania Emergency Management Agency (PEMA)
Southwestern Pennsylvania Planning Commission (SPC)	US Army Corps of Engineers
Allegheny County Housing Authority	University of Pittsburgh's Center for Disaster Management
Allegheny County Conservation District	Duquesne University
Allegheny County Forester	

The stakeholders represent a diverse mix of higher education; local governments; adjacent county emergency management agencies; and county, state, and federal agencies operating programs in Allegheny County.

Stakeholders were invited to the workshops held February 24 – 25, 2015, as well as April 14 – 15, 2015. They were also encouraged to attend the Draft Plan Review Public and Municipal Open House on June 1, 2015. As part of the workshops, stakeholders were asked to complete a Hazard Risk Evaluation Form (Hazards in Your Community) which listed hazards to be profiled for the 2015 HMP Update. Stakeholders were asked to rank each hazard from the perspective of their organization. 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 Worksheet were reviewed as part of the preparation of the 2015 Risk Factor ranking.

A few stakeholders did not attend meetings but were contacted for their knowledge in completing portions of the HMP Update. For example, the US Army Corps of Engineers were contacted to discuss the lock-and-dam systems. The County Forester was contacted to discuss wildfires, and the Department of Public Works was contacted for landslide information.

Figure 3.4-1 Legal Note Published in Pittsburgh Post-Gazette and the Time-Tribune

PUBLIC NOTICE

Allegheny County is starting the in the process of updating its All-Hazard Mitigation Plan. The Plan is a blueprint for reducing property damage and saving lives from the effects of future natural and human-made disasters in Allegheny County. Interested persons may visit www.pennsylvaniahmp.com/allegheny-hmp throughout the planning process to sign-up for alerts and view draft documents and meeting dates. A series of kick-off meetings for the project are being held on February 24th at 10 AM, 1 PM, and 7 PM and February 25th at 10 AM and 1 PM. Please RSVP using the website and plan to participate in the planning process between now and June 15, 2015!

6035314(2-22-15)

Rather than invite the public to participate in the planning process at the end of the plan for the draft plan open houses, the planning process was announced in the two major papers in the County at the beginning of the planning process. Matching legal notices were published in the Pittsburgh Post-Gazette and the Times-Tribune on February 22, 2015 as shown in Figure 3.4-1.

As noted above, all stakeholders were e-mailed a link to the project website: http://www.pennsylvaniahmp.com/allegheny-hmp. The website included general resources pertaining to hazard mitigation planning and posting of upcoming events and project announcements. In addition, HMP Workshop materials were posted on the website including: the agenda, minutes, PowerPoint presentation, a fillable PDF of the Hazard Risk Evaluation form, and a fillable PDF of the New Mitigation Action Form. The Draft HMP Update was also posted to the project website for comment. None were received. As of August 18, 2015, the project website had 404 hits.

Figure 3.4-2 Allegheny HMP Website

Pennsylvania Hazard Mitigation Planning

Search this site

Home About Planning Tools County HMPs University HMPs Contact Us

Allegheny County HMP

Welcome to the online home of the Allegheny County Hazard Mitigation Plan Update. We're happy you stopped by!
If your community has not yet participated in the plan, it is not too late! Contact the consultant planner Christine Caggiano at ccaggiano (at) mbakerintl.com to get signed on to the plan and be eligible for hazard mitigation assistance funding.

Recent Announcements

Final Meeting Materials Now Online The meeting materials from the June 1 public meeting and the June 2 municipal final meeting are now available in the Allegheny Library. The draft plan will be posted on June 22 for 30 days of public comment. If your municipality has not yet participated, please get in touch with the consultant planners Christine (ccaggiano(at)mbakerintl.com) or Madeleine (Madeleine.Fincham(at)mbakerintl.com).
Posted Jun 9, 2015, 3:08 PM by Taryn Murray

Final Public Meeting and Municipal Workshop: June 1 & 2 Please join us to discuss the draft 2015 Allegheny County Hazard Mitigation Plan Update on June 1 and 2, 2015.The first meeting will be open house style on Monday, June 1st from 2 pm – 7:30 pm at the Green Tree municipal building (10 W. Manila Avenue, Pittsburgh PA, 15220). Come to the meeting and stay as long as you like! This meeting will be open to all: members of the public, municipal leaders, and other stakeholders.The second meeting opportunity is intended for municipal representatives only and will be held from 10 am – 11 am on Tuesday, June 2nd at the Allegheny County Department of Emergency Services Building, (400 North Lexington Street, Pittsburgh, PA).
Posted May 13, 2015, 1:53 PM by Taryn Murray

RSVP For the Risk Assessment/Mitigation Solutions Workshops in April The online RSVP form for the April 14 and 15 meetings and office hours is now online at Allegheny RSVPs. Please let us know which meeting you are attending. As a reminder, each municipality in Allegheny County must attend **at least one meeting**, complete **at least one form**, and have **at least one mitigation action** to be allowed to adopt the plan and be eligible for certain kinds of FEMA funding. If you missed the first

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

3.5 Multi-Jurisdictional Planning

This HMP update was developed using a multi-jurisdictional approach. With funding support form PEMA, the County had resources such as technical expertise and data, which local jurisdictions lacked, but involvement from local municipalities has been critical to the collection of local knowledge relating to hazard events and mitigation activities. Local municipalities also have the legal authority to enforce compliance with land use planning and development issues. The County undertook an intensive effort to involve all jurisdictions in the planning process. In the end, 126 out of 128 municipalities participated.

Each municipality was part of the Planning Team, crucial in the development of the 2015 HMP Update, and were invited to participate in several meetings held at the Allegheny County Emergency Services Center. Dates of sent invitations, follow-up e-mails, and calls can be found in Appendix C – Meeting and Other Participation Documentation.

Table 3.1-1 documents jurisdictional presence at the meetings described in Section 3.3 and other involvement from each jurisdiction throughout the planning process. Each municipality was emailed invitations to all meetings and received email reminders prior to each session. Efforts were made by each member of the steering committee to engage the two non-participating communities. Members of the HMPSC sent e-mails and letters and called and left messages, and the Councils of Government also encouraged their respective communities to participate. Multi-jurisdictional participation is summarized in Table 3.5-1.

Table 3.5-1 Allegheny County HMP Update Stakeholders

MUNICIPALITY	ATTENDANCE				FORMS			
	KICK-OFF MEETING	RAMS MEETING	TELECONFERENCE / IN-PERSON MEETING	OPEN HOUSE/ PUBLIC MEETING	CAPABILITY ASSESSMENT SURVEY	HAZARD EVALUATION	NFIP FORM	MITIGATION STRATEGY REVIEW OR NEW ACTION
Aleppo Township				X		X	X	X
Aspinwall Borough		X					X	X
Avalon Borough			X			X	X	X
Baldwin Borough		X						
Baldwin Township			X			X		X
Bell Acres Borough			X		X	X		
Bellevue Borough	X	X				X		
Ben Avon Borough		X			X		X	X
Ben Avon Heights Borough		X		X	X	X		
Bethel Park Borough		X			X	X	X	X
Blawnox Borough		X						X
Brackenridge Borough				X				
Braddock Borough	X	X			X	X		
Braddock Hills Borough		X						
Bradford Woods Borough	X	X			X	X		X
Brentwood Borough		X						X
Bridgeville Borough	X	X		X	X	X	X	X
Carnegie Borough		X		X				
Castle Shannon Borough		X		X	X	X		X
Chalfant Borough	X	X			X	X		
Cheswick Borough	X	X			X	X		
Churchill Borough	X	X			X	X		
Clairton, City of		X						
Collier Township		X			X	X		X
Coraopolis Borough		X						X
Crafton Borough	X	X			X	X		
Crescent Township		X				X	X	
Dormont Borough	X					X		
Dravosburg Borough				X				

Table 3.5-1 Allegheny County HMP Update Stakeholders

MUNICIPALITY	ATTENDANCE				FORMS			
	KICK-OFF MEETING	RAMS MEETING	TELECONFERENCE / IN-PERSON MEETING	OPEN HOUSE/ PUBLIC MEETING	CAPABILITY ASSESSMENT SURVEY	HAZARD EVALUATION	NFIP FORM	MITIGATION STRATEGY REVIEW OR NEW ACTION
Duquesne, City of				X		X	X	X
East Deer Township				X				X
East McKeesport Borough		X		X	X	X	X	X
East Pittsburgh Borough								
Edgewood Borough				X	X			X
Edgeworth Borough	X	X			X	X	X	
Elizabeth Borough		X						X
Elizabeth Township		X			X	X		
Emsworth Borough		X				X	X	
Etna Borough	X	X		X	X	X		X
Fawn Township			X			X	X	X
Findlay Township	X	X		X	X	X		X
Forest Hills Borough	X	X		X	X	X		X
Forward Township								
Fox Chapel Borough	X	X		X	X	X	X	X
Franklin Park Borough		X		X	X	X	X	X
Frazer Township		X			X	X		X
Glassport Borough	X	X			X	X		
Glenfield Borough			X		X			
Glen Osborne Borough				X	X			X
Green Tree Borough				X				
Hampton Township		X			X	X		X
Harmar Township	X	X			X	X		
Harrison Township		X		X	X	X	X	X
Haysville Township			X					
Heidelberg Borough			X					
Homestead Borough	X					X		
Indiana Borough	X					X		
Ingram Borough				X				

Table 3.5-1 Allegheny County HMP Update Stakeholders

MUNICIPALITY	ATTENDANCE				FORMS			
	KICK-OFF MEETING	RAMS MEETING	TELECONFERENCE / IN-PERSON MEETING	OPEN HOUSE/ PUBLIC MEETING	CAPABILITY ASSESSMENT SURVEY	HAZARD EVALUATION	NFIP FORM	MITIGATION STRATEGY REVIEW OR NEW ACTION
Jefferson Hills Borough	X	X		X	X	X		
Kennedy Township				X			X	X
Kilbuck Township		X				X	X	X
Leet Township				X			X	X
Leetsdale Borough		X						
Liberty Borough		X		X			X	X
Lincoln Borough	X	X				X		
Marshall Township			X				X	X
McCandless, Town of		X				X	X	
McDonald Borough	*Washington County HMP Update*							
McKees Rocks Borough	X	X		X		X		X
McKeesport, City of		X					X	X
Millvale Borough	X	X			X	X		
Monroeville, Municipality of	X					X		
Moon Township	X	X			X	X		
Mount Lebanon, Municipality of	X	X				X	X	X
Mount Oliver Borough	X	X		X	X	X		X
Munhall Borough	X	X		X	X	X		X
Neville Township	X	X		X	X	X		
North Braddock Borough	X				X	X		
North Fayette Township	X	X		X	X	X		X
North Versailles		X		X	X		X	X
O'Hara Township		X					X	X
Oakdale Borough	X	X			X	X	X	X
Oakmont Borough			X		X	X	X	X
Ohio Township	X					X		
Penn Hills, Municipality of	X	X		X	X	X	X	X
Pennsbury Village Borough			X					X

Table 3.5-1 Allegheny County HMP Update Stakeholders

MUNICIPALITY	ATTENDANCE				FORMS			
	KICK-OFF MEETING	RAMS MEETING	TELECONFERENCE / IN-PERSON MEETING	OPEN HOUSE/ PUBLIC MEETING	CAPABILITY ASSESSMENT SURVEY	HAZARD EVALUATION	NFIP FORM	MITIGATION STRATEGY REVIEW OR NEW ACTION
Pine Township	X	X			X	X		X
Pitcairn Borough		X		X	X		X	X
Pittsburgh, City of	X		X			X		
Pleasant Hills Borough	X				X	X		
Plum Borough		X						
Port Vue Borough		X			X			X
Rankin Borough				X			X	X
Reserve Township		X		X	X	X	X	
Richland Township		X			X	X	X	X
Robinson Township		X				X		
Ross Township	X	X			X	X	X	X
Rosslyn Farms Borough			X					
Scott Township				X				
Sewickley Borough		X			X	X		
Sewickley Heights Borough		X			X	X		
Sewickley Hills Borough			X					
Shaler Township	X					X		
Sharpsburg Borough		X			X	X	X	X
South Fayette Township		X		X			X	X
South Park Township	X	X			X	X		X
South Versailles Township				X	X		X	X
Springdale Borough	X	X			X	X	X	X
Springdale Township			X					
Stowe Township	X	X		X	X	X		
Swissvale Township				X	X	X		
Tarentum Borough	X	X			X	X		
Thornburg Borough	X	X			X	X		
Trafford Borough	*Westmoreland County HMP Update*							
Turtle Creek Borough	X	X			X	X		X

Table 3.5-1 Allegheny County HMP Update Stakeholders

MUNICIPALITY	ATTENDANCE				FORMS			
	KICK-OFF MEETING	RAMS MEETING	TELECONFERENCE / IN-PERSON MEETING	OPEN HOUSE/ PUBLIC MEETING	CAPABILITY ASSESSMENT SURVEY	HAZARD EVALUATION	NFIP FORM	MITIGATION STRATEGY REVIEW OR NEW ACTION
Upper St. Clair Township	X					X		
Verona Borough				X				
Versailles Borough	X	X				X	X	X
Wall Borough		X						X
West Deer Township		X			X	X	X	X
West Elizabeth Borough	X	X			X	X	X	X
West Homestead Borough		X						
West Mifflin Borough		X						X
West View Borough		X					X	X
Whitaker Borough				X		X		X
Whitehall Borough		X			X	X		
White Oak Borough		X			X	X	X	X
Wilkins Township		X			X	X		
Wilkinsburg Borough	X				X	X		
Wilmerding Borough		X		X	X	X	X	X

4 Risk Assessment

4.1 Update Process Summary

The risk assessment provides a factual basis for activities proposed by the County in their mitigation strategy. Hazards that may affect Allegheny County are identified and defined in terms of their location and extent, magnitude of impacts, previous events, and probability of future events. Wherever data could be validated, information from the previous plan has been incorporated and/or updated in the 2015 HMP. In addition, new data sources and analysis has been incorporated throughout the Risk Assessment.

The 2005 Allegheny County Hazard Mitigation Plan included a list of five natural and one human-made hazard affecting the County. In the 2011 HMP, the HMPT added eleven hazards: *earthquake; tornado and windstorms; hurricane, tropical storm, nor'easter; dam failure; nuclear incidents; pandemic; urban fire and explosion; transportation accidents; civil disturbance; and levee failure.* In addition, the 2011 HMP re-arranged hazard profiles to be compliant with the Commonwealth of Pennsylvania's Standard Operating Guide.

For the 2015 HMP, the HMPSC evaluated the County's development patterns, recent disaster events, and population and growth trends in the County vis-à-vis the Pennsylvania Standard List of Hazards and the 2013 Pennsylvania SSAHMP. The HMPSC evaluated changes in risk and decided to include three hazards not previously identified in the County but included in the Pennsylvania Standard State List of Hazards using the Evaluation of Identified Hazard and Risk Form. After this hazard identification and evaluation, the HMPSC added two new hazards to the HMP: Radon Exposure and Terrorism. In addition, the HMPSC decided to expand its definition of Dam Failure to also include failures of the lock and dam systems on the Allegheny, Monongahela, and Ohio Rivers as the 2013 SSAHMP does. Finally, the discussion of hazardous material releases in transit has been moved from the Environmental Hazards profile to Transportation Accidents. This change occurred because the US Department of Transportation is the overseeing agency for hazardous material releases in transit; in addition, comments from the HMPSC and municipalities indicated that Transportation Accidents were largely a concern when there were chemicals or crude oil involved.

Hazard profiles were then developed in order to define the characteristics of each hazard as they apply to Allegheny County. In addition, participating municipalities and stakeholders evaluated the impact of the profiled hazards on their jurisdiction using the Hazards in Your Community form (see Appendix C). These evaluations, together with discussion at community meetings and research and analysis, allow the HMP to evaluate where municipal risk may deviate from the overall countywide risk.

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

identifies structures, critical facilities, and/or populations that may be impacted during hazard events and describes what events can do to physical, social, and economic assets.

4.2 Hazard Identification

Pennsylvania's disaster history provides direction on the identification of hazards that may be of concern to Allegheny County and other parts of the commonwealth. An analysis of past declared disasters is the first step toward predicting the future susceptibility to that hazard. This section outlines the past disaster declarations as well as defines the hazards being profiled in the 2015 HMP.

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 2015, these thresholds are $3.56 per capita for counties and $1.41 per capita for the state. With a population of over 1.2 million, the Allegheny County threshold is over $4 million. State and county thresholds must be simultaneously attained for a Presidential Disaster Declaration to be issued.

Table 4.2-1 displays the Presidential Disaster and Emergency Declarations for Allegheny County from most to least recent.

Table 4.2-1 Presidential Disaster and Emergency Declarations Affecting Allegheny County.

DECLARATION NUMBER	DATE	EVENT
4149	October 2013	Severe Storms, Tornadoes, and Flooding
3356*	October 2012	Hurricane Sandy Response and Recovery
1898	April 2010	Severe Winter Storms and Snowstorms
3235*	September 2005	Hurricane Katrina Evacuation
1557	September 2004	Tropical Depression Ivan
1555	September 2004	Severe Storms and Flooding Associated with Tropical Depression Frances
1219	June 1998	Flooding, Severe Storms, and Tornadoes
1093	January 1996	Flooding
1085	January 1996	Blizzard
1015	March 1994	Winter Storm, Severe Storm
3105*	March 1993	Severe Snowfall and Winter Storm
766	June 1986	Severe Storms, Flooding
754	November 1985	Severe Storms, Flooding
721	August 1984	Severe Storms, Flooding

Table 4.2-1 Presidential Disaster and Emergency Declarations Affecting Allegheny County.		
DECLARATION NUMBER	DATE	EVENT
3081*	June 1980	Severe Storms and Tornadoes
340	June 1972	Tropical Storm Agnes
**Presidential Emergency Declaration*		

4.2.2 Summary of Hazards

The HMPT was provided the Pennsylvania Standard List of Hazards to be considered for evaluation in the 2015 HMP. Following a review of the hazards considered in the 2011 HMP and the Standard List of Hazards, the Steering Committee along with input from the municipalities decided that the 2015 plan should identify, profile, and analyze twenty hazards. These twenty hazards include all hazards profiled in the 2011 plan and the addition of ***radon exposure, terrorism, and utility interruption*** as hazards of concern.

Table 4.2-2 contains a complete list of the nineteen hazards that have the potential to impact Allegheny County as identified through previous risk assessments, the County Hazards Vulnerability Analysis, and input from those that participated in the 2015 HMP update. Hazard profiles are included in Section 4.3 for each of these hazards.

Table 4.2-2 List of Hazards Profiled in the Allegheny County HMP Update with Associated Descriptions.	
PROFILED HAZARDS	**DESCRIPTION**
NATURAL	
Drought	Drought is a natural climatic condition which occurs in virtually all climates, the consequence of a natural reduction in the amount of precipitation experienced over a long period of time, usually a season or more in length. High temperatures, prolonged winds, and low relative humidity can exacerbate the severity of drought. This hazard is of particular concern in Pennsylvania due to the presence of farms as well as water-dependent industries and recreation areas across the Commonwealth. A prolonged drought could severely impact these sectors of the local economy, as well as residents who depend on wells for drinking water and other personal uses. (National Drought Mitigation Center, 2006).
Earthquake	An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking which is dependent upon amplitude and duration of the earthquake. (FEMA, 1997).

Table 4.2-2 List of Hazards Profiled in the Allegheny County HMP Update with Associated Descriptions.	
PROFILED HAZARDS	**DESCRIPTION**
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 and are any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise (in the Northern Hemisphere) and whose diameter averages 10-30 miles across. While most of Pennsylvania is not directly affected by the devastating impacts cyclonic systems can have on coastal regions, many areas in the state are subject to the primary damaging forces associated with these storms including high-level sustained winds, heavy precipitation, and tornadoes. Areas in southeastern Pennsylvania could be susceptible to storm surge and tidal flooding. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season (June through November). (FEMA, 1997).
Landslide	A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation reacting to the force of gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, and changes in groundwater levels. Mudflows, mudslides, rock falls, rockslides, and rock topples are all forms of 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).
Radon	Radon is a cancer-causing natural radioactive gas that you can't 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).
Pandemic and Infectious Disease	A pandemic occurs when infection from of a new strain of a certain disease, to which most humans have no immunity, substantially exceeds the number of expected cases over a given period of time. Such a disease may or may not be transferable between humans and animals. (Martin & Martin-Granel, 2006).

Table 4.2-2 List of Hazards Profiled in the Allegheny County HMP Update with Associated Descriptions.	
PROFILED HAZARDS	**DESCRIPTION**
Subsidence, Sinkhole	Subsidence is a 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. Subsidence can also occur in areas that have been extensively mined (usually coal pillar mining in Pennsylvania). While there is some limestone bedrock in Allegheny County, it is not prone to dissolution. As a result, this profile focuses on **mine subsidence**. Collapses can take place slowly over time or quickly in a single event.
Tornado, Wind Storm	A wind storm can occur during severe thunderstorms, winter storms, coastal storms, or tornadoes. Straight-line winds such as a downburst have the potential to cause wind gusts that exceed 100 miles per hour. Based on 40 years of tornado history and over 100 years of hurricane history, FEMA identifies western and central Pennsylvania as being more susceptible to higher winds than eastern Pennsylvania. (FEMA, 1997). A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes or tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and wind-blown debris. According to the National Weather Service, tornado wind speeds can range between 30 to more than 300 miles per hour. They are more likely to occur during the spring and early summer months of March through June and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small, short-lived tornadoes can inflict tremendous damage. Destruction ranges from minor to catastrophic depending on the intensity, size, and duration of the storm. Structures made of light materials such as mobile homes are most susceptible to damage. Waterspouts are weak tornadoes that form over warm water and are relatively uncommon in Pennsylvania. Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries (NOAA, 2002). Based on NOAA Storm Prediction Center Statistics, the number of recorded F3, F4, & F5 tornadoes between 1950-1998 ranges from <1 to 15 per 3,700 square mile area across Pennsylvania (FEMA, 2009). A water spout is a tornado over a body of water (American Meteorological Society, 2009).
Wildfire	A wildfire is a raging, uncontrolled fire that spreads rapidly through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that can be seen for miles. Wildfires can occur at any time of the year, but mostly occur during long, dry hot spells. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in fields, grass, brush, and forests. 98% of wildfires in Pennsylvania are a direct result of people, often caused by debris burns (PA DCNR, 1999).

Table 4.2-2 List of Hazards Profiled in the Allegheny County HMP Update with Associated Descriptions.	
PROFILED HAZARDS	**DESCRIPTION**
Winter Storm	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. A winter storm can range from a moderate snowfall or ice event over a period of a few hours to blizzard conditions with wind-driven snow that lasts for several days. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow, which can severely impair visibility and disrupt transportation. The Commonwealth of Pennsylvania has a long history of severe winter weather. (NOAA, 2009).
HUMAN-MADE	
Civil Disturbance	Civil disturbance hazards encompass a set of hazards emanating from a wide range of possible events that cause civil disorder, confusion, strife, and economic hardship. Civil disturbance hazards include the following: **Famine**; involving a widespread scarcity of food leading to malnutrition and increased mortality (Robson, 1981). **Economic Collapse, Recession**; Very slow or negative growth, for example (Economist, 2009). **Misinformation**; erroneous information spread unintentionally (Makkai, 1970). **Civil Disturbance, Public Unrest, Mass Hysteria, Riot**; group acts of violence against property and individuals, for example (18 U.S.C. § 232, 2008). **Strike, Labor Dispute**; controversies related to the terms and conditions of employment, for example (29 U.S.C. § 113, 2008).
Dam and Lock 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). Lock and Dam systems are navigational systems built on shallow rivers to form navigational pools and enable riverine navigation. Lock and Dam systems are prevalent in Western Pennsylvania on the Allegheny, Monongahela, and Ohio Rivers. Their failures are also rare, but the damage expected is akin to a 1%-annual-chance flood, not a high-velocity flood event.

Table 4.2-2 List of Hazards Profiled in the Allegheny County HMP Update with Associated Descriptions.	
PROFILED HAZARDS	**DESCRIPTION**
Environmental Hazards	Environmental hazards are hazards that pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. Environmental hazards include the following: **Hazardous material releases**: at fixed facilities including toxic chemicals, infectious substances, biohazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive (PL 1990-165, § 207(e)). **Coal Mining Incidents:** including the release of the release of harmful chemical and waste materials into water bodies or the atmosphere, explosions, fires, and other hazards and threats to life safety stemming from mining (Environmental Protection Agency, Natural Disaster PSAs, 2009). **Oil and gas well incidents:** including the release of the release of harmful chemical and waste materials into water bodies or the atmosphere, explosions, fires, and other hazards and threats to life safety stemming from oil and gas extraction(Environmental Protection Agency, Natural Disaster PSAs, 2009).
Levee Failure	A levee is a human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding (Interagency Levee Policy Review Committee, 2006). Levee failures or breaches occur when a levee fails to contain the floodwaters for which it is designed to control or floodwaters exceed the height of the constructed levee. 51 of Pennsylvania's 67 counties have been identified as having at least one levee (FEMA Region III, 2009).
Nuclear Incident	Nuclear incidents generally refer to events involving the release of significant levels of radioactivity or exposure of workers or the general public to radiation (FEMA, 1997). Nuclear accidents/incidents can be placed into three categories: 1) Criticality accidents which involve loss of control of nuclear assemblies or power reactors, 2) Loss-of-coolant accidents which result whenever a reactor coolant system experiences a break or opening large enough so that the coolant inventory in the system cannot be maintained by the normally operating make-up system, and 3) Loss-of-containment accidents which involve the release of radioactivity. The primary concern following such an incident or accident is the extent of radiation, inhalation, and ingestion of radioactive isotopes which can cause acute health effects (e.g. death, burns, severe impairment), chronic health effects (e.g. cancer), and psychological effects. (FEMA, 1997).
Terrorism	Terrorism is use of force or violence against persons or property with the intent to intimidate or coerce. Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear and radiological weapons. (FEMA, 2009).
Transportation Accident	Transportation accidents can result from any form of air, rail, water, or road travel. It is unlikely that small accidents would significantly impact the larger community. However, certain accidents could have secondary regional impacts such as a hazardous material release or disruption in critical supply/access routes, especially if vital transportation corridors or junctions are present (Research and Innovative Technology Administration, 2009). Because the USDOT is charged with the control of **hazardous materials incidents in-transit**, this hazard is covered under transportation accidents rather than environmental hazards. 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.

Table 4.2-2 List of Hazards Profiled in the Allegheny County HMP Update with Associated Descriptions.	
PROFILED HAZARDS	**DESCRIPTION**
Urban Fire and Explosion	An urban fire involves a structure or property within an urban or developed area. For hazard mitigation purposes, major urban fires involving large buildings and/or multiple properties are of primary concern. The effects of a major urban fire include minor to significant property damage, loss of life, and residential or business displacement. Explosions are extremely rapid releases of energy that usually generate high temperatures and often lead to fires. The risk of severe explosions can be reduced through careful management of flammable and explosive hazardous materials. (FEMA, 1997).
Utility Interruption	Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works, and information network sectors. Utility interruption hazards include the following: • Geomagnetic Storms; including temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation, and satellite systems (National Research Council et al., 1986). • Fuel or Resource Shortage; resulting from supply chain breaks or secondary to other hazard events, for example (Mercer County, PA, 2005). • 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, deep-water 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

NATURAL HAZARDS

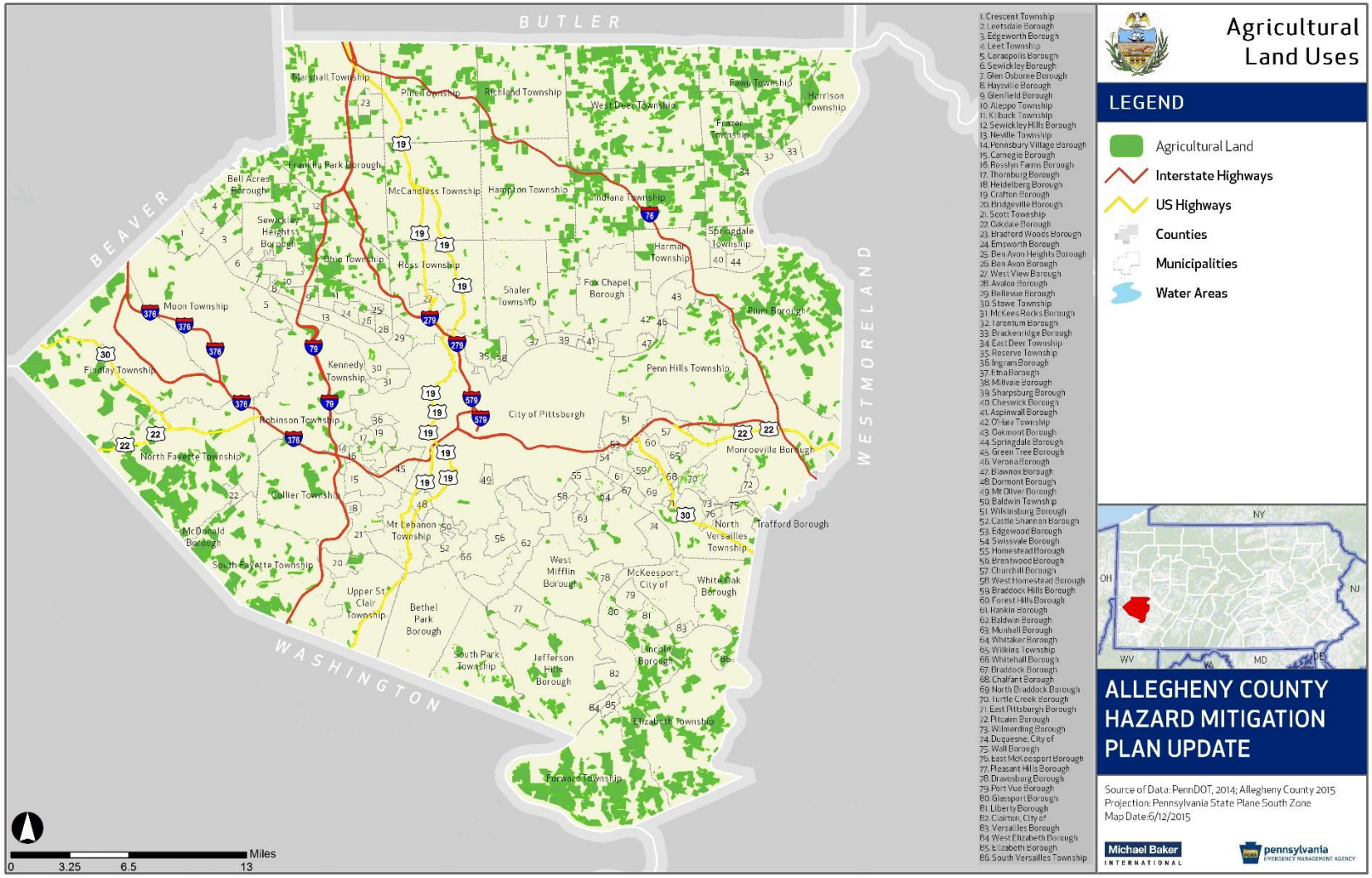
4.3.1 Drought

4.3.1.1 Location and Extent

Droughts are a normal part of the climate in the Mid-Atlantic; they are a consequence of a natural reduction in the amount of precipitation experienced over a long period of time. High temperatures, prolonged winds, and low relative humidity can exacerbate the severity of a drought.

Droughts are regional climatic events, so when these events occur in Allegheny County, impacts are felt across the County as well as in areas outside the County boundaries. The spatial extent for areas of impact can range from localized areas in Pennsylvania to the entire Mid-Atlantic region. Areas with extensive agricultural (farmland) land uses are most vulnerable to drought. Less than one-half of one percent of Allegheny County's parcels have a use code of Agricultural. As shown in Figure 4.3.1-1, these uses are scattered near the edges of the County and the north side of the Ohio River. Additionally, areas that heavily forested can also be negatively impacted by drought.

Figure 4.3.1-1 Agricultural Land Uses in Allegheny County



4.3.1.2 Range of Magnitude

Droughts can have varying effects, depending on what month they occur in, the severity, duration, and location of the event. Even short-term droughts can be devastating, especially in conjunction with extreme temperatures.

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

The Commonwealth uses five parameters to assess drought conditions:

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

Table 4.3.1-1 Palmer Drought Severity Index (PSDI) Classifications (NDMC, 2009)

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

In Pennsylvania, PEMA has primary responsibility for managing droughts with direct support from the Department of Environmental Protection (DEP). According to *Drought Management in Pennsylvania* (2102), PEMA and DEP use the following three stages to describe and manage droughts. They are listed in order of increasing severity:

- Drought Watch: A period to alert government agencies, public water suppliers, water users and the public regarding the potential for future drought-related problems. 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, communities may opt to ask for local water rationing:

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

The worst historical drought event for Allegheny County occurred in the summer of 1930, when no rain fell from June 15 through the end of October. According to USGS, during this drought, precipitation was 68% of the mean in Pennsylvania while there were 20 days with a high temperature of over 100 degrees and a maximum temperature of 108. Crop yields were only 88% of the normal yield (USGS, 1930). In Allegheny County, many park construction projects were delayed, and golf courses were closed due to

water shortages. In addition, records from the Carnegie Library in Pittsburgh state that Pine Creek ran dry in North Park that year (Gangewere, 1986).

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
- 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
- Loss of water for navigation and recreation
- Increase in nitrate levels which can have health impacts on pregnant women and children.

4.3.1.3 Past Occurrence

Between 1930 and 1994, the Commonwealth of Pennsylvania experienced five significant droughts: 1930-1934, 1939-1942, 1953-1955, 1961-1967, and 1991-1992. In addition, PA DEP maintains Pennsylvania's history of declared droughts back to 1980. This drought history is presented in Table 4.3.1-2 below. While there have been significant droughts since 1980, DEP's records indicate that there has only been one drought emergency in Allegheny County since 1980, in the summer of 1999.

Table 4.3.1-2 Summary of Declared Drought Status from 1980 to 2015 for Allegheny County (PA DEP, 2015)

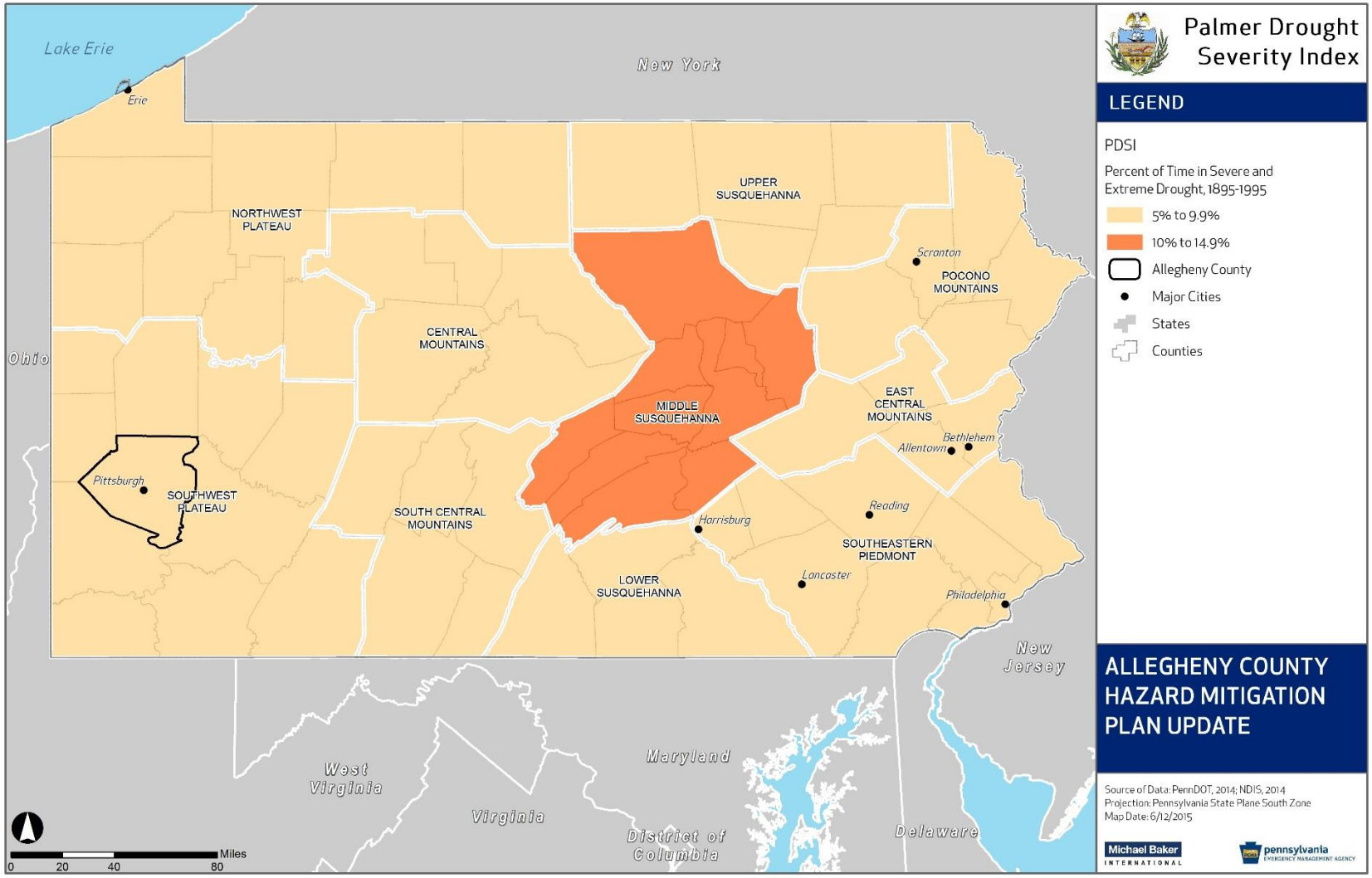
TIME PERIOD	DROUGHT STATUS	TIME PERIOD	DROUGHT STATUS
Jul 7, 1988 - Aug 24, 1988	Watch	Dec 16, 1998 - Jan 15, 1999	Warning
Aug 24, 1988 - Dec 12, 1988	Warning	Jan 15, 1999 - Mar 15, 1999	Warning
Mar 3, 1989 - May 15, 1989	Watch	Mar 15, 1999 - Jun 10, 1999	Watch
Jun 28, 1991 - Jul 24, 1991	Watch	Jun 10, 1999 - Jun 18, 1999	Watch
Jul 24, 1991 - Aug 16, 1991	Watch	Jun 18, 1999 - Jul 20, 1999	Warning
Aug 16, 1991 - Sep 13, 1991	Warning	Jul 20, 1999 - Sep 30,1999	Emergency
Sep 13, 1991 - Oct 21, 1991	Warning	Sep 30, 1999 - Dec 16, 1999	Warning
Oct 21, 1991 - Jan 16, 1992	Warning	Dec 16, 1999 - Feb 25,2000	Warning
Jan 17, 1992 - Apr 20, 1992	Warning	Feb 25, 2000 - May 5, 2000	Watch
Apr 20, 1992 - Jun 23, 1992	Warning	Sep 5, 2002 - Nov 7, 2002	Watch
Jun 23, 1992 - Sep 11, 1992	Watch	Apr 11, 2006 - Jun 30, 2006	Watch
Sep 1, 1995 - Sep 20, 1995	Watch	Aug 8, 2007 - Sep 5, 2007	Watch
Sep 20, 1995 - Nov 8, 1995	Watch	Nov 7, 2008 - Jan 26, 2009	Watch
Nov 8, 1995 - Dec 18, 1995	Watch	Sept 16, 2010 - Nov 10 2010	Warning

Table 4.3.1-2 Summary of Declared Drought Status from 1980 to 2015 for Allegheny County (PA DEP, 2015)			
TIME PERIOD	DROUGHT STATUS	TIME PERIOD	DROUGHT STATUS
Dec 3, 1998 - Dec 8, 1998	Watch	Nov 10, 2010 - Dec 17, 2010	Watch
Dec 8, 1998 - Dec 14, 1998	Watch	Aug 5, 2011 - Sept 2, 2011	Watch
Dec 14, 1998 - Dec 16, 1998	Warning	July 19, 2012 - Aug 31, 2012	Watch

4.3.1.4 Future Occurrence

It is difficult to forecast the severity and frequency of future drought events. Based on national data from 1895 to 1995, Allegheny County and the rest of Pennsylvania's Southwest Plateau is in severe or extreme drought approximately 5-9.9 percent of the time, shown in Figure 4.3.1-2. Therefore, the future occurrence of drought can be considered *possible* according to the Risk Factor Methodology (see Table 4.4-1).

Figure 4.3.1-2 Palmer Severity Drought Index for Allegheny County



4.3.1.5 Vulnerability Assessment

The most significant losses resulting from drought events are typically found in the agriculture sector of any County's economy. For example, the drought in 1999 resulted in a Gubernatorial Proclamation of Emergency in part because of significant crop damage. Preliminary damage estimates by the US Department of Agriculture indicated possible crop losses across Pennsylvania in excess of $500 million. This figure did not include a 20 percent decrease in dairy milk production statewide, which also resulted in million dollar losses (NCDC, 2009).

While these were statewide impacts, they illustrate the potential for droughts to severely impair the local economy in more agricultural communities. As of the 2012 Census of Agriculture, the US Department of Agriculture counted 428 farms in Allegheny County, a 20% decrease in farms over 2007. Nearly 35,000 acres of land are in farms, and average farm size is 81 acres. Statewide, Allegheny County ranks 58th out of the 67 counties in Pennsylvania for market value of agricultural products sold. In 2012, the total market value of agricultural products sold was $10,397,000. Over 84% of the total products come from crop sales. Allegheny County's strongest agricultural performance is in vegetables, melons, potatoes, and sweet potatoes as well as other animal products. According to the Agricultural Census, the county has a population of 4,124 layers (chickens), 2,435 cattle and calves, 1,365 horses and ponies, and 910 sheep and lambs.

Because agriculture is a small portion of Allegheny County's economy, it is important to recognize that the primary vulnerability in Allegheny County is a threat to the County's water supply. Allegheny County residents that use private domestic wells are more vulnerable to droughts because their drinking water can literally dry up, but public supplies may also be at risk.

Table 4.3.1-4 shows the number of domestic wells per municipality. It is important to note that the well data was obtained from the Pennsylvania Groundwater Information System (PaGWIS). **PaGWIS relies on <u>voluntary submissions</u> of well record data by well drillers; as a result, it is not a complete database of all domestic wells in the County.** This is the most complete dataset of domestic wells available.

Table 4.3.1-3 PaGWIS Domestic Water Wells Drilled Per Municipality (PA DEP, 2014)

MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WATER WELLS	MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WATER WELLS
Aleppo Township	0	McCandless, Town of	51
Aspinwall Borough	7	McDonald Borough	0
Avalon Borough	0	McKees Rocks Borough	1
Baldwin Borough	0	McKeesport, City of	17
Baldwin Township	4	Millvale Borough	8
Bell Acres Borough	26	Monroeville, Municipality of	9
Bellevue Borough	2	Moon Township	35
Ben Avon Borough	0	Mount Lebanon, Municipality of	1
Ben Avon Heights Borough	0	Mount Oliver Borough	2
Bethel Park, Municipality of	23	Munhall Borough	0

Table 4.3.1-3 PaGWIS Domestic Water Wells Drilled Per Municipality (PA DEP, 2014)			
MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WATER WELLS	MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WATER WELLS
Blawnox Borough	8	Neville Township	3
Brackenridge Borough	0	North Braddock Borough	0
Braddock Borough	0	North Fayette Township	52
Braddock Hills Borough	0	North Versailles Township	1
Bradford Woods Borough	2	Oakdale Borough	29
Brentwood Borough	0	Oakmont Borough	23
Bridgeville Borough	0	O'Hara Township	4
Carnegie Borough	3	Ohio Township	14
Castle Shannon Borough	9	Penn Hills, Municipality of	14
Chalfant Borough	0	Pennsbury Village Borough	0
Cheswick Borough	0	Pine Township	44
Churchill Borough	1	Pitcairn Borough	2
Clairton City	16	Pittsburgh, City of	165
Collier Township	1	Pleasant Hills Borough	0
Coraopolis Borough	4	Plum Borough	20
Crafton Borough	0	Port Vue Borough	0
Crescent Township	2	Rankin Borough	0
Dormont Borough	0	Reserve Township	1
Dravosburg Borough	0	Richland Township	97
Duquesne, City of	1	Robinson Township	17
East Deer Township	0	Ross Township	17
East McKeesport Borough	0	Rosslyn Farms Borough	2
East Pittsburgh Borough	0	Scott Township	8
Edgewood Borough	0	Sewickley Borough	18
Edgeworth Borough	1	Sewickley Heights	8
Elizabeth Borough	1	Sewickley Hills Borough	7
Elizabeth Township	3	Shaler Township	12
Emsworth Borough	1	Sharpsburg Borough	0
Etna Borough	0	South Fayette Township	18
Fawn Township	23	South Park Township	4
Findlay Township	46	South Versailles Township	2
Forest Hills Borough	0	Springdale Borough	1
Forward Township	7	Springdale Township	4
Fox Chapel Borough	4	Stowe Township	3
Franklin Park Borough	42	Swissvale Borough	14
Frazer Township	14	Tarentum Borough	2
Glassport Borough	12	Thornburg Borough	0

Table 4.3.1-3 PaGWIS Domestic Water Wells Drilled Per Municipality (PA DEP, 2014)			
MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WATER WELLS	MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WATER WELLS
Glen Osborne Borough	0	Trafford Borough	0
Glenfield Borough	0	Turtle Creek Borough	1
Green Tree Borough	0	Upper St. Clair Township	9
Hampton Township	28	Verona Borough	2
Harmar Township	1	Versailles Borough	2
Harrison Township	8	Wall Borough	0
Haysville Borough	0	West Deer Township	56
Heidelberg Borough	2	West Elizabeth Borough	3
Homestead Borough	3	West Homestead Borough	0
Indiana Township	15	West Mifflin Borough	89
Ingram Borough	3	West View Borough	2
Jefferson Hills Borough	21	Whitaker Borough	2
Kennedy Township	14	White Oak Borough	3
Kilbuck Township	4	Whitehall Borough	1
Leet Township	5	Wilkins Township	5
Leetsdale Borough	4	Wilkinsburg Borough	0
Liberty Borough	1	Wilmerding Borough	1
Lincoln Borough	0	Unknown	46
Marshall Township	49	**GRAND TOTAL**	**1373**

According to the Allegheny County Health Department, the oversight agency for public water supplies, there are 36 public water supplies in Allegheny County, and many systems are multi-municipal entities that share the service. As shown in Table 4.3.1-4, these supplies are a combination of surface water supplies, ground water supplies, and consecutive systems (systems interconnected with other suppliers).

Table 4.3.1-4 Community Public Water Suppliers and Municipalities Served (ACHD, 2007)			
NAME	TYPE OF SYSTEM	MUNICIPALITIES SERVED	POPULATION SERVED
Aleppo Township Authority	Consecutive System	Aleppo Township, Glenfield	1,362
Borough of Blawnox	Consecutive System	Blawnox Borough	1,700
Borough of Brackenridge	Surface Water Treatment Plant	Brackenridge Borough	3,784
The Water Authority of the Borough of Braddock	Consecutive System	Braddock Borough	4,280
Coraopolis Water & Sewer Authority	Groundwater Treatment Plant	Coraopolis Borough Moon Township (part)	6,750

Table 4.3.1-4 Community Public Water Suppliers and Municipalities Served (ACHD, 2007)			
NAME	TYPE OF SYSTEM	MUNICIPALITIES SERVED	POPULATION SERVED
City of Duquesne	Consecutive System	City of Duquesne West Mifflin Borough (part)	8,300
Township of East Deer	Consecutive System	East Deer Township	1,651
Municipal Authority of the Borough of Edgeworth	Consecutive System	Edgeworth Borough, Bell Acres Borough (part), Leetsdale Borough, Leet Township	5,500
Borough of Etna	Consecutive System	Etna Borough	4,201
Fawn-Frazer Joint Water Authority	Consecutive System	Fawn Township, Frazer Township, West Deer Township (part)	4,582
Findlay Township Municipal Authority	Consecutive System	Findlay Township	4,248
Fox Chapel Authority	Consecutive System	Fox Chapel Borough, Harmar Township (part), Indiana Township (part), O'Hara Township (part)	16,000
Hampton Township Municipal Authority	Consecutive System	Hampton Township, West Deer Township (part), Indiana Township (part), O'Hara Township (part), Richland Township (part)	22,200
Municipal Authority of the Township of Harmar	Groundwater Treatment Plant	Harmar Township, Cheswick Borough, Springdale Township (part)	3,144
Harrison Township Water Authority	Surface Water Treatment Plant	Harrison Township	11,673
Municipal Authority of Westmoreland County – McKeesport Water Treatment Plant	Surface Water Treatment Plant	City of McKeesport, Forward Township, North Versailles Township, Port Vue Borough, Versailles Borough, White Oak Borough (part)	35,178
Monroeville Municipal Authority	Consecutive System	Municipality of Monroeville	29,169
Moon Township Municipal Authority	Surface Water Treatment Plant	Moon Township, Findlay Township (part)	19,922
Township of Neville	Consecutive System	Neville Township	1,273
Borough of Oakdale	Consecutive System	Oakdale Borough	1,800
Municipal Authority of the Borough of Oakmont	Surface Water Treatment Plant	Oakmont Borough, Verona Borough, Plum Borough (part), Municipality of Penn Hills (part), Harmar Township (part) Indiana Township (part), West Deer (part), Middlesex Township (Butler County)	39,829

Table 4.3.1-4 Community Public Water Suppliers and Municipalities Served (ACHD, 2007)			
NAME	TYPE OF SYSTEM	MUNICIPALITIES SERVED	POPULATION SERVED
Pennsylvania American Water Company	Surface Water Treatment Plant	Baldwin Borough, Baldwin Township, Bethel Park Borough, Brentwood Borough, Bridgeville Borough, Carnegie Borough, Castle Shannon Borough, City of Clairton, Collier Township, Crafton Borough, Dormont Borough, Dravosburg Borough, Elizabeth Borough, Elizabeth Township, Glassport Borough, Green Tree Borough, Heidelberg Borough, Homestead Borough, Ingram Borough, Jefferson Borough, Liberty Borough, Lincoln Borough, McDonald Borough, Municipality of Mt. Lebanon, Mt. Oliver Borough, Pennsbury Borough, City of Pittsburgh (Ward, 29, 30, 31, 32, & Parts of 16, 18, 19, 20 & 28), Pleasant Hills Borough, Rosslyn Farms Borough, Scott Township, South Fayette Township, South Park Township, Thornburg Borough, Upper St. Clair Township, West Elizabeth Borough, West Mifflin Borough, Whitaker Borough, Whitehall Borough, and Communities in Washington County	569,328
The Pittsburgh Water & Sewer Authority	Surface Water Treatment Plant	City of Pittsburgh, Millvale, Aspinwall	370,000
Plum Borough Municipal Authority	Consecutive System	Plum Borough	25,500
Township of Reserve	Consecutive System	Reserve Township	3,860
Richland Township Municipal Authority	Consecutive System	Richland Township	6,186
Municipal Authority of the Township of Robinson	Surface Water Treatment Plant	Robinson Township, Findlay Township (part), North Fayette Township (part)	10,798
Sewickley Water Authority	Groundwater Treatment Plant	Sewickley Borough, Aleppo Township (part), Edgeworth Borough (part), Haysville Borough (part), Osborne Borough (part), Sewickley Heights Borough	7,575
Hampton/Shaler	Groundwater Treatment Plant	Shaler Township, Hampton Township (part)	31,500
Borough of Sharpsburg	Groundwater Treatment Plant	Sharpsburg Borough	3,781

Table 4.3.1-4 Community Public Water Suppliers and Municipalities Served (ACHD, 2007)			
NAME	TYPE OF SYSTEM	MUNICIPALITIES SERVED	POPULATION SERVED
Borough of Springdale	Groundwater Treatment Plant	Springdale Borough	3,992
Township of Springdale	Consecutive System	Springdale Township	1,870
Borough of Tarentum	Surface Water Treatment Plant	Tarentum Borough	5,609
Western Allegheny County Municipal Authority	Consecutive System	North Fayette Township	11,905
Municipal Authority of the Borough of West View	Surface Water Treatment Plant	West View Borough, Avalon Borough, Bellevue Borough, Ben Avon Borough, Ben Avon Heights Borough, Bradford Woods Borough, Emsworth Borough, Franklin Park Borough, Kennedy Township, Kilbuck Township, Marshall Township, Town of McCandless, McKees Rocks Borough, Ohio Township, Pine Township, City of Pittsburgh (Ward 28), Reserve Township (part), Robinson Township (part), Ross Township, Sewickley Hills Borough, Shaler Township (part), Stowe Township (part)	200,000
Wilkinsburg-Penn Joint Water Authority	Surface Water Treatment Plant	Braddock Hills Borough, Chalfant Borough, Churchill Borough, East McKeesport Borough, East Pittsburgh Borough, Edgewood Borough, Forest Hills Borough, Municipality of Monroeville (part), North Braddock Borough, Municipality of Penn Hills, Pitcairn Borough, City of Pittsburgh (Ward 13), Rankin Borough, Wilkinsburg Borough	125,000

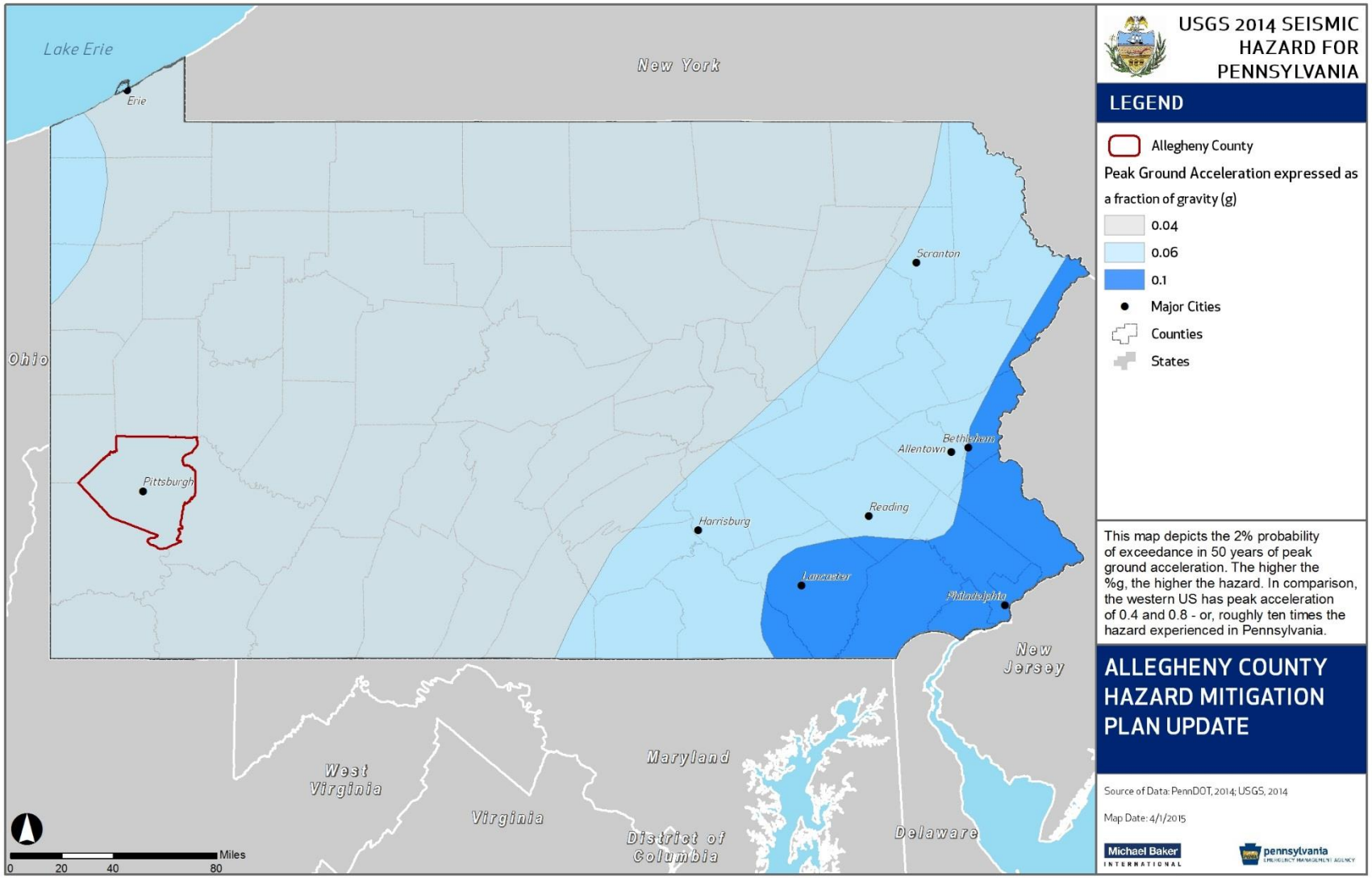
4.3.2 Earthquake

4.3.2.1 Location and Extent

Earthquake events in Pennsylvania typically do not impact areas greater than 100 km from the epicenter, according to available data it does not appear that there have been any earthquake epicenters within Allegheny County. The area is generally not known for seismicity, and USGS downgraded the probabilistic seismic hazard for much of Pennsylvania in 2014. Figure 4.3.2-1 shows the 2014 earthquake hazard in Pennsylvania and Allegheny County, expressed as the two-percent probability of exceedance in 50 years of peak ground acceleration (g). This map was digitized from the 2014 National Seismic Hazard report. Allegheny County lies in the 0.04 zone, indicating that the hazard is minimal. Earthquakes originating from

outside Pennsylvania can also impact the Commonwealth, as was the case with a magnitude 5.8 earthquake in Virginia in August 2011 (see Section 4.3.2.3).

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



4.3.2.2 Range of Magnitude

Earthquake magnitude is often measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake. Table 4.3.2-1 summarizes Richter Scale magnitudes as they relate to the spatial extent of impacted areas. While the highest known magnitude earthquake occurring within Pennsylvania registered 5.1 on the Richter Scale, most earthquakes with known magnitudes generally fall between 2 and 3. Pennsylvania has not experienced any earthquakes with a magnitude greater than 6.0.

Table 4.3.2-1 Richter Scale Magnitudes and Associated Earthquake Size Effects.

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

The Richter Scale does not give any indication of the impact or damage of an earthquake, although it can be inferred that higher magnitude events cause more damage. Instead, the impact of an earthquake event is measured in terms of earthquake intensity, usually measured using the Modified Mercalli Intensity Scale, shown in Table 4.3.1-2. Based on historical data of earthquakes with a recorded Intensity, little damage is expected from earthquake events. Allegheny County does not have a record of measured earthquakes epicenters.

Table 4.3.2-2 Modified Mercalli Intensity Scale with Associated Impacts.

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

Table 4.3.2-2 Modified Mercalli Intensity Scale with Associated Impacts.

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

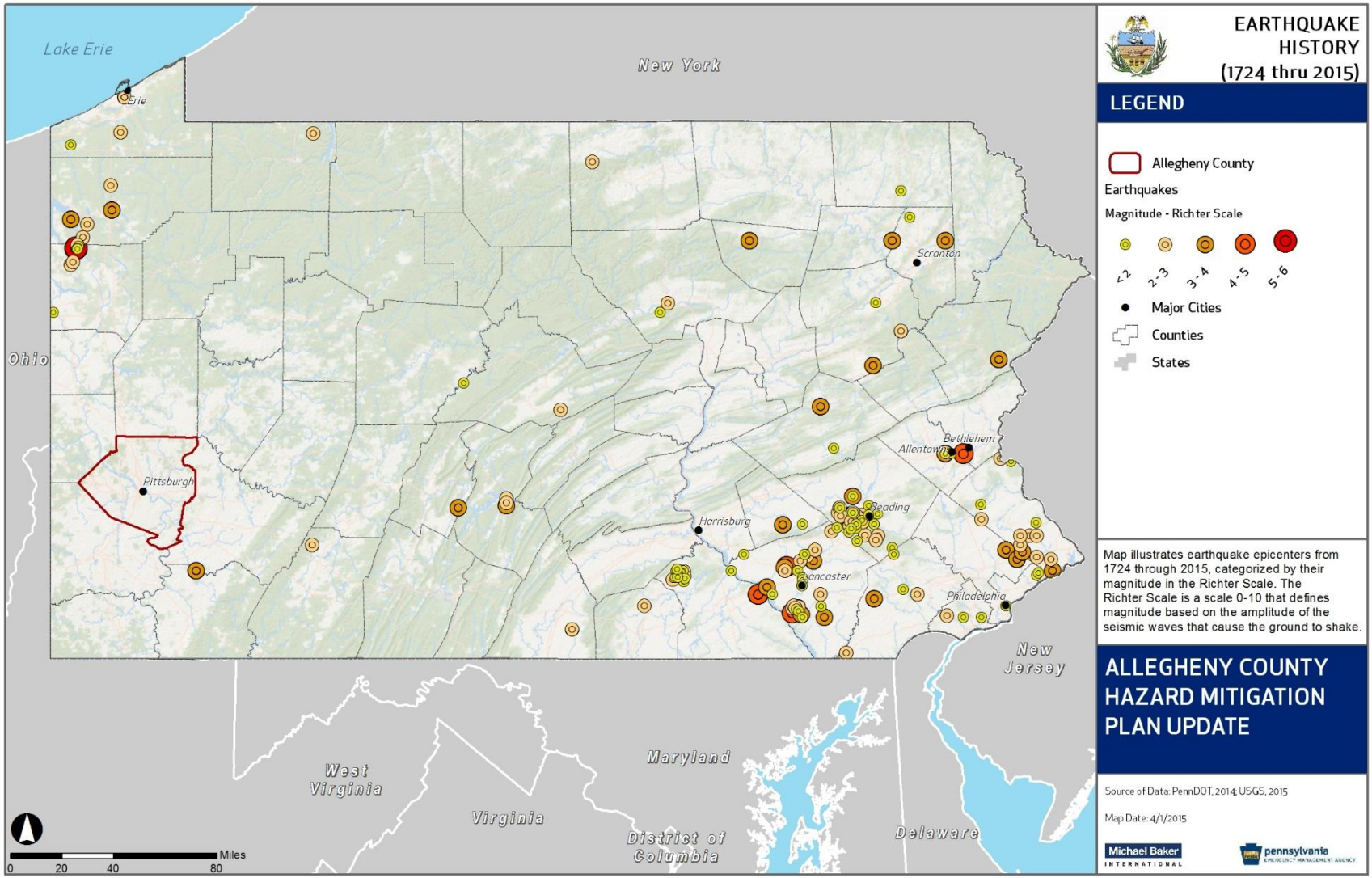
Since the worst earthquake recorded in Pennsylvania was a magnitude 5.2, a worst-case scenario for this hazard would be if an earthquake of similar magnitude occurred in Allegheny County or near the border in an adjacent county, causing mild damage in populated areas. Structural damage would not be expected in this scenario for most buildings, but blighted structures or those in a state of disrepair might experience further structural damage.

Environmental impacts of earthquakes can be numerous, widespread, and devastating, particularly if indirect impacts like economic impacts are considered. Earthquakes are known for causing induced tsunamis, flooding, landslides, and avalanches; poor water quality; damage to vegetation; and breakage in sewage or toxic material containments. However, but because of its geographic location, these impacts are extremely unlikely to occur in Allegheny County.

4.3.2.3 Past Occurrence

To date, no earthquake epicenters have been recorded in Allegheny County, as shown in Figure 4.3.2-2. The nearest epicenter was a shallow, 3.3 magnitude earthquake located in Fayette County in 1965. Recently, a magnitude 5.8 earthquake with an epicenter in rural Louisa County, VA was felt throughout Pennsylvania. In the Allegheny County area, the tremor prompted both mandatory and voluntary evacuations, including at the steel-and-glass PPG Place building downtown. This shallow earthquake occurring along the Spotsylvania Fault was felt as far north as Ontario, Canada and as far south as Alabama. Crawford and Mercer Counties to the north of Allegheny County have been affected by a significant number of earthquakes in the past, some of them sizable for the region.

Figure 4.3.2-2 Map of Earthquake Epicenters in Allegheny County (DCNR, 2004).



4.3.2.4 Future Occurrence

One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak ground acceleration (PGA) measures the strength of ground movements in this manner. PGA represents the rate in change of motion of the earth's surface during an earthquake as a ratio of the established rate of acceleration due to gravity. As shown in Figure 4.3.2-1, Allegheny County has a very low PGA ratio of 0.04. In contrast, the western United States has a peak ground acceleration ten times that of Allegheny County. Historical records indicate that the future liklihood of an earthquake is *unlikely* as defined by the Risk Factor Methodology probability criteria (see Table 4. 1-1).

4.3.2.5 Vulnerability Assessment

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

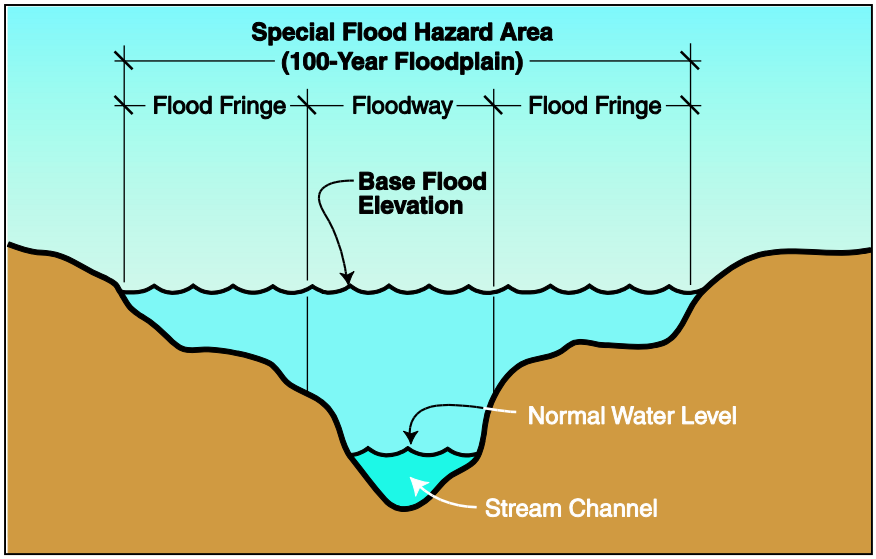
4.3.3 Flood, Flash Flood, Ice Jam

4.3.3.1 Location and Extent

A flood is a natural event for streams and rivers. Floodplains are lowlands adjacent to rivers, streams and creeks that are subject to recurring floods. The size of the floodplain is described by the recurrence interval of a given flood. Flood recurrence intervals are explained in more detail in Section 4.3.3.4. However, in assessing the potential spatial extent of flooding it is important to know that a floodplain associated with a flood that has a 10 percent chance of occurring in a given year is smaller than the floodplain associated with a flood that has a 0.2% annual chance of occurring.

The National Flood Insurance Program (NFIP), for which Flood Insurance Rate Maps (FIRM) 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 4.3.3-1 illustrates these terms. The SFHA serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania and Allegheny County local governments.

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



Allegheny County has FEMA effective Flood Insurance Rate Maps and a Countywide Flood Insurance Study. This study was conducted as a part of FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) process and went effective on September 26, 2014. The purpose of the Risk MAP program is to assist communities nationwide to assess flood risk, encourage mitigation planning, and to strengthen local ability to make informed decisions about risk reduction. Individual map panels can be obtained from the FEMA Map Service Center (http://www.msc.fema.gov). These maps can be used to identify the expected spatial extent and elevation of flooding from a 1% and 0.2% annual chance event. In addition, as a Risk MAP study, Allegheny County's flood risk information is also available online at http://maps.riskmap3.com/PA/Allegheny/. This online map is a simple, easy-to-use way to view and understand flood risk information.

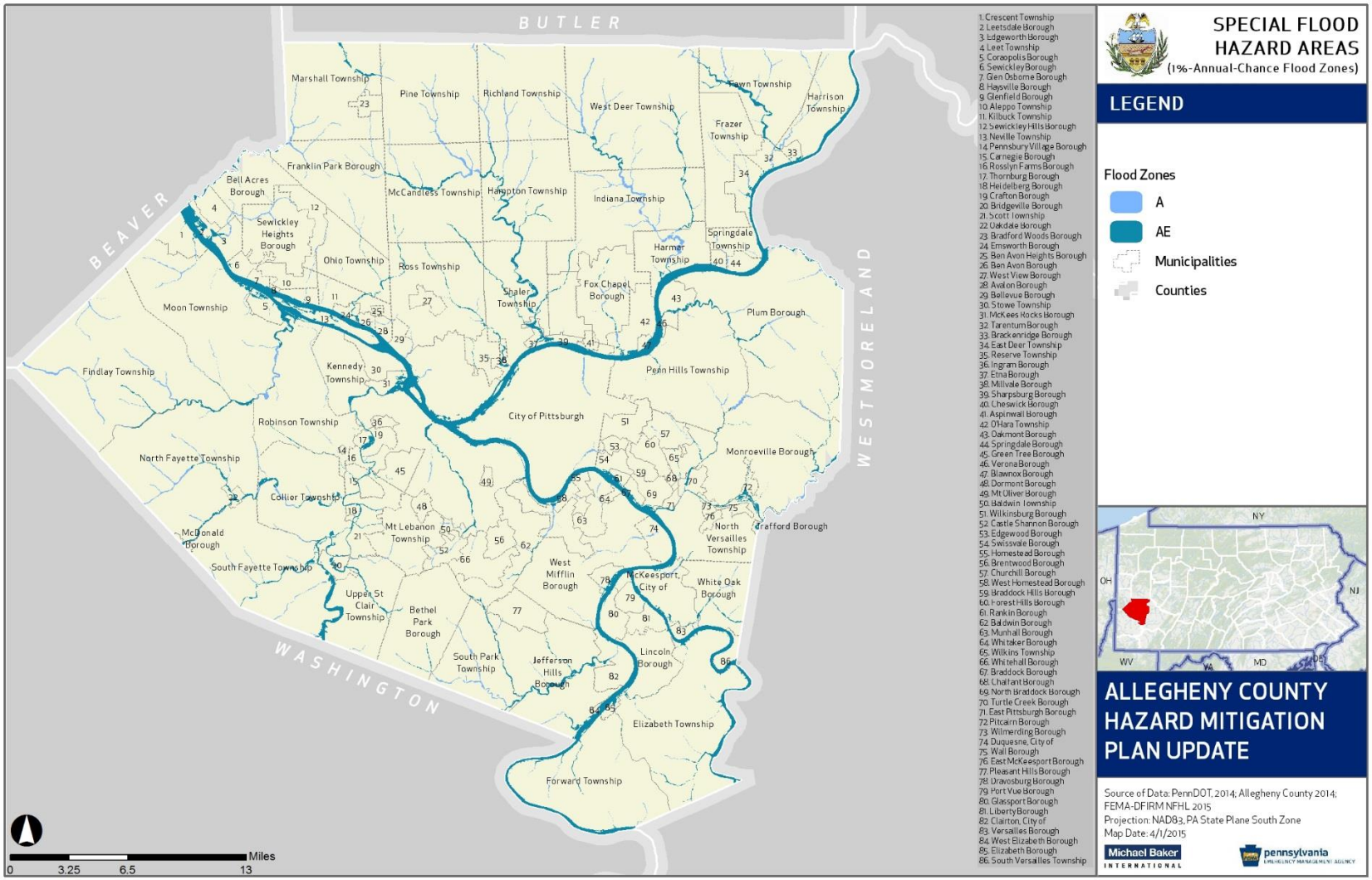
One hundred nineteen of the 130 communities in Allegheny County have determined SFHAs. The communities without SFHAs include the boroughs of: Ben Avon Heights, Braddock Hills, Chalfant, Dormont, East Pittsburgh, Edgewood, Forest Hills, Mount Oliver, Pennsbury Village, West View, and Wilkinsburg. Allegheny County is located in the Ohio, Monongahela, Lower Allegheny, and Youghiogheny River Basins; individual watersheds are mapped in Figure 2.1-3. Overbank flooding of the Monongahela River, including backwater flooding from the Allegheny River, is the principal flooding problem in Allegheny County. Allegheny County has been, and remains, one of the great industrial areas in the U.S., due in large part to the accessibility of major waterways for transportation of coal, steel, and other products. As such, substantial development took place and industrial facilities were situated in the 1-percent-annual-chance floodplain, which has led to many buildings being flooded. In addition to riverine flooding, there are many tributaries in the County that have experienced flash flooding and present flash flood hazards.

The following streams and creeks and their associated tributaries present a recurring flood threat:

- Northwest Sector - Pine Creek, Girty's Run, Brush Creek, and Little Sewickley Creek
- Northeast Sector - Bull Creek, Deer Creek, Lowries Run and Rawlins Run
- East Sector - Plum Creek, Turtle Creek and Dirty Camp Run / Pitcairn
- Southeast Sector – Sawmill Run, Streets Run, Crooked Run, Long Run, and Peters Creek
- Southwest Sector - Chartiers Creek, Robinson Run, Moon Run, McLaughlin Run, Montour Run and Campbells Run

Figure 4.3.3-2 shows the locations of watercourses and flood zones throughout Allegheny County.

Figure 4.3.3-2 Map Showing the Location of Watercourses and Flood Zones throughout Allegheny County (FEMA).



The table below indicates municipal participation in the National Flood Insurance Program. Only one community does not participate: Pennsbury Village. As noted above, ten additional communities participate in the NFIP despite not having SFHAs.

Table 4.3.3-1 Participation in the National Flood Insurance Program for Allegheny County.

COMMUNITY	PARTICIPATION STATUS	CID	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
Aleppo Township	PARTICIPATING	421266	09/01/86	09/26/2014
Aspinwall Borough	PARTICIPATING	420005	12/18/79	09/26/2014
Avalon Borough	PARTICIPATING	420006	12/15/78	09/26/2014
Baldwin Borough	PARTICIPATING	420007	08/15/78	09/26/2014
Baldwin Township	PARTICIPATING	422650	10/04/95	09/26/2014
Bell Acres Borough	PARTICIPATING	420008	05/01/85	09/26/2014
Bellevue Borough	PARTICIPATING	420009	12/15/78	09/26/2014
Ben Avon Heights Borough	PARTICIPATING	420011	10/04/95	09/26/2014
Ben Avon Borough	PARTICIPATING	420010	07/16/81	09/26/2014
Bethel Park Municipality	PARTICIPATING	420012	06/15/81	09/26/2014
Blawnox Borough	PARTICIPATING	420013	09/03/80	09/26/2014
Brackenridge Borough	PARTICIPATING	420014	08/15/80	09/26/2014
Braddock Hills Borough	PARTICIPATING	420016	08/10/79	09/26/2014
Braddock Borough	PARTICIPATING	420015	09/30/80	09/26/2014
Bradford Woods Borough	PARTICIPATING	421262	11/06/81	09/26/2014
Brentwood Borough	PARTICIPATING	420017	10/04/95	09/26/2014
Bridgeville Borough	PARTICIPATING	420018	01/05/84	09/26/2014
Carnegie Borough	PARTICIPATING	420019	05/01/78	09/26/2014
Castle Shannon Borough	PARTICIPATING	420020	10/04/95	09/26/2014
Chalfant Borough	PARTICIPATING	420021	10/04/95	09/26/2014
Cheswick Borough	PARTICIPATING	420022	06/18/80	09/26/2014
Churchill Borough	PARTICIPATING	420023	12/15/78	09/26/2014
Clairton City	PARTICIPATING	420024	10/16/79	09/26/2014
Collier Township	PARTICIPATING	421058	03/15/82	09/26/2014
Coraopolis Borough	PARTICIPATING	420025	06/15/79	09/26/2014
Crafton Borough	PARTICIPATING	420026	12/19/80	09/26/2014
Crescent Township	PARTICIPATING	421060	07/16/81	09/26/2014
Dormont Borough	PARTICIPATING	422630	01/04/95	09/26/2014
Dravosburg Borough	PARTICIPATING	420027	06/15/79	09/26/2014
Duquesne City	PARTICIPATING	420028	09/14/79	09/26/2014
East Deer Township	PARTICIPATING	421061	08/15/80	09/26/2014
East McKeesport Borough	PARTICIPATING	420029	10/04/95	09/26/2014
East Pittsburgh Borough	PARTICIPATING	422662	10/04/95	09/26/2014
Edgewood Borough	PARTICIPATING	422663	10/04/95	09/26/2014

Table 4.3.3-1 Participation in the National Flood Insurance Program for Allegheny County.

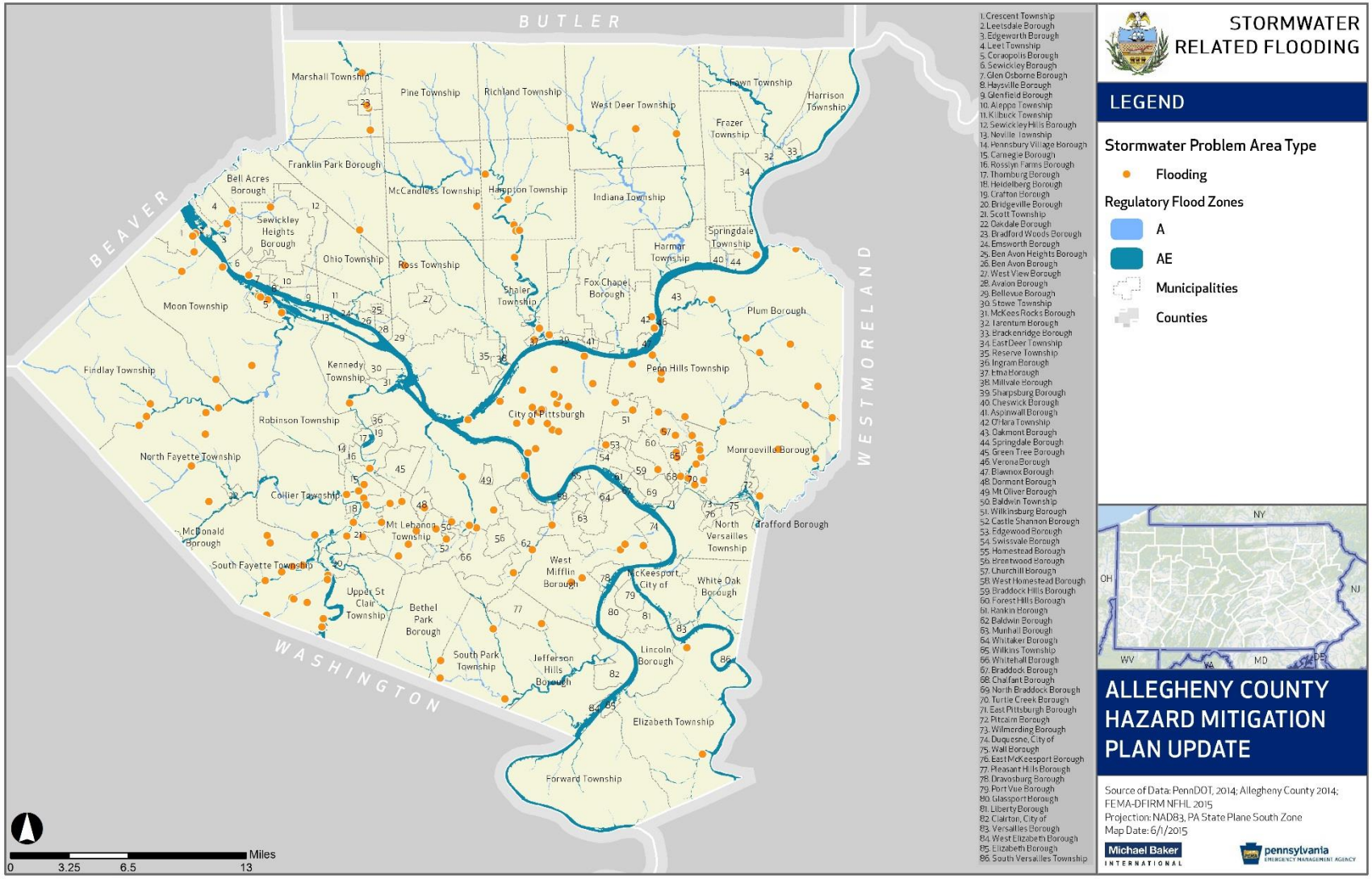
COMMUNITY	PARTICIPATION STATUS	CID	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
Edgeworth Borough	PARTICIPATING	420032	05/01/80	09/26/2014
Elizabeth Borough	PARTICIPATING	421263	07/16/81	09/26/2014
Elizabeth Township	PARTICIPATING	420033	03/15/77	09/26/2014
Emsworth Borough	PARTICIPATING	420034	09/30/80	09/26/2014
Etna Borough	PARTICIPATING	421062	09/01/78	09/26/2014
Fawn Township	PARTICIPATING	421285	01/18/84	09/26/2014
Findlay Township	PARTICIPATING	421286	11/18/88	09/26/2014
Forest Hills Borough	PARTICIPATING	420035	09/01/86	09/26/2014
Forward Township	PARTICIPATING	421064	02/01/80	09/26/2014
Fox Chapel Borough	PARTICIPATING	420036	04/15/77	09/26/2014
Franklin Park Borough	PARTICIPATING	420037	01/01/82	09/26/2014
Frazer Township	PARTICIPATING	421288	12/19/80	09/26/2014
Glassport Borough	PARTICIPATING	420038	06/15/79	09/26/2014
Glenfield Borough	PARTICIPATING	420039	03/18/80	09/26/2014
Green Tree Borough	PARTICIPATING	420040	07/16/81	09/26/2014
Hampton Township	PARTICIPATING	420978	05/01/78	09/26/2014
Harmar Township	PARTICIPATING	421068	07/02/80	09/26/2014
Harrison Township	PARTICIPATING	420041	09/29/78	09/26/2014
Haysville Borough	PARTICIPATING	420042	03/18/80	09/26/2014
Heidelberg Borough	PARTICIPATING	420043	06/15/81	09/26/2014
Homestead Borough	PARTICIPATING	420044	10/04/95	09/26/2014
Indiana Township	PARTICIPATING	421070	10/18/83	09/26/2014
Ingram Borough	PARTICIPATING	420045	10/04/95	09/26/2014
Jefferson Hills Borough	PARTICIPATING	420046	04/01/80	09/26/2014
Kennedy Township	PARTICIPATING	421072	02/15/80	09/26/2014
Kilbuck Township	PARTICIPATING	421073	02/01/80	09/26/2014
Leet Township	PARTICIPATING	421075	09/14/79	09/26/2014
Leetsdale Borough	PARTICIPATING	420047	11/19/80	09/26/2014
Liberty Borough	PARTICIPATING	420048	11/01/79	09/26/2014
Lincoln Borough	PARTICIPATING	420049	09/28/79	09/26/2014
Marshall Township	PARTICIPATING	421080	11/04/81	09/26/2014
McCandless, Town of	PARTICIPATING	421081	06/18/80	09/26/2014
McDonald Borough	PARTICIPATING	420855	10/04/95	09/26/2014
McKees Rocks Borough	PARTICIPATING	420052	05/16/77	09/26/2014
McKeesport City	PARTICIPATING	420051	01/03/79	09/26/2014
Millvale Borough	PARTICIPATING	420053	07/16/79	09/26/2014
Monroeville Borough	PARTICIPATING	420054	08/01/79	09/26/2014
Moon Township	PARTICIPATING	421082	08/15/79	09/26/2014

Table 4.3.3-1 Participation in the National Flood Insurance Program for Allegheny County.				
COMMUNITY	PARTICIPATION STATUS	CID	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
Mount Oliver Borough	PARTICIPATING	420055	10/04/95	09/26/2014
Mt. Lebanon Township	PARTICIPATING	421272	06/30/76	09/26/2014
Munhall Borough	PARTICIPATING	420056	04/24/81	09/26/2014
Neville Township	PARTICIPATING	425385	09/30/88	09/26/2014
North Braddock Borough	PARTICIPATING	420058	02/16/79	09/26/2014
North Fayette Township	PARTICIPATING	421085	10/18/83	09/26/2014
North Versailles Township	PARTICIPATING	421231	04/01/81	09/26/2014
O'Hara Township	PARTICIPATING	421088	07/02/80	09/26/2014
Oakdale Borough	PARTICIPATING	420059	08/15/83	09/26/2014
Oakmont Borough	PARTICIPATING	420060	01/16/81	09/26/2014
Ohio Township	PARTICIPATING	421089	11/04/88	09/26/2014
Osborne Borough	PARTICIPATING	420061	11/15/79	09/26/2014
Penn Hills Township	PARTICIPATING	421092	06/15/81	09/26/2014
Pennsbury Village Borough	NOT PARTICIPATING	422665	10/04/95	09/26/2014
Pine Township	PARTICIPATING	421094	09/22/78	09/26/2014
Pitcairn Borough	PARTICIPATING	420062	04/01/80	09/26/2014
Pittsburgh City	PARTICIPATING	420063	12/15/81	09/26/2014
Pleasant Hills Borough	PARTICIPATING	420064	10/04/95	09/26/2014
Plum Borough	PARTICIPATING	420065	09/16/81	09/26/2014
Port Vue Borough	PARTICIPATING	420066	09/28/79	09/26/2014
Rankin Borough	PARTICIPATING	420067	07/02/80	09/26/2014
Reserve Township	PARTICIPATING	420068	04/15/77	09/26/2014
Richland Township	PARTICIPATING	421199	09/21/78	09/26/2014
Robinson Township	PARTICIPATING	421097	02/03/82	09/26/2014
Ross Township	PARTICIPATING	420979	12/18/79	09/26/2014
Rosslyn Farms Borough	PARTICIPATING	420069	05/19/81	09/26/2014
Scott Township	PARTICIPATING	421100	05/03/82	09/26/2014
Sewickley Heights Borough	PARTICIPATING	420071	05/01/86	09/26/2014
Sewickley Hills Borough	PARTICIPATING	420072	09/01/86	09/26/2014
Sewickley Borough	PARTICIPATING	420070	09/14/79	09/26/2014
Shaler Township	PARTICIPATING	421101	03/18/80	09/26/2014
Sharpsburg Borough	PARTICIPATING	420073	06/04/76	09/26/2014
South Fayette Township	PARTICIPATING	421106	02/03/82	09/26/2014
South Park Township	PARTICIPATING	421165	11/05/80	09/26/2014
South Versailles Township	PARTICIPATING	421281	08/01/79	09/26/2014
Springdale Borough	PARTICIPATING	421282	07/16/80	09/26/2014
Springdale Township	PARTICIPATING	420074	07/16/80	09/26/2014
Stowe Township	PARTICIPATING	421110	02/15/80	09/26/2014

Table 4.3.3-1 Participation in the National Flood Insurance Program for Allegheny County.				
COMMUNITY	PARTICIPATION STATUS	CID	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
Swissvale Borough	PARTICIPATING	420075	06/30/76	09/26/2014
Tarentum Borough	PARTICIPATING	420076	08/15/80	09/26/2014
Thornburg Borough	PARTICIPATING	420077	10/04/95	09/26/2014
Trafford Borough	PARTICIPATING	420903	10/04/95	09/26/2014
Turtle Creek Borough	PARTICIPATING	420079	11/19/80	09/26/2014
Upper St. Clair Township	PARTICIPATING	421119	06/18/76	09/26/2014
Verona Borough	PARTICIPATING	422611	01/16/81	09/26/2014
Versailles Boroughs	PARTICIPATING	420081	10/18/88	09/26/2014
Wall Boroughs	PARTICIPATING	420082	11/19/87	09/26/2014
West Deer Township	PARTICIPATING	421299	10/18/83	09/26/2014
West Elizabeth Borough	PARTICIPATING	420083	09/29/78	09/26/2014
West Homestead Borough	PARTICIPATING	420084	08/15/80	09/26/2014
West Mifflin Borough	PARTICIPATING	420085	02/15/80	09/26/2014
West View Borough	PARTICIPATING	420086	06/30/76	09/26/2014
Whitaker Borough	PARTICIPATING	420087	10/04/95	09/26/2014
White Oak Borough	PARTICIPATING	420089	09/14/79	09/26/2014
Whitehall Borough	PARTICIPATING	420088	10/04/95	09/26/2014
Wilkins Township	PARTICIPATING	420090	09/29/78	09/26/2014
Wilkinsburg Borough	PARTICIPATING	422667	10/04/95	09/26/2014
Wilmerding Borough	PARTICIPATING	420091	08/01/79	09/26/2014

The 2014 Allegheny County Stormwater Management Plan asked municipal officials to identify areas of stormwater-related flooding in their communities. Figure 4.3.3-3 shows these stormwater flooding areas. It is important to note that many of these identified areas are not in the SFHA, highlighting the need to look at comprehensive flood management in Allegheny County. The Stormwater Management Plan seeks to reduce these stormwater-related floods through stormwater best management practices and updated model ordinances in its second phase of work, which is underway and will continue through Fall 2016.

Figure 4.3.3-3 Community-Identified Stormwater Flooding Problem Areas.



4.3.3.2 Range of Magnitude

Floods are considered hazards when people and property are affected. Most injuries and deaths from flooding happen when people are swept away by flood currents and 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 to no vegetative ground cover. Since the County has mountainous terrain, this can contribute to more severe floods as runoff reaches receiving water bodies more rapidly over steep terrain. Also, urbanization typically results in the replacement of vegetative ground cover with asphalt and concrete, increasing the volume of surface runoff and stormwater, particularly in areas with poorly planned stormwater drainage systems.

In Allegheny County there are seasonal differences in how floods are caused. A measurable amount of precipitation occurs around 160 to 165 days a year in Allegheny County. 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. 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, when the velocity of floodwaters has the potential to amplify the impacts of a flood event.

Winter floods also have resulted from runoff of intense rainfall on frozen ground, and, on rare occasions, local flooding has been exacerbated by ice jams in rivers. Ice jam floods, as mentioned in the previous section, 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 particularly an issue on the Youghiogheny River and Pine Creek.

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

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

Figure 4.3.3-4 1936 Flood Crest Marked on a Downtown Pittsburgh Building.

There are several examples of possible worst-case scenario flooding events in Allegheny County. An extremely high flood occurred in March 1936, the result of flooding on the Allegheny River and backwater flooding from the Monongahela River (FEMA FIS). This flood was caused by heavy rain and snowmelt from the 16th to the 18th of March and resulted in a stage of 46.0 feet (21 feet above flood stage) at the confluence of the Allegheny and Monongahela Rivers.

Another devastating flooding event occurred in Allegheny County in September 2004. The county received two to four inches of rainfall from Tropical Depression Frances starting on September 8 and then received another nine inches starting on September 16 from the remnants of Hurricane Ivan. Ivan developed off the west coast of Africa and entered the Caribbean, intensifying to a Category 5 storm three separate times while in the Caribbean. The storm made landfall in the continental US in Alabama, near the Florida border, on September 16. The storm then weakened, but still continued to drop significant amounts of rain and tornadoes in the southeastern US and as it moved forward. In Allegheny County, Ivan caused major flooding from September 17-19. The storm set the greatest daily precipitation on record for Pittsburgh, with 5.95 inches of rain failing in a 24-hour period (NOAA-NWS, 2005). This broke the previous record, set just days earlier with the remnants of Tropical Depression Frances. When Ivan hit, 89 of the 130 communities in Allegheny County declared a state of emergency, and the county 911 center received over 5,000 calls in a single hour. A Major Disaster Declaration was declared on September 19, 2004. The storm caused $26 million in property damage as well as one fatality and 92 injuries. According to the incident report from the NCDC:

> *Widespread flooding stranded thousands. A total of 9494 homes, 1060 businesses, 4 schools, 9 fire depts, 50 public buildings damaged or destroyed. 140 boats broke away and ran away down several rivers… In Carnegie, 22 people were trapped on a bridge as flood waters rose and surrounded them. They tied themselves together and waited for rescue... The Allegheny River*

flooded, from Freeport to Sharpsburg, from 11 PM EDT on 17th, until 5 AM EDT on 19th. Here are city, flood stage, crest, time: Freeport (flood stage 23 ft), 24.1 10 AM 18th; Natrona (21 ft), 24.2 11 AM 18th; Acmetonia (17), 19.8 1 PM 18th; Sharpsburg (21), 22.1 4 PM EDT 18th. The Ohio River flooded, from Pittsburgh to Dashields, from 10 PM on 17th, until 830 AM EDT on 19th. Pittsburgh (flood stage 25 ft), crested 31.0 at 4 PM EDT on 18th; Dashields (25 ft), crested 29.9 at 8 PM on 18th. On the Youghiogheny River, Sutersville rose above flood stage (20 ft) 1 PM on 18th, crested 20.7 at 430 PM, and fell below flood stage at 730 PM EDT on 18th.

4.3.3.3 Past Occurrence

Allegheny County has a long history of flooding problems. Since the Allegheny, Monongahela, and Ohio Rivers, along with a large number of their tributaries, are located in Allegheny County, the County has suffered damage from numerous major overbank floods and localized flash flooding. In addition to an historic pattern of development occurring in the floodplain, Allegheny County has steep slopes that allow fast runoff from storms, which exacerbates flooding conditions. There are also several bridges and culverts that get blocked with debris and cause backup flooding during a large storm.

Flood data from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center and Spatial Hazard Events and Losses Database for the United States (SHELDUS) is included in Table 4.3.3-2.

Table 4.3.3-2 Significant Flood Events in Allegheny County, 1968-2015 (NOAA and SHELDUS).

DATE	TYPE OF FLOOD EVENT	ESTIMATED DAMAGES ($)	DAMAGE DESCRIPTION
8/12/2014	Flood	25,000	Flooding in Highcliff.
8/3/2014	Flood	1,000	Flooding in Brentwood.
8/3/2014	Flood	25,000	Flooding in Dormont.
8/3/2014	Flood	1,000	Flooding in Port Vue.
8/3/2014	Flood	10,000	Flooding in Wilkins Township.
6/28/2014	Flash Flood	5,000	Flooding in Rook.
6/28/2014	Flash Flood	15,000	Flooding in Heidelberg.
6/28/2014	Flash Flood	10,000	Flooding in Carnegie.
6/28/2014	Flash Flood	10,000	Flooding in Carnegie.
6/13/2014	Flood	3,000	Flooding in Wilkins Township.
6/13/2014	Flood	1,000	Flooding in Dravosburg.
6/13/2014	Flood	1,000	Flooding in Mc Keesport.
6/13/2014	Flood	1,000	Flooding in Riverton.
6/12/2014	Flood	2,000	Flooding in Elfinwild.
6/12/2014	Flood	2,000	Flooding in Shalecrest.
6/12/2014	Flood	2,000	Flooding in Port Vue.
6/12/2014	Flood	10,000	Flooding in New Texas.
5/27/2014	Flood	0	Flooding in Boyce.
5/27/2014	Flood	0	Flooding in Library.
9/11/2013	Flood	5,000	Flooding in Edgewood.
9/11/2013	Flash Flood	20,000	Flooding in Sandy Creek.

Table 4.3.3-2 Significant Flood Events in Allegheny County, 1968-2015 (NOAA and SHELDUS).

DATE	TYPE OF FLOOD EVENT	ESTIMATED DAMAGES ($)	DAMAGE DESCRIPTION
9/11/2013	Flash Flood	25,000	Flooding in Aspinwall.
9/11/2013	Flash Flood	25,000	Flooding in Acmetonia.
9/11/2013	Flash Flood	10,000	Flooding in Logans Ferry.
9/9/2013	Flood	10,000	Flooding in Wilkins Township.
8/8/2013	Flood	0	Flooding in Bairdford.
7/22/2013	Flood	25,000	Flooding in Option.
7/21/2013	Flash Flood	10,000	Flooding in Wall.
7/21/2013	Flash Flood	35,000	Flooding in Dravosburg.
7/21/2013	Flash Flood	10,000	Flooding in Riverton.
7/17/2013	Flash Flood	15,000	Flooding in Blaine Hill.
7/17/2013	Flash Flood	75,000	Flooding in Coulter.
7/17/2013	Flash Flood	100,000	Flooding in Coulter.
7/17/2013	Flash Flood	75,000	Flooding in Mc Keesport.
7/17/2013	Flash Flood	100,000	Flooding in Sutersville.
7/16/2013	Flash Flood	25,000	Flooding in Etna.
7/16/2013	Flash Flood	10,000	Flooding in Pleasant Hills.
7/16/2013	Flash Flood	35,000	Flooding in Glassport.
7/16/2013	Flash Flood	10,000	Flooding in Blaine Hill.
7/16/2013	Flash Flood	35,000	Flooding in Aspinwall.
7/16/2013	Flash Flood	10,000	Flooding in Wilson.
7/16/2013	Flash Flood	50,000	Flooding in Versailles.
7/16/2013	Flash Flood	100,000	Flooding in Mc Keesport.
7/16/2013	Flash Flood	20,000	Flooding in Mc Keesport.
7/10/2013	Flash Flood	10,000	Flooding in Baldwin.
7/10/2013	Flash Flood	10,000	Flooding in West Mifflin.
7/10/2013	Flash Flood	10,000	Flooding in Dormont.
7/10/2013	Flash Flood	25,000	Flooding in Cliff Mine.
7/10/2013	Flash Flood	25,000	Flooding in East Carnegie.
7/10/2013	Flash Flood	25,000	Flooding in Crafton.
7/10/2013	Flash Flood	50,000	Flooding in Dormont.
7/10/2013	Flash Flood	50,000	Flooding in West Mifflin.
7/10/2013	Flash Flood	20,000	Flooding in White Oak.
7/10/2013	Flash Flood	25,000	Flooding in Ingram.
7/10/2013	Flash Flood	50,000	Flooding in Elizabeth.
7/10/2013	Flash Flood	10,000	Flooding in Liberty.
7/10/2013	Flash Flood	10,000	Flooding in Dravosburg.
7/10/2013	Flash Flood	25,000	Flooding in Large.
7/10/2013	Flash Flood	10,000	Flooding in Clairton.
7/10/2013	Flash Flood	5,000	Flooding in Millerstown.
7/10/2013	Flash Flood	10,000	Flooding in Bruceton.
7/10/2013	Flash Flood	35,000	Flooding in Glendale.
7/10/2013	Flash Flood	5,000	Flooding in Clifton.
7/10/2013	Flash Flood	50,000	Flooding in Oakdale.
7/10/2013	Flash Flood	10,000	Flooding in Option.
7/10/2013	Flash Flood	5,000	Flooding in Crafton.

Table 4.3.3-2 Significant Flood Events in Allegheny County, 1968-2015 (NOAA and SHELDUS).

DATE	TYPE OF FLOOD EVENT	ESTIMATED DAMAGES ($)	DAMAGE DESCRIPTION
7/10/2013	Flash Flood	50,000	Flooding in Mustard.
7/10/2013	Flash Flood	15,000	Flooding in Rook.
7/10/2013	Flash Flood	50,000	Flooding in Baldwin.
7/10/2013	Flash Flood	10,000	Flooding in Crafton.
7/10/2013	Flash Flood	15,000	Flooding in Lincoln.
7/9/2013	Flood	5,000	Flooding in Willock.
7/9/2013	Flood	10,000	Flooding in Dormont.
6/30/2013	Flood	0	Flooding in Dormont.
6/30/2013	Flash Flood	0	Flooding in Wilkins Township.
6/30/2013	Flash Flood	0	Flooding in Sandy Creek.
6/26/2013	Flood	2,000	Flooding in Sharpsburg.
6/26/2013	Flood	8,000	Flooding in Dormont.
6/26/2013	Flood	5,000	Flooding in Ben Avon.
6/13/2013	Flood	5,000	Flooding in Brentwood.
6/13/2013	Flood	5,000	Flooding in Elizabeth.
6/13/2013	Flood	2,000	Flooding in Elizabeth.
6/13/2013	Flood	5,000	Flooding in Option.
6/13/2013	Flood	2,000	Flooding in West Elizabeth.
4/16/2013	Flash Flood	2,000	Flooding in Cliff Mine.
4/16/2013	Flash Flood	5,000	Flooding in Crafton.
10/30/2012	Flood	25,000	Flooding in Rosedale.
9/27/2012	Flash Flood	50,000	Flooding in Clairton.
9/27/2012	Flash Flood	10,000	Flooding in Aspinwall.
9/27/2012	Flash Flood	25,000	Flooding in Blawnox.
7/28/2012	Flood	10,000	Flooding in Talley Gavey.
7/27/2012	Flood	50,000	Flooding in Bakerstown Station.
7/27/2012	Flood	15,000	Flooding in Logans Ferry.
7/20/2012	Flash Flood	35,000	Flooding in Brentwood.
7/20/2012	Flash Flood	25,000	Flooding in Pleasant Hills.
7/20/2012	Flash Flood	25,000	Flooding in Cliff Mine.
7/20/2012	Flash Flood	25,000	Flooding in Oakdale.
7/20/2012	Flash Flood	10,000	Flooding in Riverton.
7/20/2012	Flash Flood	5,000	Flooding in Brentwood.
7/20/2012	Flash Flood	15,000	Flooding in Willock.
7/20/2012	Flash Flood	15,000	Flooding in Pleasant Hills.
7/20/2012	Flash Flood	25,000	Flooding in Riverton.
7/20/2012	Flash Flood	25,000	Flooding in Dormont.
7/20/2012	Flash Flood	15,000	Flooding in Dravosburg.
7/20/2012	Flash Flood	25,000	Flooding in Clairton.
7/20/2012	Flash Flood	15,000	Flooding in Noblestown.
7/20/2012	Flash Flood	20,000	Flooding in Gayly.
7/20/2012	Flash Flood	35,000	Flooding in Imperial.
7/20/2012	Flash Flood	75,000	Flooding in Pittsburgh.
8/19/2011	Flash Flood	500,000	Flooding in Pittsburgh on Washington Boulevard. 4 fatalities and 1 injury.

Table 4.3.3-2 Significant Flood Events in Allegheny County, 1968-2015 (NOAA and SHELDUS).

DATE	TYPE OF FLOOD EVENT	ESTIMATED DAMAGES ($)	DAMAGE DESCRIPTION
8/19/2011	Flash Flood	50,000	Flooding in Option.
7/18/2011	Flash Flood	50,000	Flooding in Aspinwall.
7/18/2011	Flood	20,000	Flooding in Jefferson.
7/4/2011	Flood	5,000	Flooding in Edgewood.
7/4/2011	Flash Flood	10,000	Flooding in Edgewood.
6/20/2011	Flood	35,000	Flooding in Bridgeville.
6/20/2011	Flash Flood	10,000	Flooding in Glendale.
6/19/2011	Flood	25,000	Flooding in Bridgeville.
5/13/2011	Flood	20,000	Flooding in Millvale.
5/13/2011	Flood	5,000	Flooding in Fairoaks.
5/12/2011	Flood	15,000	Flooding in Natrona.
3/10/2011	Flood	12,000	Flooding in Curtisville.
2/28/2011	Flash Flood	25,000	Flooding in Highcliff.
2/28/2011	Flood	100,000	Flooding in Tarentum.
2/28/2011	Flood	25,000	Flooding in Cherry City.
8/14/2010	Flash Flood	10,000	Flooding in Highcliff.
7/13/2010	Flash Flood	50,000	Flooding in Mt Lebanon.
7/9/2010	Flash Flood	5,000	Flooding in Carnegie.
6/5/2010	Flash Flood	200,000	Flooding in Whitaker ($100,000 damages), Brentwood ($50,000 damages), and Cliff Mine ($50,000 damages).
1/26/2010	Flood	75,000	Flooding in Option.
6/17/2009	Flash Flood	9,000	Flooding in Option.
8/14/2008	Flash Flood	25,000	Flooding in Cuddy.
8/5/2008	Flash Flood	10,000	Flooding in Sharpsburg.
7/23/2008	Flash Flood	50,000	Flooding in Pitcairn.
7/6/2008	Flash Flood	15,000	Flooding in Bellevue.
6/16/2008	Flash Flood	125,000	Flooding in Hardy.
3/4/2008	Flood	100,000	Flooding in Bridgeville.
8/9/2007	Flash Flood	15,180,000	Flooding in Millvale ($15,000,000 damages), Penn Hills ($100,000 damages), Shalecrest ($25,000 damages), Wilkinsburg ($25,000 damages), Glenshaw ($15,000), and Verona ($15,000 damages).
8/6/2007	Flash Flood	70,000	Flooding in Millvale ($50,000 damages) and Ingomar ($20,000 damages).
7/5/2007	Flash Flood	10,000	Flooding in Glenshaw.
6/8/2007	Flash Flood	3,000	Flooding in Springdale.
5/31/2007	Flash Flood	1,000	Flooding in Pittsburgh.
3/23/2007	Flash Flood	4,000	Flooding in White Oak.
8/20/2005	Flash Flood	0	Flooding in Whitehall.
7/13/2005	Flash Flood	35,000	Flooding in Springdale.
7/5/2005	Flash Flood	5,000	Flooding in Etna ($5,000 damages) and Sewickley (0 damages).
6/30/2005	Flash Flood	15,000	Flooding County-wide.
3/29/2005	Flood	0	Flooding in several counties.

Table 4.3.3-2 Significant Flood Events in Allegheny County, 1968-2015 (NOAA and SHELDUS).			
DATE	TYPE OF FLOOD EVENT	ESTIMATED DAMAGES ($)	DAMAGE DESCRIPTION
1/6/2005	Flood	700,000	Flooding County-wide.
9/17/2004	Flash Flood	100,000,000+	Flooding County-wide. 1 fatality and 92 injuries. Most widespread and devastating flash flood in recent history that resulted in a Presidential Declaration of Disaster.
9/8/2004	Flood	40,000	Flooding County-wide.
8/20/2004	Flood	0	Flooding County-wide.
7/26/2004	Flood	0	Flooding County-wide.
6/17/2004	Flash Flood	8,000	Flooding in Tarentum.
6/15/2004	Flash Flood	0	Flooding in Pittsburgh.
5/18/2004	Flash Flood	20,000	Flooding in Sewickley.
4/14/2004	Flood	15,000	Flooding in several counties.
4/13/2004	Flood	0	Flooding County-wide.
3/7/2004	Flood	0	Flooding County-wide.
2/7/2004	Flood	18,000	Flooding in several counties.
2/6/2004	Flood	85,000	Flooding in several counties.
1/4/2004	Flood	25,000	Flooding County-wide.
12/10/2003	Flash Flood	0	Flooding in Russelton and Dravosburg.
11/19/2003	Flash Flood and Flood	101,000	Flooding in Baldwin, Turtle Creek, Dravosburg, Bell Acres ($5,000 damages), and several counties ($68,000 damages). Note: an additional $28,000 in damages was reported by other areas, but the locations were not reported to NCDC/SHELDUS.
8/12/2003	Flash Flood	0	Flooding in Emsworth.
8/10/2003	Flash Flood	0	Flooding in Oakmont.
8/6/2003	Flash Flood	0	Flooding in Monroeville.
8/4/2003	Flash Flood	0	Flooding in Bridgeville.
8/3/2003	Flash Flood	0	Flooding in Leetsdale.
7/23/2003	Flash Flood	5,000	Flooding in Pittsburgh.
7/22/2003	Flash Flood	120,000	Flooding in Russelton. Little Deer Creek Road in W. Deer Township flooded.
7/4/2003	Flash Flood	2,000	Flooding in Pittsburgh.
6/20/2003	Flash Flood	0	Flooding in Pittsburgh.
6/12/2003	Flash Flood	0	Flooding in Etna and Russelton.
5/10/2003	Flash Flood	0	Flooding in Bellevue and Castle Shannon.
2/24/2003	Flood	0	Flooding county-wide.
10/3/2002	Flood	0	Flooding at Unity Center.
8/12/2002	Flood	0	Flooding in Harmerville.
7/31/2002	Flood	2,000,000	Ice jams produced flooding along the Youghiogheny River from Boston to McKeesport. Destroyed 210 boat slips at the McKeesport Marina.
7/25/2002	Flood	5,000	Flooding in Pittsburgh.

Table 4.3.3-2 Significant Flood Events in Allegheny County, 1968-2015 (NOAA and SHELDUS).

DATE	TYPE OF FLOOD EVENT	ESTIMATED DAMAGES ($)	DAMAGE DESCRIPTION
7/18/2002	Flood	100,000	Flooding in Castle Shannon. Flash-flooding in Overbrook section of Pittsburgh. Cars stranded in 4-5 feet of water at intersection of Routes 51 and 88. First-floor flooding in the vicinity.
7/1/2002	Flood	0	Flooding in Pleasant Hills.
5/31/2002	Flood	0	Flooding in East McKeesport.
3/26/2002	Flood	96,000	Flooding in several counties.
3/21/2002	Flood	5,000	Flooding in Elizabeth.
7/1/2001	Flood	1,000	Flooding in Wexford.
5/18/2001	Flood	25,000	Flooding in Pittsburgh.
1/31/2001	Flood	2,000,000	Flooding in McKeesport.
9/2/2000	Flood	0	Flooding in Monroeville.
8/6/2000	Flood	10,010,000	Flooding county-wide. 51 communities reported some degree of damage; approximately 1,200 homes and 51 businesses were impacted. Street and roadway flooding throughout the County.
7/31/2000	Flood	20,000	Flooding in Bridgeville.
7/30/2000	Flood	10,000	Flooding in Wilkinsburg.
7/28/2000	Flood	5,000	Flooding in Imperial ($5,000 damages) and Emsworth (0 damages).
2/19/2000	Flood	6,300,000	Flooding in several counties. Flooding in Allegheny County ($5,000,000 damages). 31 homes in Elizabeth and West Elizabeth suffered minor damage. 1 home had major damage. Point State Park, Mon Parking Wharf, and the 10th Street Bypass were forced to close.
7/28/1999	Flash Flood	1,000,000	Flooding county-wide. Brentwood, Castle Shannon, Mt. Lebanon, Dormont, and W. Elizabeth declared emergencies; many streets, facilities, and businesses flooded. Roof, shingle, and siding damage to homes and businesses, some outbuildings destroyed. Port Authority's entire light-rail line was disabled due to flooding; 110,000 customers lost power; air traffic at Pittsburgh International Airport was suspended for 4 hours.
5/18/1999	Flash Flood	100,000	Flooding in East Portion.
4/22/1999	Flash Flood	0	Flooding in Pittsburgh.
4/9/1999	Flash Flood	2,000	Flooding in Pittsburgh.
8/16/1998	Flood	0	Flooding in Coraopolis.
6/27/1998	Flash Flood	0	Flooding in Mt Lebanon, Carnegie, and Imperial.

Table 4.3.3-2 Significant Flood Events in Allegheny County, 1968-2015 (NOAA and SHELDUS).

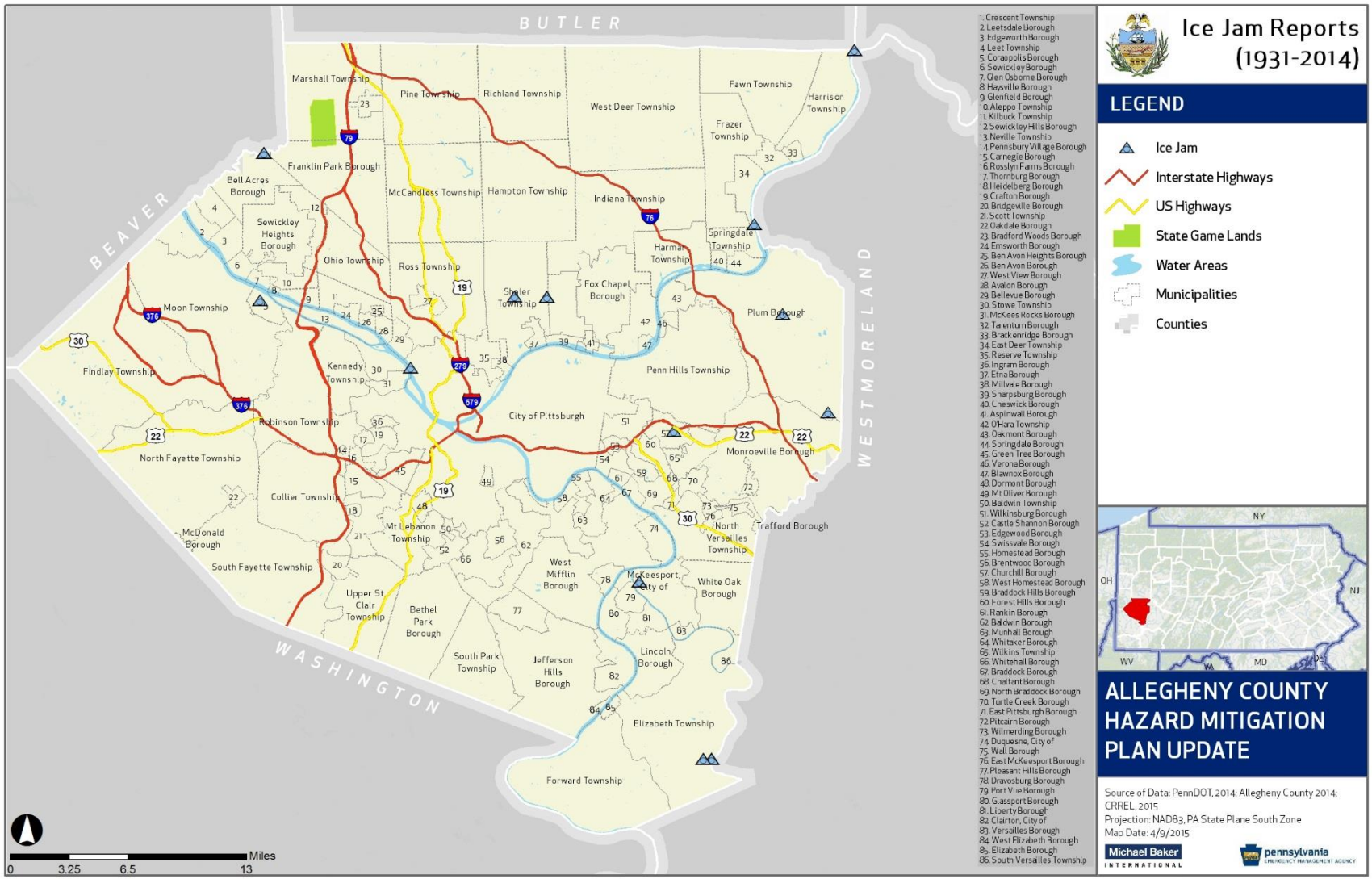
DATE	TYPE OF FLOOD EVENT	ESTIMATED DAMAGES ($)	DAMAGE DESCRIPTION
6/2/1998	Flash Flood	250,000	Flooding in Verona ($150,000 damages) and Wilkinsburg ($100,000 damages).
4/26/1998	Flash Flood	0	Flooding in Tarentum.
1/9/1998	Flood	0	Flooding county-wide.
7/1/1997	Flash Flood	10,000,000	429 homes, 12 businesses, 2 sewer systems, 1 park, and 13 roads/bridges in Pitcairn, Monroeville, Turtle Creek, and Wilkins Township were impacted; 13 structures in Pitcairn were moved from their foundations. An elementary school in Pitcairn (built over channelized creek bed) had several walls destroyed. Mud slide at a gas station along Route 22; bridge at the intersection of Routes 130 and 48 was washed out. 1 fatality.
6/18/1997	Flash Flood	0	Flooding in West Mifflin.
6/13/1997	Flash Flood	6,000	Flooding in Penn Hills.
5/25/1997	Flash Flood	10,000	Flooding in Penn Hills.
3/2/1997	Flood	0	Flooding in several counties.
8/8/1996	Flash Flood	80,000	Flooding in Pittsburgh.
7/20/1996	Flood	16,000	Flooding in several counties.
7/19/1996	Flood	54,000	Flooding in several counties. Allegheny River Boulevard in Pittsburgh experienced extensive flooding. Mudslides along Route 51.
6/24/1996	Flash Flood	150,000	Flooding in Pittsburgh.
6/19/1996	Flash Flood	3,100,000	Flooding in McKeesport ($3,100,000 damages) and Leetsdale (0 damages).
6/18/1996	Flash Flood	0	Flooding in Bridgeville.
6/8/1996	Flash Flood	0	Flooding in Monroeville.
5/18/1996	Flood	0	Flooding in several counties.
5/17/1996	Flash Flood	0	Flooding in Moon.
3/19/1996	Flood	8,000	Flooding in Pittsburgh.
1/19/1996	Flash Flood and Flood	35,500,000	Flooding in several counties. Flooding in Allegheny County ($9,600,000 damages). 650 buildings damages, many in downtown Pittsburgh sustained extensive basement flooding. 22 cars submerged, many pleasure boats/barges broke away and were destroyed. Allegheny County Sanitary Authority had to shut down its sewage treatment plant that serves 113 communities. Several hundred people had to be evacuated. Point Park Museum was flooded with 4.5 feet of water.
8/11/1995	Flash Flood	200,000	Flooding county-wide.
8/2/1995	Flash Flood and Flood	10,000	Flooding county-wide.

Table 4.3.3-2 Significant Flood Events in Allegheny County, 1968-2015 (NOAA and SHELDUS).			
DATE	TYPE OF FLOOD EVENT	ESTIMATED DAMAGES ($)	DAMAGE DESCRIPTION
7/15/1995	Flash Flood and Flood	2,000	Flooding in Monroeville.
6/24/1995	Flash Flood and Flood	70,000	Flooding county-wide.
6/21/1995	Flash Flood and Flood	12,000	Flooding in Emsworth ($5,000 damages), Avalon ($5,000 damages), Sewickley ($2,000), and Coraopolis (0 damages).
6/10/1995	Flash Flood and Flood	5,000	Flooding in Pittsburgh
6/3/1995	Flash Flood and Flood	0	Flooding in Pittsburgh.
8/27/1994	Flash Flood	550,000	Flooding county-wide.
8/2/1994	Flash Flood and Flood	0	Flooding in Pittsburgh.
7/6/1994	Flash Flood	50,000	Flooding in Pittsburgh.
6/18/1994	Flash Flood and Flood	0	Flooding in Sewickley.
3/10/1994	Flash Flood and Flood	0	Flooding in Pittsburgh.
1/28/1994	Flash Flood and Flood	5,000	Flooding county-wide.
8/16/1993	Flood	1,000	Flooding in Pittsburgh.
6/14/1990	Flash Flood	50,000	No additional details provided.
5/30/1986	Flash Flood	5,000,000	No additional details provided.
11/5/1985	Flood	500,000	No additional details provided.
5/24/1973	Heavy Rain, Flash Flooding	5,000	No additional details provided.
6/21/1972	Rain, Flooding	7,500,000	No additional details provided.
4/2/1970	Rain, Flooding	0	No additional details provided.
6/5/1968	Local Heavy Rain and Flooding	4,000	No additional details provided.

The Youghiogheny River and Pine Creek have also experienced localized flooding problems due to ice jams. Because of the shallow water and prominent sandbar conditions, the Youghiogheny River has caused flooding in the Boston area of Elizabeth Township and major ice flow damage in the McKeesport area (municipal docks). Just upstream from Boston (in the Coulter area), a massive sandbar can stop flowing ice and cause ice jams. After a period of time, large ice floes will break out of the jam and move downstream where they will again jam at the railroad bridge between Boston and McKeesport. At each jam, water will back up causing shore flooding, and as the jams start to break up and move downstream, they can cause damage to anything built near the shores. Pine Creek flows from North Park Lake through Hampton Township, Shaler Township, the Borough of Etna and Millvale and into the Allegheny River. On its path to the river, it runs along Route 8 with numerous crossings under Route 8. When ice forms in this stream, it can jam at the numerous turns or narrow spots, causing shoreline flooding. Figure 4.3.3-2

illustrates the locations of ice jams on Allegheny County's streams as documented in the US Army Corps of Engineers' Ice Jam Database.

Figure 4.3.3-5 Ice Jam Reports and Ice Sightings Reported to the US Army Corps of Engineers.



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

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

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 participating municipalities in Allegheny County are in the Regular Program; since the last HMP, Avalon Borough has been reinstated in the NFIP, and East Pittsburgh has joined the program.

The minimum floodplain management requirements include:

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

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

Table 4.3.3-3 NFIP Policies and Claims Information (CIS, 2015).

MUNICIPALITY	POLICIES-IN-FORCE	TOTAL PREMIUM AND COVERAGE	PRIOR CLAIMS	TOTAL AMOUNT OF PAID CLAIMS	SUBSTANTIAL DAMAGE CLAIMS
Aleppo Township	6	$1,130,555.00	2	$1,656.00	0
Aspinwall Borough	13	$1,937,569.00	13	$53,857.00	0
Avalon Borough	39	$7,765,599.00	22	$210,382.00	0
Baldwin Borough	6	$1,243,887.00	3	$4,984.00	0
Baldwin Township	8	$1,342,064.00	12	$129,627.00	0
Bell Acres Borough	2	$350,000.00	1	$8,191.00	1
Bellevue Borough	1	$105,000.00	0	$0.00	0
Ben Avon Borough	8	$1,023,706.00	6	$57,263.00	0
Ben Avon Heights Borough	52	$11,545,934.00	65	$381,237.00	0
Bethel Park, Municipality of	10	$2,443,721.00	3	$11,750.00	0
Blawnox Borough	21	$2,852,873.00	5	$14,369.00	0
Brackenridge Borough	5	$794,953.00	6	$41,963.00	0
Braddock Borough	9	$3,885,621.00	13	$28,025.00	0
Braddock Hills Borough	1	$280,000.00	1	$0.00	0
Bradford Woods Borough	7	$2,488,200.00	6	$16,673.00	0
Brentwood Borough	72	$10,462,228.00	143	$1,616,711.00	0
Bridgeville Borough	136	$30,096,609.00	68	$3,042,532.00	2
Carnegie Borough	21	$5,295,524.00	30	$180,707.00	5
Castle Shannon Borough	1	$280,000.00	1	$3,618.00	0
Chalfant Borough	6	$1,521,717.00	12	$51,646.00	0
Cheswick Borough	17	$3,649,357.00	10	$104,768.00	1
Churchill Borough	3	$95,109.00	16	$70,348.00	0

Table 4.3.3-3 NFIP Policies and Claims Information (CIS, 2015).

MUNICIPALITY	POLICIES-IN-FORCE	TOTAL PREMIUM AND COVERAGE	PRIOR CLAIMS	TOTAL AMOUNT OF PAID CLAIMS	SUBSTANTIAL DAMAGE CLAIMS
Clairton City	45	$10,800,525.00	35	$168,259.00	0
Collier Township	69	$11,525,986.00	25	$74,970.00	1
Coraopolis Borough	6	$958,173.00	6	$77,716.00	0
Crafton Borough	17	$1,389,143.00	3	$487.00	0
Crescent Township	2	$168,000.00	2	$2,902.00	0
Dormont Borough	4	$1,217,958.00	11	$68,543.00	0
Dravosburg Borough	2	$280,000.00	2	$0.00	0
Duquesne, City of	48	$7,654,304.00	23	$58,325.00	0
East Deer Township	1	$70,000.00	0	$0.00	1
East McKeesport Borough	3	$1,756,166.00	1	$143,139.00	0
East Pittsburgh Borough	5	$400,352.00	0	$0.00	0
Edgewood Borough	6	$2,032,729.00	2	$1,319.00	0
Edgeworth Borough	17	$3,021,292.00	53	$277,643.00	0
Elizabeth Borough	125	$15,921,785.00	134	$2,275,651.00	2
Elizabeth Township	20	$2,688,945.00	21	$262,817.00	7
Emsworth Borough	187	$26,074,117.00	242	$5,799,296.00	2
Etna Borough	50	$5,487,508.00	57	$641,762.00	32
Fawn Township	21	$4,323,849.00	9	$68,707.00	5
Findlay Township	21	$4,571,079.00	12	$63,616.00	0
Forest Hills Borough	12	$3,121,285.00	31	$159,664.00	2
Forward Township	15	$17,113,138.00	9	$25,084.00	0
Fox Chapel Borough	19	$5,424,869.00	3	$65,788.00	0
Franklin Park Borough	2	$191,000.00	2	$5,345.00	0
Frazer Township	2	$1,833,172.00	8	$26,077.00	0
Glassport Borough	12	$1,533,492.00	18	$127,530.00	0
Glen Osborne Borough	32	$4,947,191.00	35	$245,979.00	0
Glenfield Borough	6	$1,584,369.00	8	$43,364.00	1
Green Tree Borough	48	$12,038,394.00	100	$1,599,332.00	0
Hampton Township	51	$6,458,668.00	65	$1,193,256.00	10
Harmar Township	23	$2,390,140.00	13	$120,156.00	10
Harrison Township	7	$1,752,103.00	2	$3,749.00	2
Haysville Borough	43	$7,367,748.00	6	$701,823.00	0
Heidelberg Borough	2	$1,003,593.00	0	$0.00	3
Homestead Borough	23	$4,870,782.00	19	$130,552.00	0
Indiana Township	3	$339,900.00	2	$10,832.00	1
Ingram Borough	37	$9,749,411.00	63	$522,921.00	0

Table 4.3.3-3 NFIP Policies and Claims Information (CIS, 2015).

MUNICIPALITY	POLICIES-IN-FORCE	TOTAL PREMIUM AND COVERAGE	PRIOR CLAIMS	TOTAL AMOUNT OF PAID CLAIMS	SUBSTANTIAL DAMAGE CLAIMS
Jefferson Hills Borough	7	$2,036,139.00	0	$0.00	0
Kennedy Township	11	$2,395,800.00	13	$416,976.00	0
Kilbuck Township	31	$3,568,130.00	17	$112,522.00	1
Leet Township	50	$18,443,059.00	15	$29,949.00	1
Leetsdale Borough	1	$55,000.00	0	$0.00	0
Liberty Borough	4	$757,284.00	0	$0.00	0
Lincoln Borough	26	$7,860,429.00	4	$28,089.00	0
Marshall Township	71	$20,104,791.00	33	$668,055.00	1
McCandless, Town of	18	$3,176,442.00	23	$309,461.00	0
McDonald Borough	83	$25,338,453.00	76	$1,884,168.00	0
McKees Rocks Borough	21	$7,163,310.00	44	$458,475.00	0
McKeesport, City of	137	$15,451,884.00	224	$3,896,040.00	0
Millvale Borough	45	$18,260,582.00	32	$307,011.00	22
Monroeville, Municipality of	31	$6,202,357.00	8	$65,862.00	0
Moon Township	0	$0.00	0	$0.00	0
Mount Lebanon, Municipality of	59	$15,584,559.00	9	$41,014.00	0
Mount Oliver Borough	0	$0.00	0	$0.00	0
Munhall Borough	10	$1,193,253.00	5	$3,073.00	0
Neville Township	126	$24,758,875.00	23	$46,602.00	0
North Braddock Borough	0	$0.00	0	$0.00	0
North Fayette Township	52	$12,181,637.00	29	$1,221,606.00	3
North Versailles Township	10	$1,391,546.00	27	$64,900.00	0
Oakdale Borough	35	$7,996,032.00	59	$2,477,073.00	10
Oakmont Borough	79	$16,621,655.00	31	$61,004.00	0
O'Hara Township	95	$21,090,938.00	28	$156,843.00	0
Ohio Township	11	$2,478,285.00	3	$51,503.00	0
Penn Hills, Municipality of	48	$11,442,801.00	48	$223,911.00	3
Pennsbury Village Borough	0	$0.00	0	$0.00	N/A
Pine Township	7	$1,962,881.00	2	$19,894.00	0
Pitcairn Borough	67	$6,862,349.00	63	$567,908.00	1
Pittsburgh, City of	530	$190,228,943.00	557	$8,533,723.00	21
Pleasant Hills Borough	7	$1,295,423.00	7	$40,684.00	0
Plum Borough	38	$9,790,771.00	32	$789,077.00	3
Port Vue Borough	5	$2,315,354.00	5	$100,868.00	1
Rankin Borough	1	$28,000.00	1	$ 694.00	0
Reserve Township	17	$1,162,745.00	12	$28,133.00	3

Table 4.3.3-3 NFIP Policies and Claims Information (CIS, 2015).

MUNICIPALITY	POLICIES-IN-FORCE	TOTAL PREMIUM AND COVERAGE	PRIOR CLAIMS	TOTAL AMOUNT OF PAID CLAIMS	SUBSTANTIAL DAMAGE CLAIMS
Richland Township	17	$3,396,716.00	10	$52,801.00	0
Robinson Township	48	$13,208,225.00	28	$1,141,285.00	1
Ross Township	113	$30,561,419.00	149	$1,090,576.00	1
Rosslyn Farms Borough	6	$3,110,697.00	5	$2,894.00	0
Scott Township	47	$15,829,056.00	18	$276,783.00	0
Sewickley Borough	21	$6,758,711.00	14	$97,850.00	0
Sewickley Heights	4	$1,178,831.00	3	$25,599.00	0
Sewickley Hills Borough	6	$1,162,851.00	0	$0.00	0
Shaler Township	159	$32,827,583.00	221	$3,627,992.00	17
Sharpsburg Borough	112	$17,899,284.00	95	$1,507,064.00	7
South Fayette Township	69	$19,082,242.00	49	$2,903,103.00	2
South Park Township	35	$6,110,363.00	44	$982,524.00	0
South Versailles Township	5	$300,418.00	6	$14,710.00	1
Springdale Borough	1	$1,002,880.00	3	$4,726.00	1
Springdale Township	1	$105,000.00	3	$12,382.00	0
Stowe Township	10	$3,630,238.00	4	$20,745.00	0
Swissvale Borough	8	$1,155,753.00	1	$0.00	0
Tarentum Borough	28	$4,186,072.00	32	$251,151.00	5
Thornburg Borough	6	$2,907,207.00	5	$7,271.00	0
Trafford Borough	12	$3,339,308.00	10	$175,343.00	0
Turtle Creek Borough	54	$5,679,083.00	117	$1,043,418.00	2
Upper St. Clair Township	84	$23,917,217.00	38	$377,299.00	0
Verona Borough	45	$7,965,687.00	55	$406,242.00	0
Versailles Borough	3	$399,346.00	0	$0.00	0
Wall Borough	10	$1,207,874.00	0	$0.00	0
West Deer Township	37	$5,916,340.00	30	$94,594.00	1
West Elizabeth Borough	14	$1,712,412.00	65	$874,727.00	12
West Homestead Borough	2	$455,000.00	2	$ 382	0
West Mifflin Borough	12	$2,039,410.00	24	$207,439.00	1
West View Borough	7	$1,513,421.00	2	$5,720.00	0
Whitaker Borough	0	$0.00	0	$0.00	0
White Oak Borough	19	$3,021,453.00	14	$47,424.00	0
Whitehall Borough	11	$2,388,485.00	8	$80,330.00	0
Wilkins Township	24	$5,048,440.00	27	$854,158.00	1
Wilkinsburg Borough	4	$576,302.00	1	$4,042.00	0
Wilmerding Borough	5	$3,863,150.00	3	$4,294.00	0

Table 4.3.3-3 NFIP Policies and Claims Information (CIS, 2015).

MUNICIPALITY	POLICIES-IN-FORCE	TOTAL PREMIUM AND COVERAGE	PRIOR CLAIMS	TOTAL AMOUNT OF PAID CLAIMS	SUBSTANTIAL DAMAGE CLAIMS
GRAND TOTAL	**0**	**$965,307,573.00**	**0**	**$59,795,334.00**	**210**

In addition, Regular Program communities are eligible to participate in the NFIP's Community Rating System (CRS). Under the CRS, policyholders can receive premium discounts of 5 to 45 percent as their cities and towns adopt more comprehensive flood mitigation measures. Currently, there are 3 municipalities in Allegheny County that participate in CRS. They are the Etna Borough, Shaler Township, and Upper Saint Clair Township. For more information on Allegheny County's compliance with the NFIP and CRS, please see Section 5.2.1.3.

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

(a) Has incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event; and

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

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

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

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

As of June 30 2015, there were 392 repetitive loss and 17 severe repetitive loss properties in Allegheny County, none of which have been mitigated (PEMA, 2015). These repetitive loss properties are located in 68 of the 130 municipalities in Allegheny County. The highest concentrations of RL properties are in Pittsburgh, Millvale, Bridgeville, Ross Township, Turtle Creek, and Shaler Township, as shown in Table 4.3.3-4.

Table 4.3.3-4 Summary of Repetitive Loss Properties

COMMUNITY NAME	OCCUPANCY					GRAND TOTAL
	SINGLE FAMILY	2-4 FAMILY	ASSUMED CONDO	OTHER RESIDENTIAL	NON RESIDENTIAL	
Baldwin Borough	2	1	0	0	0	3
Baldwin Township	0	0	0	0	1	1
Bell Acres Borough	2	0	0	0	0	2
Bellevue Borough	0	0	0	0	1	1
Bethel Park, Municipality of	4	0	0	0	1	5
Blawnox Borough	1	0	0	0	0	1
Braddock Hills Borough	1	0	0	0	0	1
Brentwood Borough	1	0	0	0	0	1
Bridgeville Borough	15	3	0	0	4	22
Carnegie Borough	4	0	0	0	2	6
Castle Shannon Borough	0	0	0	1	2	3
Churchill Borough	1	0	0	0	0	1
Clairton City	2	0	0	0	1	3
Collier Township	5	0	0	0	1	6
Coraopolis Borough	1	0	0	0	0	1
East Deer Township	3	0	0	0	0	3
Elizabeth Borough	4	0	0	0	1	5
Elizabeth Township	2	0	0	0	1	3
Emsworth Borough	1	0	0	0	1	2
Etna Borough	11	3	0	1	2	17
Fawn Township	8	1	1	0	0	10
Findlay Township	0	0	0	0	1	1
Forest Hills Borough	2	0	0	0	0	2
Forward Township	1	0	0	0	0	1
Glen Osborne Borough	4	0	0	0	0	4
Glenfield Borough	5	0	0	0	0	5
Green Tree Borough	2	0	0	0	0	2

Table 4.3.3-4 Summary of Repetitive Loss Properties

COMMUNITY NAME	OCCUPANCY					GRAND TOTAL
	SINGLE FAMILY	2-4 FAMILY	ASSUMED CONDO	OTHER RESIDENTIAL	NON RESIDENTIAL	
Hampton Township	6	0	1	0	0	7
Harmar Township	11	0	0	0	0	11
Harrison Township	1	0	0	0	0	1
Jefferson Hills Borough	3	0	0	0	3	6
Kilbuck Township	1	0	0	0	1	2
McCandless, Town of	3	0	0	0	1	4
McDonald Borough	2	0	0	0	0	2
McKees Rocks Borough	4	0	1	0	3	8
McKeesport, City of	2	0	0	0	1	3
Millvale Borough	32	6	0	1	4	43
Monroeville, Municipality of	3	0	0	0	0	3
Neville Township	1	0	0	0	0	1
North Fayette Township	3	0	0	0	1	4
North Versailles Township	1	2	0	0	1	4
Oakdale Borough	3	0	0	0	2	5
Oakmont Borough	1	0	0	0	0	1
O'Hara Township	1	0	0	0	0	1
Penn Hills, Municipality of	3	0	0	0	2	5
Pitcairn Borough	0	1	0	0	1	2
Pittsburgh, City of	27	4	0	1	18	50
Pleasant Hills Borough	1	0	0	0	0	1
Plum Borough	1	0	0	0	3	4
Reserve Township	1	0	0	0	0	1
Richland Township	1	0	0	0	0	1
Robinson Township	0	0	0	0	4	4
Ross Township	12	0	0	1	9	22
Scott Township	1	0	0	0	0	1
Sewickley Borough	1	0	0	0	1	2

Table 4.3.3-4 Summary of Repetitive Loss Properties						
	OCCUPANCY					
COMMUNITY NAME	SINGLE FAMILY	2-4 FAMILY	ASSUMED CONDO	OTHER RESIDENTIAL	NON RESIDENTIAL	GRAND TOTAL
Shaler Township	15	1	0	0	2	18
Sharpsburg Borough	2	1	0	0	3	6
South Fayette Township	4	0	0	0	1	5
South Park Township	2	0	0	0	3	5
Stowe Township	0	0	0	0	1	1
Trafford Borough	1	0	0	0	0	1
Turtle Creek Borough	16	4	0	0	1	21
Upper St. Clair Township	2	0	0	0	3	5
Verona Borough	3	1	0	0	2	6
West Deer Township	1	0	0	0	0	1
West Elizabeth Borough	4	0	0	0	0	4
West Mifflin Borough	3	0	0	0	1	4
Wilkins Township	3	0	0	0	1	4
Grand Total	**264**	**28**	**3**	**5**	**92**	**392**

Table 4.3.3-5 shows the number of severe repetitive loss properties by municipality and property type.

Table 4.3.3-5 Summary of Severe Repetitive Loss Properties, 2015.			
	OCCUPANCY		
COMMUNITY NAME	NON RESIDENTIAL	ASSUMED CONDO	SINGLE FAMILY
Bethel Park, Municipality of	1	0	0
Elizabeth Borough	1	0	0
Elizabeth Township	1	0	0
Etna Borough	1	0	0
Hampton Township	0	1	
Jefferson Hills Borough	2	0	0
McCandless, Town of	1	0	0
Pitcairn Borough	1	0	0
Pittsburgh, City of	3	0	1
Ross Township	1	0	1
Shaler Township	0	0	1
South Park Township	1	0	0
Grand Total	**13**	**1**	**3**

4.3.3.4 Future Occurrence

In Allegheny County, flooding occurs commonly and can occur during any season of the year. Therefore the future occurrence of floods in Allegheny County can be characterized as *highly likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. The NFIP recognizes the 1%-annual-chance flood, also known as the base flood, as the standard for identifying properties subject to federal flood insurance purchase requirements. 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 4.3.3-6 shows a range of flood recurrence intervals and associated probabilities of occurrence.

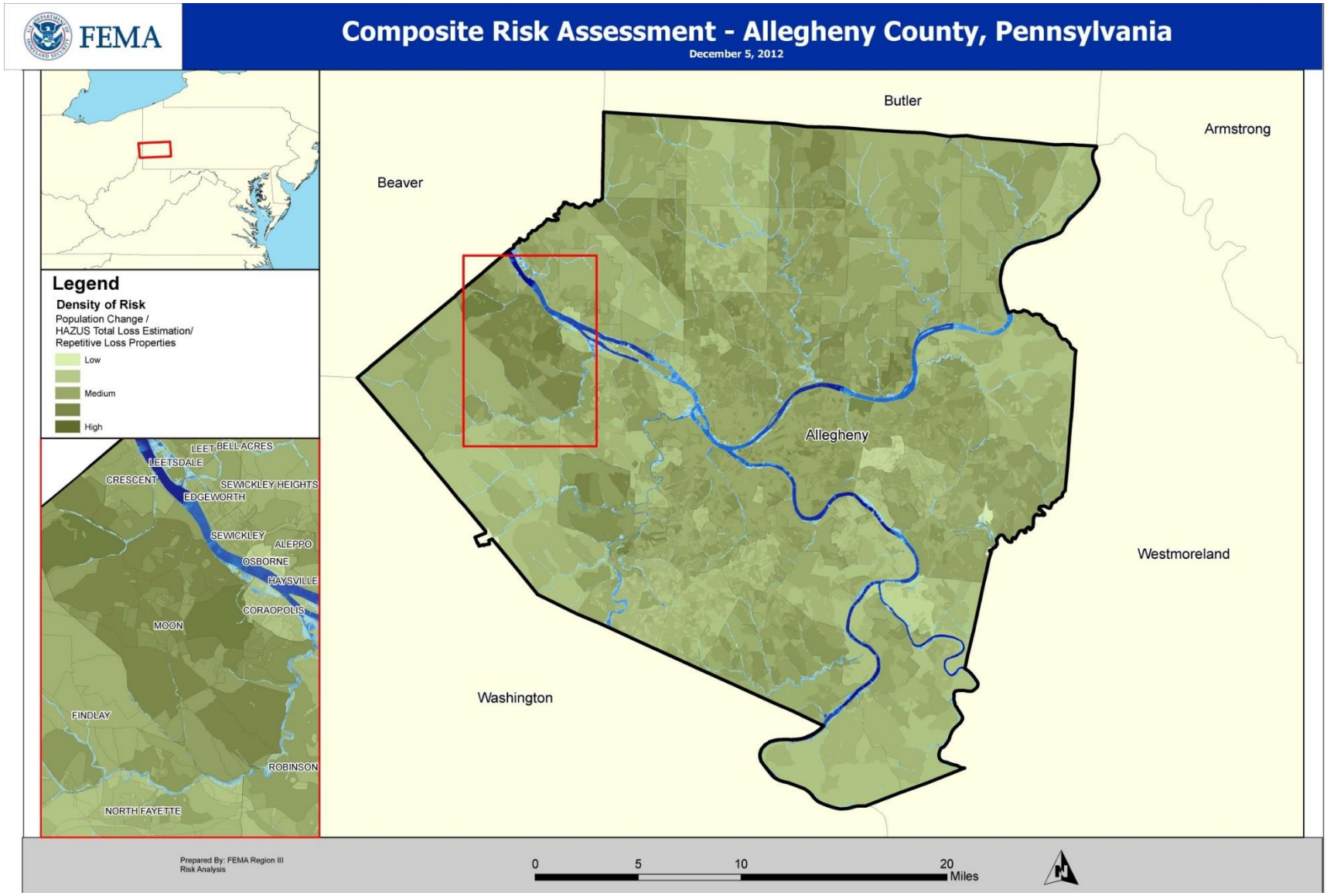
Table 4.3.3-6 Recurrence Intervals and Associated Probabilities of Occurrence (FEMA, 2001).

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

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.

In addition to the flood recurrence intervals, during the Risk MAP process, FEMA conducted a composite risk assessment that identified areas of the county by 'density of risk' – a measure incorporating population change, total economic losses calculated by Hazus, and repetitive loss properties. Figure 4.3.3-5 shows this Composite Risk Assessment, indicating that some of the areas of densest risk are north and west of Pittsburgh out the I-376 corridor and near the Pittsburgh Airport.

Figure 4.3.3-6 Allegheny County Composite Risk Assessment (FEMA, 2012).



4.3.3.5 Vulnerability Assessment

Allegheny County is vulnerable to flooding that causes loss of lives, property damage, and road closures. For purposes of assessing vulnerability, the County focused on community assets that are located in the 1%-annual-chance floodplain. While greater and smaller floods are possible, information about the extent and depths for this floodplain is available for all municipalities countywide, thus providing a consistent basis for analysis. Flood vulnerability maps for each applicable local municipality, showing the 1%-annual-chance flood hazard area and addressable structures, critical facilities and transportation routes within it, are included in Appendix D. These maps were created using the 2014 Effective DFIRM data.

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

Other concerns during a flood include the safety of mobile homes and trailers, as they are typically lightweight and unanchored, and of hazardous material facilities. Table 4.3.3-7 provides the number of mobile homes and SARA facilities in the floodplain by jurisdiction. For more information on the number of mobile homes in each community, see Section 4.3.9.5; for the vulnerability of specific SARA facilities, see Appendix E.

Table 4.3.3-7 Mobile Home and SARA Facility Flood Vulnerability.

MUNICIPALITY	MOBILE HOMES	MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA	SARA FACILITIES	SARA FACILITIES IN SFHA	PERCENT SARA FACILITIES IN SFHA
Aleppo Township	0	0	0.0%	0	0	0.0%
Aspinwall Borough	0	0	0.0%	0	0	0.0%
Avalon Borough	0	0	0.0%	1	0	0.0%
Baldwin Borough	0	0	0.0%	1	0	0.0%
Baldwin Township	0	0	0.0%	0	0	0.0%
Bell Acres Borough	6	1	16.7%	1	0	0.0%
Bellevue Borough	0	0	0.0%	1	0	0.0%
Ben Avon Borough	0	0	0.0%	0	0	0.0%
Ben Avon Heights Borough	0	0	0.0%	0	0	0.0%
Bethel Park, Municipality of	3	0	0.0%	6	0	0.0%
Blawnox Borough	2	0	0.0%	1	0	0.0%
Brackenridge Borough	3	0	0.0%	2	1	50.0%
Braddock Borough	0	0	0.0%	3	0	0.0%
Braddock Hills Borough	4	0	0.0%	0	0	0.0%
Bradford Woods Borough	0	0	0.0%	0	0	0.0%
Brentwood Borough	0	0	0.0%	2	0	0.0%

Table 4.3.3-7 Mobile Home and SARA Facility Flood Vulnerability.

MUNICIPALITY	MOBILE HOMES	MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA	SARA FACILITIES	SARA FACILITIES IN SFHA	PERCENT SARA FACILITIES IN SFHA
Bridgeville Borough	0	0	0.0%	1	0	0.0%
Carnegie Borough	1	0	0.0%	5	0	0.0%
Castle Shannon Borough	0	0	0.0%	1	0	0.0%
Chalfant Borough	1	0	0.0%	0	0	0.0%
Cheswick Borough	0	0	0.0%	0	0	0.0%
Churchill Borough	0	0	0.0%	0	0	0.0%
Clairton City	0	0	0.0%	4	0	0.0%
Collier Township	321	0	0.0%	6	1	16.7%
Coraopolis Borough	2	0	0.0%	3	1	33.3%
Crafton Borough	0	0	0.0%	1	0	0.0%
Crescent Township	35	2	5.7%	0	0	0.0%
Dormont Borough	0	0	0.0%	2	0	0.0%
Dravosburg Borough	3	0	0.0%	1	0	0.0%
Duquesne, City of	10	0	0.0%	3	0	0.0%
East Deer Township	1	0	0.0%	4	3	75.0%
East McKeesport Borough	1	0	0.0%	1	0	0.0%
East Pittsburgh Borough	1	0	0.0%	0	0	0.0%
Edgewood Borough	0	0	0.0%	0	0	0.0%
Edgeworth Borough	0	0	0.0%	0	0	0.0%
Elizabeth Borough	1	0	0.0%	1	0	0.0%
Elizabeth Township	86	5	5.8%	6	0	0.0%
Emsworth Borough	0	0	0.0%	1	1	100.0%
Etna Borough	0	0	0.0%	1	1	100.0%
Fawn Township	54	2	3.7%	3	0	0.0%
Findlay Township	71	1	1.4%	15	0	0.0%
Forest Hills Borough	0	0	0.0%	0	0	0.0%
Forward Township	274	5	1.8%	3	0	0.0%
Fox Chapel Borough	0	0	0.0%	2	0	0.0%
Franklin Park Borough	1	0	0.0%	0	0	0.0%
Frazer Township	43	0	0.0%	7	0	0.0%
Glassport Borough	1	0	0.0%	4	0	0.0%
Glen Osborne Borough	0	0	0.0%	0	0	0.0%
Glenfield Borough	0	0	0.0%	0	0	0.0%
Green Tree Borough	0	0	0.0%	1	0	0.0%
Hampton Township	5	0	0.0%	5	1	20.0%
Harmar Township	102	0	0.0%	12	0	0.0%
Harrison Township	6	0	0.0%	2	0	0.0%

Table 4.3.3-7 Mobile Home and SARA Facility Flood Vulnerability.

MUNICIPALITY	MOBILE HOMES	MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA	SARA FACILITIES	SARA FACILITIES IN SFHA	PERCENT SARA FACILITIES IN SFHA
Haysville Borough	0	0	0.0%	0	0	0.0%
Heidelberg Borough	2	0	0.0%	0	0	0.0%
Homestead Borough	0	0	0.0%	1	0	0.0%
Indiana Township	164	1	0.6%	11	0	0.0%
Ingram Borough	0	0	0.0%	0	0	0.0%
Jefferson Hills Borough	63	1	1.6%	8	2	25.0%
Kennedy Township	3	0	0.0%	4	0	0.0%
Kilbuck Township	1	0	0.0%	0	0	0.0%
Leet Township	0	0	0.0%	0	0	0.0%
Leetsdale Borough	0	0	0.0%	7	1	14.3%
Liberty Borough	1	0	0.0%	0	0	0.0%
Lincoln Borough	20	0	0.0%	0	0	0.0%
Marshall Township	1	0	0.0%	5	0	0.0%
McCandless, Town of	3	0	0.0%	3	0	0.0%
McDonald Borough	1	0	0.0%	0	0	0.0%
McKees Rocks Borough	2	0	0.0%	2	0	0.0%
McKeesport, City of	1	0	0.0%	5	0	0.0%
Millvale Borough	0	0	0.0%	1	0	0.0%
Monroeville, Municipality of	6	0	0.0%	17	1	5.9%
Moon Township	39	15	38.5%	8	1	12.5%
Mount Lebanon, Municipality of	0	0	0.0%	0	0	0.0%
Mount Oliver Borough	0	0	0.0%	1	0	0.0%
Munhall Borough	1	0	0.0%	1	0	0.0%
Neville Township	1	0	0.0%	19	5	26.3%
North Braddock Borough	0	0	0.0%	3	0	0.0%
North Fayette Township	917	57	6.2%	6	0	0.0%
North Versailles Township	39	0	0.0%	2	0	0.0%
Oakdale Borough	3	0	0.0%	14	1	7.1%
Oakmont Borough	0	1	0.0%	1	0	0.0%
O'Hara Township	0	0	0.0%	3	0	0.0%
Ohio Township	2	0	0.0%	4	0	0.0%
Penn Hills, Municipality of	11	0	0.0%	8	0	0.0%
Pennsbury Village Borough	0	0	0.0%	0	0	0.0%
Pine Township	0	0	0.0%	2	0	0.0%
Pitcairn Borough	3	0	0.0%	0	0	0.0%
Pittsburgh, City of	152	0	0.0%	100	9	9.0%
Pleasant Hills Borough	0	0	0.0%	1	0	0.0%

Table 4.3.3-7 Mobile Home and SARA Facility Flood Vulnerability.

MUNICIPALITY	MOBILE HOMES	MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA	SARA FACILITIES	SARA FACILITIES IN SFHA	PERCENT SARA FACILITIES IN SFHA
Plum Borough	241	42	17.4%	14	1	7.1%
Port Vue Borough	1	1	100.0%	1	0	0.0%
Rankin Borough	0	0	0.0%	1	0	0.0%
Reserve Township	0	0	0.0%	0	0	0.0%
Richland Township	39	0	0.0%	1	0	0.0%
Robinson Township	321	0	0.0%	11	0	0.0%
Ross Township	2	0	0.0%	4	0	0.0%
Rosslyn Farms Borough	0	0	0.0%	0	0	0.0%
Scott Township	2	0	0.0%	1	0	0.0%
Sewickley Borough	0	0	0.0%	3	1	33.3%
Sewickley Heights	0	0	0.0%	1	0	0.0%
Sewickley Hills Borough	0	0	0.0%	0	0	0.0%
Shaler Township	77	1	1.3%	5	3	60.0%
Sharpsburg Borough	0	0	0.0%	1	0	0.0%
South Fayette Township	12	1	8.3%	7	0	0.0%
South Park Township	1	0	0.0%	1	0	0.0%
South Versailles Township	12	0	0.0%	0	0	0.0%
Springdale Borough	3	0	0.0%	7	0	0.0%
Springdale Township	78	0	0.0%	1	0	0.0%
Stowe Township	1	0	0.0%	5	0	0.0%
Swissvale Borough	0	0	0.0%	1	0	0.0%
Tarentum Borough	6	0	0.0%	6	3	50.0%
Thornburg Borough	0	0	0.0%	1	0	0.0%
Trafford Borough	1	0	0.0%	0	0	0.0%
Turtle Creek Borough	0	0	0.0%	3	0	0.0%
Upper St. Clair Township	0	0	0.0%	2	0	0.0%
Verona Borough	2	1	50.0%	1	0	0.0%
Versailles Borough	0	0	0.0%	0	0	0.0%
Wall Borough	3	0	0.0%	1	0	0.0%
West Deer Township	164	1	0.6%	4	0	0.0%
West Elizabeth Borough	39	22	56.4%	3	0	0.0%
West Homestead Borough	0	0	0.0%	2	0	0.0%
West Mifflin Borough	284	7	2.5%	21	0	0.0%
West View Borough	0	0	0.0%	1	0	0.0%
Whitaker Borough	0	0	0.0%	0	0	0.0%
White Oak Borough	47	0	0.0%	1	0	0.0%
Whitehall Borough	0	0	0.0%	3	0	0.0%

Table 4.3.3-7 Mobile Home and SARA Facility Flood Vulnerability.

MUNICIPALITY	MOBILE HOMES	MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA	SARA FACILITIES	SARA FACILITIES IN SFHA	PERCENT SARA FACILITIES IN SFHA
Wilkins Township	0	0	0.0%	3	0	0.0%
Wilkinsburg Borough	0	0	0.0%	2	0	0.0%
Wilmerding Borough	0	0	0.0%	1	0	0.0%
GRAND TOTAL	**3,810**	**167**	**4.4%**	**470**	**37**	**7.9%**

Table 4.3.4-8 displays the number of structures, critical facilities, and populations intersecting the SFHA. The number of vulnerable structures was calculated by overlaying the structures with the SFHA. Similarly, the estimated population in the SFHA was calculated by overlaying the centroids of the 2010 Census blocks with the SFHA; while clearly an estimate, using the block centroid helps to minimize overestimation of floodprone populations. One community, Glenfield Borough, has more than half of its structures in the SFHA, and Haysville, Millvale, and West Elizabeth Boroughs all have over 25% of their structures in the floodplain. Countywide, 4.9% of the county-defined critical facilities are located in the SFHA, a total of 109 facilities. Table 4.3.4-9 shows the number of structures in the SFHA by generalized land use type. Unsurprisingly, most vulnerable structures are residential properties.

Table 4.3.3-8 Community Flood Vulnerability for Allegheny County.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN SFHA	PERCENT STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	2010 POPULATION	ESTIMATED POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Aleppo Township	622	2	0.3%	6	0	0.0%	1,916	0	0.0%
Aspinwall Borough	1,205	1	0.1%	7	0	0.0%	2,801	3	0.1%
Avalon Borough	1,611	11	0.7%	6	0	0.0%	4,705	43	0.9%
Baldwin Borough	7,939	45	0.6%	24	0	0.0%	19,767	100	0.5%
Baldwin Township	947	27	2.9%	2	0	0.0%	1,992	0	0.0%
Bell Acres Borough	610	12	2.0%	6	1	16.7%	1,388	2	0.1%
Bellevue Borough	2,785	1	0.0%	11	0	0.0%	8,370	1	0.0%
Ben Avon Borough	744	8	1.1%	3	0	0.0%	1,781	5	0.3%
Ben Avon Heights Borough	143	0	0.0%	1	0	0.0%	371	0	0.0%
Bethel Park, Municipality of	12,562	5	0.0%	33	0	0.0%	32,313	15	0.0%
Blawnox Borough	669	27	4.0%	7	0	0.0%	1,432	0	0.0%
Brackenridge Borough	1,483	88	5.9%	10	1	10.0%	3,260	178	5.5%
Braddock Borough	1,799	34	1.9%	13	0	0.0%	2,159	1	0.0%
Braddock Hills Borough	864	0	0.0%	2	0	0.0%	1,880	0	0.0%
Bradford Woods Borough	500	0	0.0%	3	0	0.0%	1,171	0	0.0%
Brentwood Borough	4,239	0	0.0%	14	0	0.0%	9,643	0	0.0%
Bridgeville Borough	2,160	192	8.9%	8	0	0.0%	5,148	191	3.7%
Carnegie Borough	3,499	37	1.1%	17	1	5.9%	7,972	187	2.3%
Castle Shannon Borough	3,153	26	0.8%	9	1	11.1%	8,316	38	0.5%
Chalfant Borough	422	0	0.0%	2	0	0.0%	800	0	0.0%
Cheswick Borough	880	2	0.2%	7	0	0.0%	1,746	0	0.0%
Churchill Borough	1,499	3	0.2%	9	0	0.0%	3,011	0	0.0%
Clairton City	4,331	0	0.0%	14	1	7.1%	6,796	0	0.0%
Collier Township	4,149	57	1.4%	21	2	9.5%	7,080	87	1.2%
Coraopolis Borough	2,601	183	7.0%	13	2	15.4%	5,677	610	10.7%
Crafton Borough	2,338	5	0.2%	9	0	0.0%	5,951	7	0.1%

Table 4.3.3-8 Community Flood Vulnerability for Allegheny County.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN SFHA	PERCENT STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	2010 POPULATION	ESTIMATED POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Crescent Township	1,135	19	1.7%	4	0	0.0%	2,640	43	1.6%
Dormont Borough	3,458	0	0.0%	8	0	0.0%	8,593	0	0.0%
Dravosburg Borough	798	35	4.4%	4	1	25.0%	1,792	7	0.4%
Duquesne, City of	3,308	0	0.0%	15	1	6.7%	5,565	0	0.0%
East Deer Township	784	146	18.6%	12	3	25.0%	1,500	125	8.3%
East McKeesport Borough	1,047	0	0.0%	5	0	0.0%	2,126	0	0.0%
East Pittsburgh Borough	803	0	0.0%	5	0	0.0%	1,822	52	2.9%
Edgewood Borough	1,334	0	0.0%	6	0	0.0%	3,118	0	0.0%
Edgeworth Borough	667	1	0.1%	5	0	0.0%	1,680	0	0.0%
Elizabeth Borough	677	44	6.5%	8	2	25.0%	1,493	106	7.1%
Elizabeth Township	5,864	314	5.4%	26	6	23.1%	13,271	632	4.8%
Emsworth Borough	918	25	2.7%	3	1	33.3%	2,449	31	1.3%
Etna Borough	1,611	361	22.4%	7	4	57.1%	3,451	633	18.3%
Fawn Township	1,096	75	6.8%	9	2	22.2%	2,376	155	6.5%
Findlay Township	2,789	72	2.6%	20	0	0.0%	5,060	113	2.2%
Forest Hills Borough	3,154	0	0.0%	13	0	0.0%	6,518	0	0.0%
Forward Township	1,667	54	3.2%	17	2	11.8%	3,376	64	1.9%
Fox Chapel Borough	1,951	1	0.1%	11	0	0.0%	5,388	0	0.0%
Franklin Park Borough	5,267	6	0.1%	10	0	0.0%	13,470	44	0.3%
Frazer Township	675	1	0.1%	12	0	0.0%	1,157	13	1.1%
Glassport Borough	2,115	1	0.0%	11	1	9.1%	4,483	40	0.9%
Glen Osborne Borough	231	25	10.8%	2	0	0.0%	547	58	10.6%
Glenfield Borough	112	70	62.5%	0	0	0.0%	205	115	56.1%
Green Tree Borough	2,109	0	0.0%	7	0	0.0%	4,432	0	0.0%
Hampton Township	7,202	76	1.1%	35	6	17.1%	18,363	201	1.1%
Harmar Township	1,818	12	0.7%	24	1	4.0%	2,921	0	0.0%

Table 4.3.3-8 Community Flood Vulnerability for Allegheny County.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN SFHA	PERCENT STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	2010 POPULATION	ESTIMATED POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Harrison Township	5,099	12	0.2%	22	0	0.0%	10,461	4	0.0%
Haysville Borough	49	19	38.8%	1	0	0.0%	70	23	32.9%
Heidelberg Borough	639	39	6.1%	4	0	0.0%	1,244	45	3.6%
Homestead Borough	1,582	0	0.0%	7	0	0.0%	3,165	0	0.0%
Indiana Township	3,348	42	1.3%	28	1	3.6%	7,253	41	0.6%
Ingram Borough	1,301	0	0.0%	7	0	0.0%	3,330	0	0.0%
Jefferson Hills Borough	5,121	53	1.0%	24	2	8.3%	10,619	32	0.3%
Kennedy Township	3,585	3	0.1%	14	0	0.0%	7,672	0	0.0%
Kilbuck Township	370	9	2.4%	3	0	0.0%	697	0	0.0%
Leet Township	637	55	8.6%	4	0	0.0%	1,634	271	16.6%
Leetsdale Borough	611	42	6.9%	12	1	8.3%	1,218	34	2.8%
Liberty Borough	1,153	0	0.0%	8	0	0.0%	2,551	0	0.0%
Lincoln Borough	573	4	0.7%	4	0	0.0%	1,072	0	0.0%
Marshall Township	3,479	45	1.3%	13	0	0.0%	6,915	57	0.8%
McCandless, Town of	10,876	35	0.3%	40	1	2.5%	28,457	163	0.6%
McDonald Borough	184	2	1.1%	2	0	0.0%	383	25	6.5%
McKees Rocks Borough	2,838	166	5.8%	9	3	33.3%	6,104	490	8.0%
McKeesport, City of	10,265	137	1.3%	43	2	4.7%	19,731	728	3.7%
Millvale Borough	1,736	441	25.4%	5	0	0.0%	3,744	775	20.7%
Monroeville, Municipality of	11,215	19	0.2%	66	2	3.0%	28,386	19	0.1%
Moon Township	10,065	51	0.5%	31	3	9.7%	24,185	89	0.4%
Mount Lebanon, Municipality of	11,586	3	0.0%	38	0	0.0%	33,137	88	0.3%
Mount Oliver Borough	1,506	0	0.0%	4	0	0.0%	3,403	0	0.0%
Munhall Borough	5,167	46	0.9%	17	1	5.9%	11,406	302	2.6%
Neville Township	599	126	21.0%	22	8	36.4%	1,084	243	22.4%

Table 4.3.3-8 Community Flood Vulnerability for Allegheny County.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN SFHA	PERCENT STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	2010 POPULATION	ESTIMATED POPULATION IN SFHA	PERCENT POPULATION IN SFHA
North Braddock Borough	2,920	0	0.0%	14	0	0.0%	4,857	0	0.0%
North Fayette Township	6,948	95	1.4%	29	2	6.9%	13,934	96	0.7%
North Versailles Township	4,687	17	0.4%	14	0	0.0%	10,229	0	0.0%
Oakdale Borough	3,954	106	2.7%	25	1	4.0%	1,459	81	5.6%
Oakmont Borough	673	89	13.2%	3	0	0.0%	6,303	83	1.3%
O'Hara Township	2,848	93	3.3%	17	0	0.0%	8,407	78	0.9%
Ohio Township	2,424	7	0.3%	15	0	0.0%	4,757	0	0.0%
Penn Hills, Municipality of	19,504	16	0.1%	52	1	1.9%	42,329	233	0.6%
Pennsbury Village Borough	503	0	0.0%	3	0	0.0%	661	0	0.0%
Pine Township	4,688	6	0.1%	14	0	0.0%	11,497	0	0.0%
Pitcairn Borough	1,389	213	15.3%	6	1	16.7%	3,294	538	16.3%
Pittsburgh, City of	130,310	848	0.7%	505	17	3.3%	305,704	3038	1.0%
Pleasant Hills Borough	3,239	0	0.0%	10	0	0.0%	8,268	0	0.0%
Plum Borough	10,864	72	0.7%	42	2	4.7%	27,126	128	0.5%
Port Vue Borough	1,824	9	0.5%	5	0	0.0%	3,798	51	1.3%
Rankin Borough	784	0	0.0%	3	0	0.0%	2,122	0	0.0%
Reserve Township	1,554	33	2.1%	8	1	12.5%	3,333	0	0.0%
Richland Township	4,553	9	0.2%	17	1	5.9%	11,100	39	0.4%
Robinson Township	6,093	50	0.8%	29	0	0.0%	13,354	72	0.5%
Ross Township	13,249	86	0.6%	35	0	0.0%	31,105	248	0.8%
Rosslyn Farms Borough	212	0	0.0%	3	0	0.0%	427	0	0.0%
Scott Township	6,160	55	0.9%	21	1	4.8%	17,024	72	0.4%
Sewickley Borough	1,551	6	0.4%	12	2	16.7%	3,827	22	0.6%
Sewickley Heights	425	2	0.5%	3	0	0.0%	810	0	0.0%
Sewickley Hills Borough	265	3	1.1%	3	0	0.0%	639	0	0.0%
Shaler Township	12,428	304	2.4%	24	4	16.7%	28,757	449	1.6%

Table 4.3.3-8 Community Flood Vulnerability for Allegheny County.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN SFHA	PERCENT STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	2010 POPULATION	ESTIMATED POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Sharpsburg Borough	1,570	274	17.5%	7	2	28.6%	3,446	380	11.0%
South Fayette Township	6,421	96	1.5%	23	2	8.7%	14,416	811	5.6%
South Park Township	5,127	46	0.9%	17	1	5.9%	13,416	46	0.3%
South Versailles Township	163	16	9.8%	3	1	33.3%	351	0	0.0%
Springdale Borough	1,573	0	0.0%	14	0	0.0%	3,405	0	0.0%
Springdale Township	860	1	0.1%	4	0	0.0%	1,636	0	0.0%
Stowe Township	3,161	0	0.0%	13	0	0.0%	6,362	0	0.0%
Swissvale Borough	4,109	0	0.0%	12	0	0.0%	8,983	0	0.0%
Tarentum Borough	2,109	46	2.2%	19	3	15.8%	4,530	174	3.8%
Thornburg Borough	190	0	0.0%	3	0	0.0%	455	59	13.0%
Trafford Borough	51	1	2.0%	2	0	0.0%	61	0	0.0%
Turtle Creek Borough	2,165	171	7.9%	13	0	0.0%	5,349	263	4.9%
Upper St. Clair Township	7,419	52	0.7%	19	0	0.0%	19,229	254	1.3%
Verona Borough	1,264	133	10.5%	7	1	14.3%	2,474	198	8.0%
Versailles Borough	669	0	0.0%	5	0	0.0%	1,515	0	0.0%
Wall Borough	370	21	5.7%	2	0	0.0%	580	0	0.0%
West Deer Township	5,424	47	0.9%	22	0	0.0%	11,771	251	2.1%
West Elizabeth Borough	291	102	35.1%	5	1	20.0%	518	139	26.8%
West Homestead Borough	1,112	13	1.2%	5	0	0.0%	1,929	35	1.8%
West Mifflin Borough	8,856	27	0.3%	54	0	0.0%	20,313	32	0.2%
West View Borough	2,669	0	0.0%	13	0	0.0%	6,771	0	0.0%
Whitaker Borough	618	0	0.0%	1	0	0.0%	1,271	0	0.0%
White Oak Borough	3,739	27	0.7%	11	2	18.2%	7,862	14	0.2%
Whitehall Borough	5,426	2	0.0%	16	0	0.0%	13,944	57	0.4%
Wilkins Township	2,761	54	2.0%	13	0	0.0%	6,357	69	1.1%
Wilkinsburg Borough	7,156	0	0.0%	25	0	0.0%	15,930	0	0.0%

Table 4.3.3-8 Community Flood Vulnerability for Allegheny County.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN SFHA	PERCENT STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	2010 POPULATION	ESTIMATED POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Wilmerding Borough	848	2	0.2%	4	0	0.0%	2,190	0	0.0%
GRAND TOTAL	**530,098**	**6,703**	**1.3%**	**2,208**	**109**	**4.9%**	**1,223,348**	**15,339**	**1.3%**

Table 4.3.3-9 Structures Vulnerable to Flooding by Generalized Land Use.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Aleppo Township	622	0	0	0	0	0	2	0	0	2
Aspinwall Borough	1,205	0	1	0	0	0	0	0	0	1
Avalon Borough	1,611	0	2	1	1	0	7	0	0	11
Baldwin Borough	7,939	0	3	0	1	2	38	1	0	45
Baldwin Township	947	0	20	0	6	0	1	0	0	27
Bell Acres Borough	610	0	1	0	1	0	10	0	0	12
Bellevue Borough	2,785	0	0	0	0	0	1	0	0	1
Ben Avon Borough	744	0	2	0	2	0	4	0	0	8
Ben Avon Heights Borough	143	0	0	0	0	0	0	0	0	0
Bethel Park, Municipality of	12,562	0	2	0	1	0	2	0	0	5
Blawnox Borough	669	0	1	0	0	0	26	0	0	27
Brackenridge Borough	1,483	0	0	1	0	1	84	2	0	88
Braddock Borough	1,799	0	6	3	2	0	22	0	1	34
Braddock Hills Borough	864	0	0	0	0	0	0	0	0	0
Bradford Woods Borough	500	0	0	0	0	0	0	0	0	0
Brentwood Borough	4,239	0	0	0	0	0	0	0	0	0
Bridgeville Borough	2,160	0	41	1	7	15	127	1	0	192
Carnegie Borough	3,499	0	1	1	2	0	33	0	0	37
Castle Shannon Borough	3,153	0	9	0	0	8	8	1	0	26
Chalfant Borough	422	0	0	0	0	0	0	0	0	0
Cheswick Borough	880	0	0	0	2	0	0	0	0	2
Churchill Borough	1,499	0	0	0	0	0	3	0	0	3
Clairton City	4,331	0	0	0	0	0	0	0	0	0
Collier Township	4,149	0	7	0	10	0	40	0	0	57
Coraopolis Borough	2,601	0	23	3	15	7	135	0	0	183
Crafton Borough	2,338	0	0	1	0	0	4	0	0	5
Crescent Township	1,135	0	2	1	0	0	14	2	0	19
Dormont Borough	3,458	0	0	0	0	0	0	0	0	0
Dravosburg Borough	798	0	18	3	6	3	5	0	0	35
Duquesne, City of	3,308	0	0	0	0	0	0	0	0	0
East Deer Township	784	0	8	0	1	4	131	2	0	146
East McKeesport Borough	1,047	0	0	0	0	0	0	0	0	0

Table 4.3.3-9 Structures Vulnerable to Flooding by Generalized Land Use.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
East Pittsburgh Borough	803	0	0	0	0	0	0	0	0	0
Edgewood Borough	1,334	0	0	0	0	0	0	0	0	0
Edgeworth Borough	667	0	0	1	0	0	0	0	0	1
Elizabeth Borough	677	0	4	0	2	0	38	0	0	44
Elizabeth Township	5,864	0	14	8	6	2	280	4	0	314
Emsworth Borough	918	0	4	0	2	0	19	0	0	25
Etna Borough	1,611	0	36	3	13	6	303	0	0	361
Fawn Township	1,096	1	4	0	1	0	69	0	0	75
Findlay Township	2,789	0	15	1	3	10	42	1	0	72
Forest Hills Borough	3,154	0	0	0	0	0	0	0	0	0
Forward Township	1,667	0	4	1	1	0	48	0	0	54
Fox Chapel Borough	1,951	0	0	0	0	0	1	0	0	1
Franklin Park Borough	5,267	0	4	0	0	0	2	0	0	6
Frazer Township	675	0	0	0	0	0	1	0	0	1
Glassport Borough	2,115	0	0	0	1	0	0	0	0	1
Glen Osborne Borough	231	0	0	1	1	0	23	0	0	25
Glenfield Borough	112	0	9	0	0	0	61	0	0	70
Green Tree Borough	2,109	0	0	0	0	0	0	0	0	0
Hampton Township	7,202	0	17	19	7	3	30	0	0	76
Harmar Township	1,818	0	3	2	2	0	5	0	0	12
Harrison Township	5,099	0	0	0	0	0	12	0	0	12
Haysville Borough	49	0	0	0	3	0	16	0	0	19
Heidelberg Borough	639	0	1	0	0	0	37	1	0	39
Homestead Borough	1,582	0	0	0	0	0	0	0	0	0
Indiana Township	3,348	0	5	0	8	0	27	1	1	42
Ingram Borough	1,301	0	0	0	0	0	0	0	0	0
Jefferson Hills Borough	5,121	0	16	1	6	1	27	2	0	53
Kennedy Township	3,585	0	0	0	1	0	2	0	0	3
Kilbuck Township	370	0	1	0	2	0	6	0	0	9
Leet Township	637	0	2	0	2	0	51	0	0	55
Leetsdale Borough	611	0	12	0	14	0	16	0	0	42
Liberty Borough	1,153	0	0	0	0	0	0	0	0	0

Table 4.3.3-9 Structures Vulnerable to Flooding by Generalized Land Use.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Lincoln Borough	573	0	3	0	0	0	1	0	0	4
Marshall Township	3,479	0	10	2	0	1	32	0	0	45
McCandless, Town of	10,876	0	8	4	0	0	23	0	0	35
McDonald Borough	184	0	0	0	1	0	1	0	0	2
McKees Rocks Borough	2,838	0	64	26	10	6	59	1	0	166
McKeesport, City of	10,265	0	45	22	7	6	56	0	1	137
Millvale Borough	1,736	0	70	3	5	60	301	2	0	441
Monroeville, Municipality of	11,215	0	7	0	0	0	12	0	0	19
Moon Township	10,065	0	5	3	3	0	40	0	0	51
Mount Lebanon, Municipality of	11,586	0	1	1	0	0	1	0	0	3
Mount Oliver Borough	1,506	0	0	0	0	0	0	0	0	0
Munhall Borough	5,167	1	0	0	0	0	44	0	1	46
Neville Township	599	0	10	0	2	1	113	0	0	126
North Braddock Borough	2,920	0	0	0	0	0	0	0	0	0
North Fayette Township	6,948	0	11	0	4	0	80	0	0	95
North Versailles Township	4,687	0	1	0	0	0	16	0	0	17
Oakdale Borough	3,954	0	7	1	1	3	94	0	0	106
Oakmont Borough	673	0	18	3	4	12	52	0	0	89
O'Hara Township	2,848	0	7	1	2	3	78	1	1	93
Ohio Township	2,424	0	4	0	2	0	1	0	0	7
Penn Hills, Municipality of	19,504	0	7	0	4	0	4	1	0	16
Pennsbury Village Borough	503	0	0	0	0	0	0	0	0	0
Pine Township	4,688	0	0	2	0	0	4	0	0	6
Pitcairn Borough	1,389	0	12	4	3	22	172	0	0	213
Pittsburgh, City of	130,310	0	316	37	56	38	368	27	6	848
Pleasant Hills Borough	3,239	0	0	0	0	0	0	0	0	0
Plum Borough	10,864	0	5	1	1	0	65	0	0	72
Port Vue Borough	1,824	0	1	0	1	1	6	0	0	9
Rankin Borough	784	0	0	0	0	0	0	0	0	0
Reserve Township	1,554	0	3	2	0	1	27	0	0	33
Richland Township	4,553	0	3	0	1	0	5	0	0	9
Robinson Township	6,093	0	11	2	11	0	26	0	0	50

Table 4.3.3-9 Structures Vulnerable to Flooding by Generalized Land Use.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Ross Township	13,249	0	36	1	5	5	38	0	1	86
Rosslyn Farms Borough	212	0	0	0	0	0	0	0	0	0
Scott Township	6,160	0	14	1	0	0	40	0	0	55
Sewickley Borough	1,551	0	0	1	1	0	3	0	1	6
Sewickley Heights	425	0	0	2	0	0	0	0	0	2
Sewickley Hills Borough	265	0	0	0	0	0	3	0	0	3
Shaler Township	12,428	0	57	16	24	6	198	1	2	304
Sharpsburg Borough	1,570	0	40	2	9	52	171	0	0	274
South Fayette Township	6,421	0	18	1	5	1	70	1	0	96
South Park Township	5,127	0	16	1	1	2	26	0	0	46
South Versailles Township	163	0	0	0	0	0	16	0	0	16
Springdale Borough	1,573	0	0	0	0	0	0	0	0	0
Springdale Township	860	0	0	0	0	0	1	0	0	1
Stowe Township	3,161	0	0	0	0	0	0	0	0	0
Swissvale Borough	4,109	0	0	0	0	0	0	0	0	0
Tarentum Borough	2,109	0	5	3	0	0	38	0	0	46
Thornburg Borough	190	0	0	0	0	0	0	0	0	0
Trafford Borough	51	0	1	0	0	0	0	0	0	1
Turtle Creek Borough	2,165	9	7	2	1	1	150	1	0	171
Upper St. Clair Township	7,419	0	30	2	4	0	15	0	1	52
Verona Borough	1,264	0	11	2	3	0	117	0	0	133
Versailles Borough	669	0	0	0	0	0	0	0	0	0
Wall Borough	370	0	0	0	0	0	21	0	0	21
West Deer Township	5,424	0	5	0	1	3	38	0	0	47
West Elizabeth Borough	291	0	5	3	1	1	92	0	0	102
West Homestead Borough	1,112	0	1	0	0	0	12	0	0	13
West Mifflin Borough	8,856	0	2	0	0	0	25	0	0	27
West View Borough	2,669	0	0	0	0	0	0	0	0	0
Whitaker Borough	618	0	0	0	0	0	0	0	0	0
White Oak Borough	3,739	0	16	0	0	2	8	1	0	27
Whitehall Borough	5,426	0	1	0	1	0	0	0	0	2
Wilkins Township	2,761	0	7	3	0	0	44	0	0	54

Table 4.3.3-9 Structures Vulnerable to Flooding by Generalized Land Use.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Wilkinsburg Borough	7,156	0	0	0	0	0	0	0	0	0
Wilmerding Borough	848	0	0	0	2	0	0	0	0	2
GRAND TOTAL	**530,098**	**11**	**1,199**	**206**	**308**	**289**	**4,620**	**54**	**16**	**6,703**

4.3.4 Hurricane, Tropical Storm, Nor'easter

4.3.4.1 Location and Extent

Pennsylvania does not have any open-ocean coastline. However, the impacts of coastal storm systems such as hurricanes, tropical storms, and nor'easters can extend well inland. Tropical storms impacting Allegheny County develop in tropical or sub-tropical waters found in the Atlantic Ocean, Gulf of Mexico, or Caribbean Sea. Nor'easters are extra-tropical storms which typically develop from low-pressure centers off the Atlantic Coast north of North Carolina during the winter months. Extra-tropical is a term used to describe a hurricane or tropical storm that's cyclone has lost its 'tropical' characteristics. While an extra-tropical storm donates a change in weather pattern and how the storm is gathering energy, it may still have winds that are tropical storm or hurricane force.

Allegheny County is located more than 200 hundred miles from open coastline, but 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 Allegheny County are equally subject to the impacts of hurricanes, tropical storms, and Nor'easters that track through or near the County. However, areas within the county which are already at risk for flooding, wind, and winter storm damage are particularly vulnerable.

4.3.4.2 Range of Magnitude

Intense precipitation and wind resulting in flood and wind damage (see Sections 4.3.3 and 4.3.9 respectively) are the most common impacts associated with coastal storm systems in Pennsylvania. Nor'easters develop as extra-tropical cyclonic weather systems over the Atlantic Ocean and are capable of producing winds equivalent to hurricane or tropical storm force; precipitation from these storms may also come in the form of heavy snow or ice (see Section 4.3.11).

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 (a threat only to the tidal portions of the Delaware River), which are combined to estimate potential damage. Table 4.3.4-1 lists Saffir-Simpson Scale categories with associated wind speeds and expected damages. Categories 3, 4, and 5 are classified as "major" hurricanes. While major hurricanes comprise only 20% of all tropical cyclones making landfall, they account for over 70% of the damage in the United States.

Table 4.3.4-1 Saffir-Simpson Scale Categories with Associated Wind Speeds and Damages (NHC, 2013).		
STORM CATEGORY	WIND SPEED (MPH)	TYPES OF DAMAGE DUE TO HURRICANE WINDS
1	74-95	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111-130	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	131-155	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	>155	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

It is important to recognize the potential for flooding events during hurricanes and tropical storms; the risk assessment and associated impact for these events is included Section 4.3.3. Wind impacts in Allegheny County could generally include downed trees and utility poles, which can spark widespread utility interruptions. Wind impacts are particularly an issue for mobile homes and other manufactured housing; these structures are often not well-anchored and are highly susceptible to wind damage in a hurricane, tropical storm, or Nor'easter.

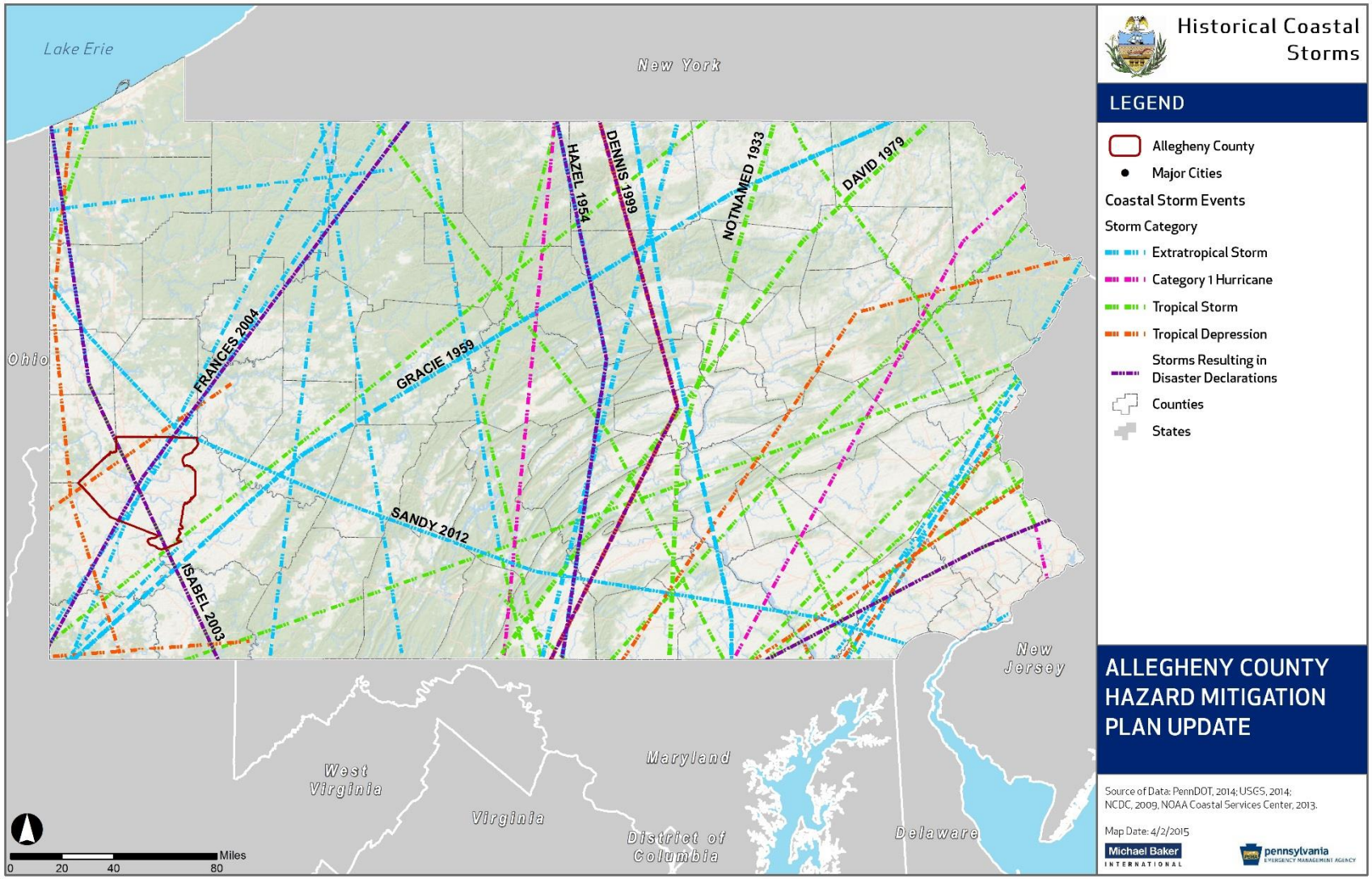
The worst hurricane, tropical storm, or nor'easter in Allegheny County was the remnants of Tropical Depression Ivan in September 2004, as described in Section 4.3.3.2.

4.3.4.3 Past Occurrence

The National Oceanic and Atmospheric Administration's Coastal Services Center maintains records of all coastal storms occurring in the United States since the 1850s. Table 4.3.4-2 lists all coastal storms having centers of circulation to pass through Allegheny County. Figure 4.3.4-2 shows the historical coastal storms tracking through Pennsylvania, highlighting Allegheny County.

Table 4.3.4-2 Table 4.3.4-2: Previous Coastal Storms Tracking Through or Near Allegheny County.		
YEAR	EVENT	STRENGTH IN/NEAR ALLEGHENY COUNTY
1901	Not Named	Tropical Depression
1957	Audrey	Extra-tropical
1979	Frederic	Tropical Storm
2002	Isidore	Tropical Depression
2003	Isabel	Tropical Storm
2004	Frances	Tropical Depression
2012	Sandy	Extra-tropical

Figure 4.3.4-1 Map Showing Historical Coastal Storm Events Tracked Through Allegheny County (NOAA CSC, 2015).



A number of hurricane, tropical storm, and nor'easter events may have impacted the County without tracking through or near it. Perhaps the best example of this is Tropical Storm Agnes (1972). While it was the most significant tropical storm event to impact the Commonwealth, the storm track for Agnes remained to the east of Pennsylvania and New Jersey until making landfall near New York City and traveling into upstate New York. Ivan is another example of these storms; the center of circulation never passed through Allegheny County. According to the National Weather Service, there have been 12 hurricanes and tropical storms whose remnants produced 24-hour record rainfall for Pittsburgh, shown in Table 4.3.4-3.

Table 4.3.4-3 Hurricane and Tropical Storm Events Producing 24-hour Rainfall Records (NOAA NWS, 2005). http://www.erh.noaa.gov/pit/hurricane.htm

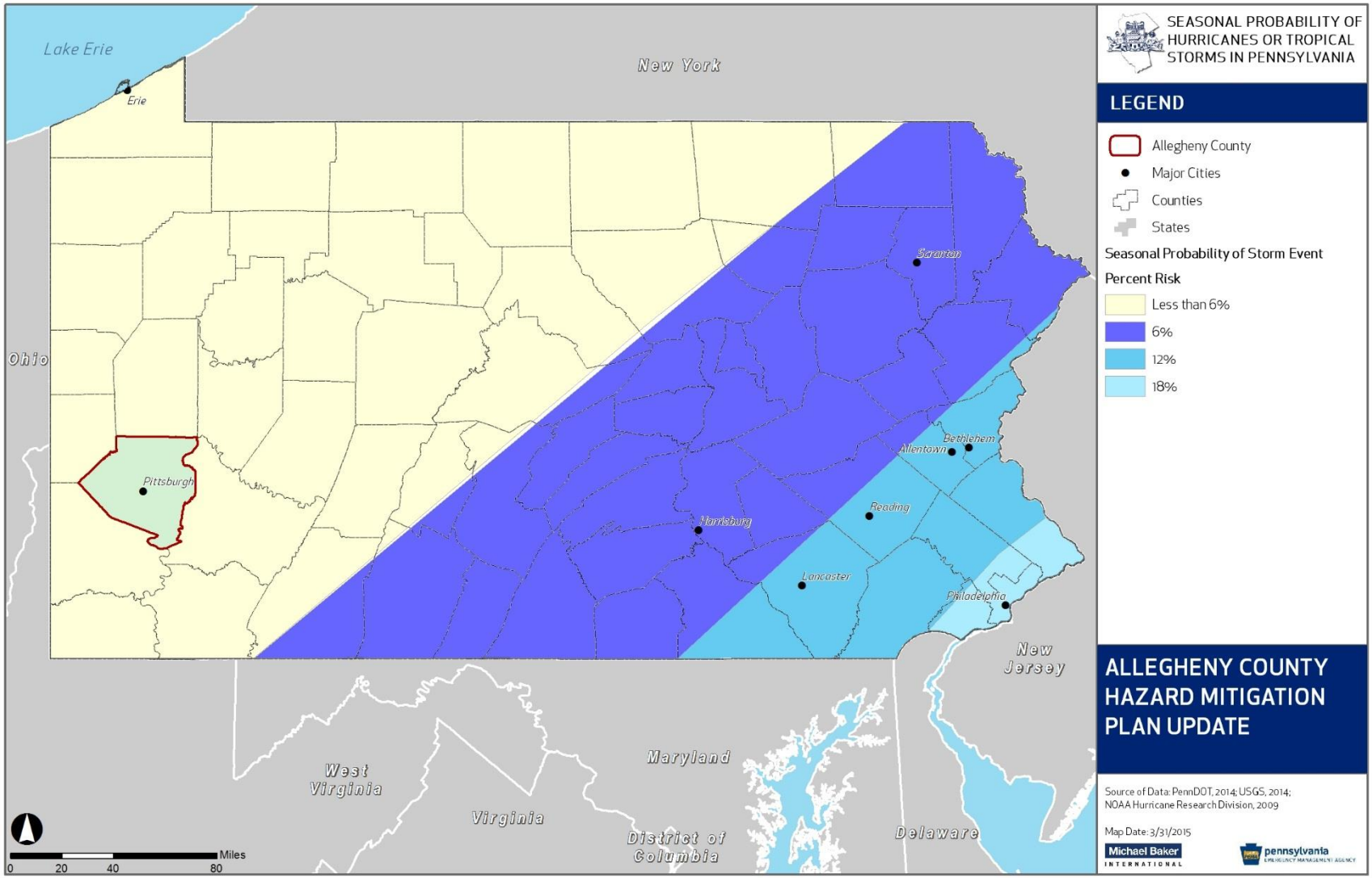
DATE	NAME	CATEGORY AT LANDFALL	PRECIPITATION (INCHES)
September 17, 1876	Hurricane #2	1	3.38
September 12, 1878	Hurricane #5	1	3.24
August 21, 1888	Hurricane #3	2	3.57
October 31, 1899	Hurricane #6	2	1.22
October 1, 1915	Hurricane #5	4	1.5
October 2, 1929	Hurricane #2	4	3.22
September 13-14, 1945	Hurricane #9	4	1.28 (24hr) / 1.77(total)
October 15, 1954	Hazel	4	3.56
September 30-October 1, 1959	Gracie	4	1.18 (24hr)/ 1.21(total)
September 6-7, 1996	Fran	3	1.52 (24hr)/ 1.69(total)
September 8-9, 2004	Frances	2	3.60 (24hr)/ 3.83(total)
September 17, 2004	Ivan	4	5.95

4.3.4.4 Future Occurrence

The National Oceanic and Atmospheric Administration Hurricane Research Division published the map included as Figure 4.3.4-2 showing the chance that a tropical storm or hurricane will affect a given area during the entire Atlantic hurricane season spanning from June to November. Note that this figure does not provide information on the probability of various storm intensities. However, based on historical data between 1944 and 1999, this map reveals there is a less-than-six percent chance of experiencing a tropical storm or hurricane event between June and November of any given year Western Pennsylvania. 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.

The probability of future hurricane, tropical storm, or nor'easter events is *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

Figure 4.3.4-2 Seasonal Probability of Atlantic Basin Hurricanes or Tropical Storms across Pennsylvania.



4.3.4.5 Vulnerability Assessment

A vulnerability assessment for hurricanes and tropical storms focuses on the impacts of flooding and severe wind. Therefore, the assessment for flood-related vulnerability is addressed in Section 4.3.3.5 and vulnerability to wind damage is addressed in Section 4.3.10.5. Allegheny County may be vulnerable to severe winter weather impacts caused by Nor'easters, as evaluated in Section 4.3.11.5.

4.3.5 Landslide

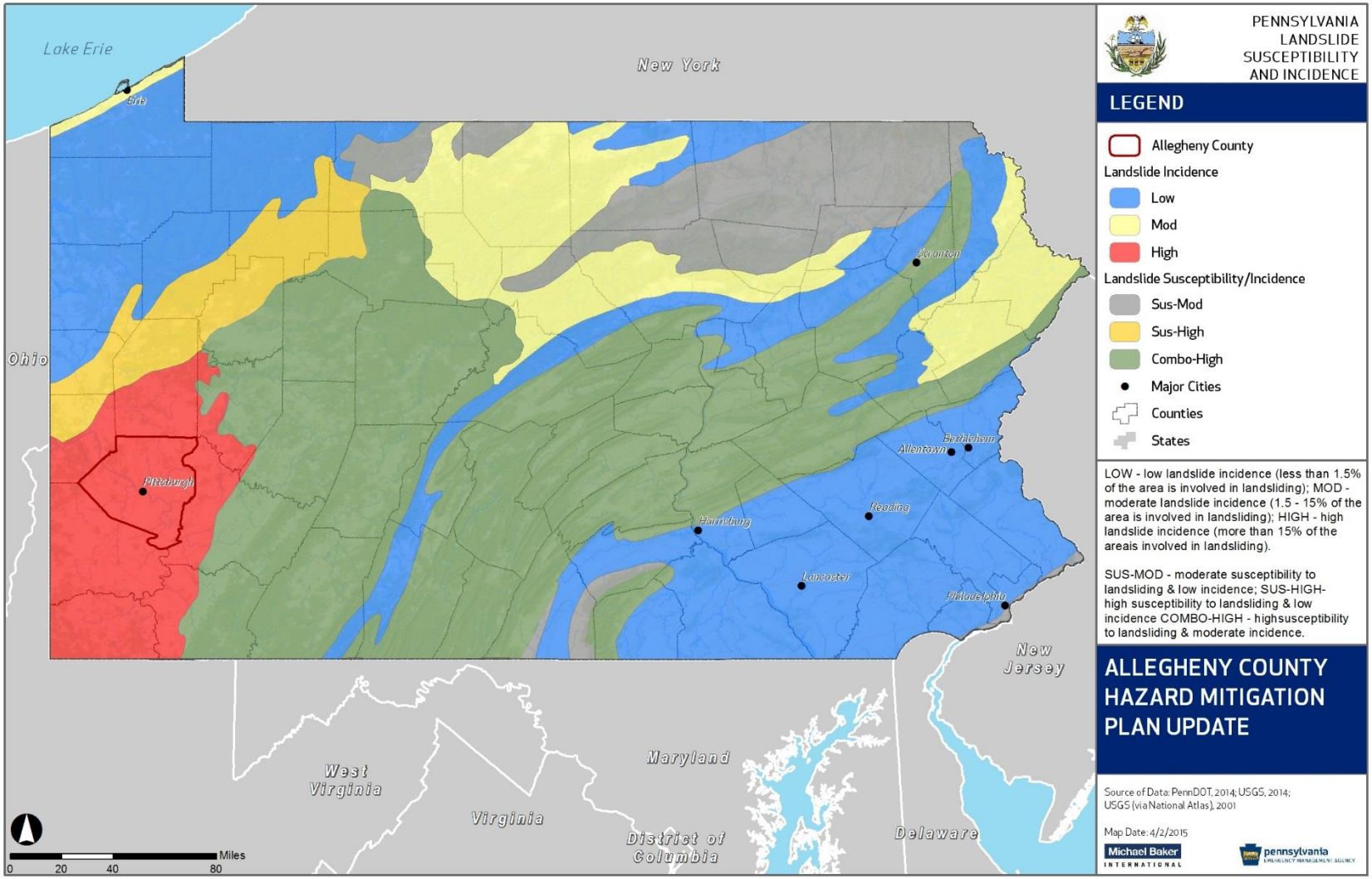
4.3.5.1 Location and Extent

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.

According to DCNR, southwestern Pennsylvania has by far the highest concentration of landslides, even though much of the state has susceptible areas. Most major and minor highways have sections cut in rock or soil that can fail. Outside the southwest, high susceptibility areas are smaller and have more varied geology and topography. This can be confirmed from the map below that illustrates the relative landslide hazard susceptibility across the Commonwealth of Pennsylvania. According to the figure Allegheny County has “high to moderate” and “highest” landslide susceptibility in the state. The DCNR website explains how geologists have studied that a 310-million-year-old landslide in northern Allegheny County slid into the river channel when the sedimentary deposits were young. At the time, southwestern Pennsylvania was a low, flat tropical river delta, draining to the west. These same sediments are now a weak red claystone known as the “Pittsburgh redbeds” which underlie many modern landslide problems predominant in the north-western part of the County.

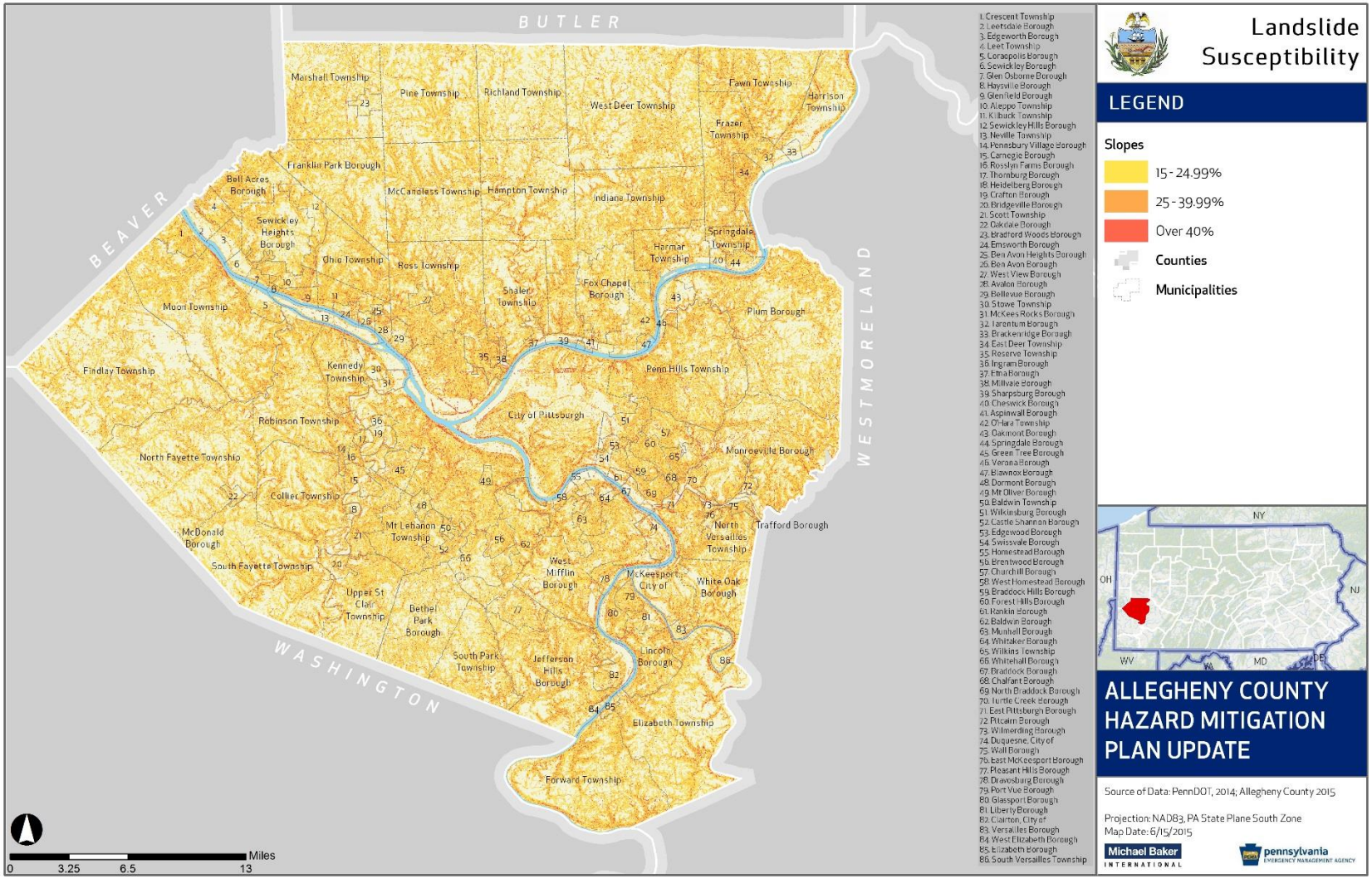
The Monongahela River Valley of northern West Virginia and southwestern Pennsylvania has a special place in landslide folklore. The name "Monongahela" is derived from an American Indian word that is translated as "river with the sliding banks" or "high banks which break off and fall down" (Espenshade, 1925). The Monongahela Valley and Pittsburgh in southwestern Pennsylvania is the most slide-prone portion of the Commonwealth. Figure 4.3.5-1 shows the USGS’s evaluation of landslide susceptibility and incidence, showing that all of Allegheny County is located in an area with high landslide incidence.

Figure 4.3.5-1 Landslide Susceptibility and Incidence for Allegheny County, (USGS, 2001).



Urban and rural land development increases both the number of landslides and the economic effects of natural slides. Major highway construction with large excavations and fills located in mountainous areas creates potential for many landslides (DCNR, 2001). In the Pittsburgh area, the major zones of weak rock involved in landsliding are claystones, including many red beds, some of which are located at varying distances below the Pittsburgh coal seam. A stable slope on these claystones may be so modified by human activity as to create problems where none had existed previously (Pittsburgh Geological Society, 1977). In other words, human activity can cause instability in an otherwise stable slope because of the presence of underlying weak red beds. In general, though, slopes with a gradient of 15% or higher may be prone to slide, especially in conjunction with heavy rain events. These steep slopes are shown in Figure 4.3.5-2.

Figure 4.3.5-2 Allegheny County Steep Slopes.



4.3.5.2 Range of Magnitude

Landslides can have potentially devastating consequences in localized areas. Landslides cause damage to transportation routes, utilities, and buildings and create travel delays and other side effects. Structures or infrastructure built on susceptible land will likely collapse as their footings slide downhill. Structures below the landslide can be crushed. Landslides next to roads and highways have the potential to fall on and damage vehicles or cause accidents.

According to the DCNR website, deaths and injuries due to landslides are rare in Pennsylvania. Most Pennsylvania landslides are moderate to slow moving and damage property rather than people. Almost all of the known deaths due to landslides have occurred when rock falls or other slides along highways involved vehicles. If residential and recreational development increases on and near steep mountain slopes, the hazard from these rapid events will also increase. Storm-induced debris flows are the only other type of landslide likely to cause death and injuries in Allegheny County. Most southwestern Pennsylvania landslides are small and move slowly.

Property losses due to landslides and associated effects are more common than injuries and deaths. An example of a worst case scenario is a small landslide in 1990 that involved a broken petroleum pipeline. Spilled petroleum products entered a major river, causing city water systems to shut down. The identified costs of repair of this landslide damage, clean-up of the spill, technical investigations, legal and court costs and environmental fines were approximately $12 million. The incalculable costs include lost productivity while people stayed at home because their businesses were closed or to care for children normally in schools that were closed due to lack of water supply, costs for the National Guard to deliver water to neighborhoods, and costs to the pipeline company and its customers due to business loss for several months. Although this example is extreme, associated damages such as this occur with many landslides.

Most damages are less expensive, but significant. "Backyard" landslides, common in the Pittsburgh area, are usually repaired incompletely or not at all. Cost estimates of several hundred thousand dollars for stabilization and repair of a landslide affecting two or three properties are typical. With repair estimates exceeding the value of the properties, abandonment is a frequent "solution". Sometimes local governments assist with relocation costs or "buy out" homeowners. Insurance covers landslide damage only for some business situations (PA DCNR 2011).

The Pennsylvania Department of Transportation and large municipalities incur substantial costs due to landslide damage and to extra construction costs for new roads in known landslide-prone areas. A 1991 estimate showed an average of $10 million per year is spent on landslide repair contracts across the Commonwealth and a similar amount is spent on mitigation costs for grading projects (PADCNR, 2009).

A study done by the USGS found that the total public and private costs of landslides in Allegheny County averaged at least $4 million per year from 1970 to 1976. Similar accounting for a more recent period is not available (PA DCNR 2011). A more recent 2002 report produced by DCNR for USGS put landslide costs at $3 million in public money and $650,025 in private funds in 2001 and 2002 alone. It is thought that actual costs are higher, as landslides are more frequent in wetter years (Delano, 2002).

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

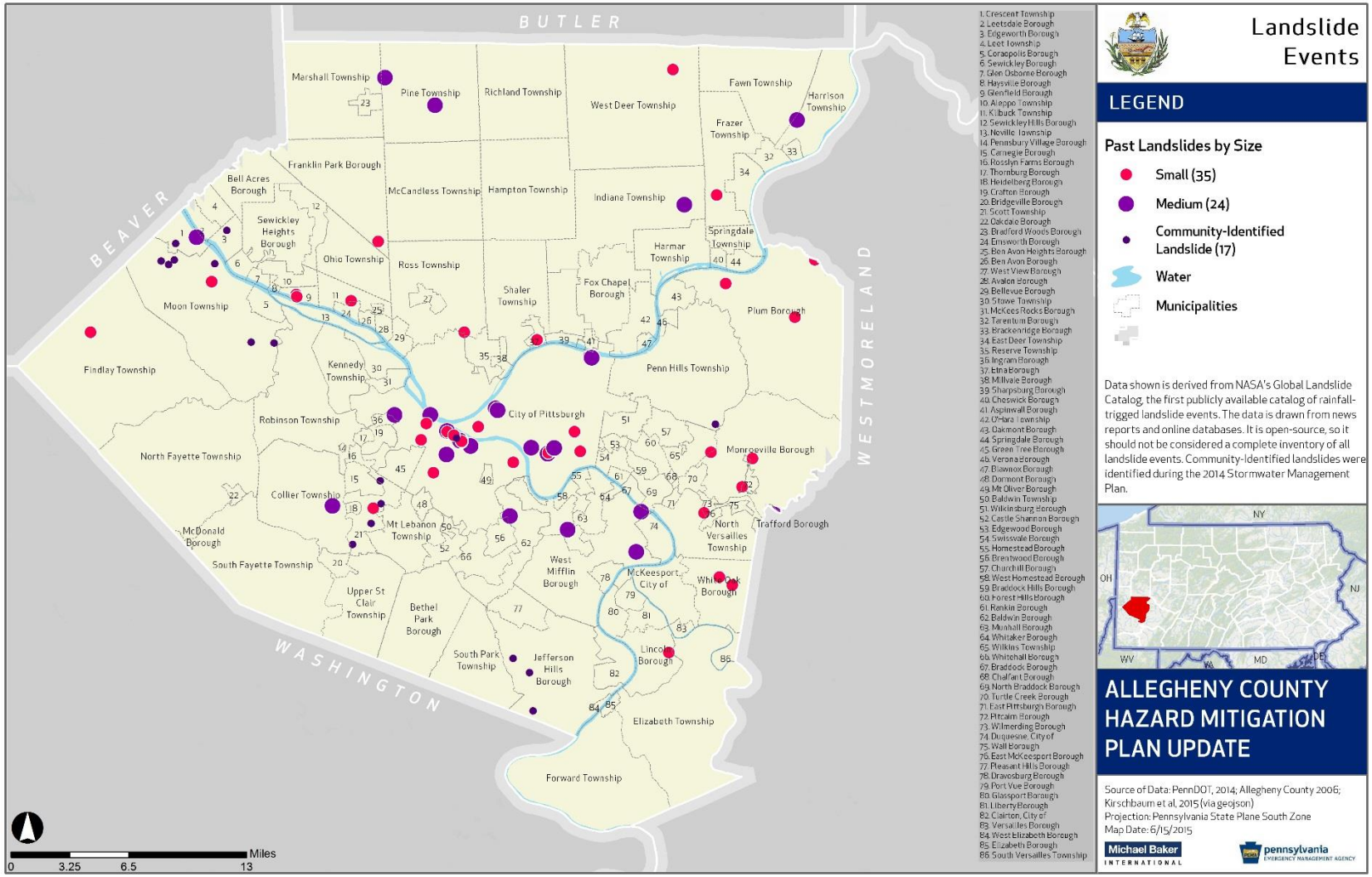
4.3.5.3 Past Occurrence

According to the Pennsylvania Department of Conservation and Natural Resources (DCNR), no one really knows how many landslides occur each year in Pennsylvania or how much damage they cause, although there have been a few efforts to determine totals. A 1986 study identified more than 700 recent and active landslides in Allegheny County. U.S. Geological Survey (USGS) landslide inventory maps identify more than 3,000 recent and 12,000 older landslides in Allegheny and Washington Counties (DCNR, 2001). A 1991 list from the Pennsylvania Department of Transportation (PennDOT) showed that there were 226 problem landslides in Allegheny County (Commonwealth of Pennsylvania, 2000).

Figure 4.3.5-3 2014 Landslide Damage on PJ McArdle Roadway.

More recently, NASA released a prototype Global Landslide Catalog. This is an open-source research and data dissemination tool stemming from work completed at the Goddard Space Flight Center. It should not be considered an exhaustive catalog of landslide events, but it provides more detail on the locations of landslide events than have been previously available. As shown in Figure 4.3.5-3, NASA's inventory lists 59 landslides in Allegheny County from April 2007 through March 2015. Most are rated as small in size. In addition, Figure 4.3.5-3 includes landslides identified by community officials during the 2014 Act 167 Stormwater Management Plan.

Figure 4.3.5-4 Landslide Areas of Allegheny County.



Landslides are not the type of hazard that receives a disaster declaration, since they affect only localized sites. However, a few catastrophic landslide events have occurred in Pittsburgh in the past. In 1951, excavators for a new office building made an 8-foot deep cut at the base of a hill along Island Avenue in Stowe, triggering a 500-foot wide landslide that destroyed 6 houses and disrupted a streetcar line and utilities. In 1983, a rockslide killed 2 people who were sitting in their cars at a traffic light on Saw Mill Run Boulevard.

4.3.5.4 Future Occurrence

Since the exact number of previous landslides over a definite time interval is not known, it is not possible to determine a quantitative probability of future occurrence for landslides in Allegheny County. With many landslide events in the past, the presence of areas susceptible to landslides, and increasing human development near hillsides, landslides causing varying levels of damage are likely to continue to occur every year in the absence of mitigation activities. Utilizing the Risk Factor Methodology, the probability for a landslide event to occur is likely (see Table 4.4-1).

4.3.5.5 Vulnerability Assessment

A landslide vulnerability assessment involves determining the location of susceptible lands and then determining what community assets are located on those susceptible lands. The following steps are typically followed to determine the spatial extent of landslide hazard (FEMA, 2001):

- Identify existing or old landslides:
  - On or at the base of slopes;
  - In or at the base of minor drainage hollows;
  - At the base or top of an old fill slope;
  - At the base or top of a steep cut slope; or
  - Developed hillsides where leach field septic systems are used.
- Map the topography, since steeper slopes have greater probability of landslides.
- Map the geology, because in addition to the slope angle, the presence of rock or soil that weakens when saturated, as well as poorly drained rock or soil are indicators of slope instability as well.
- Contact local and state geological survey, other persons who might be knowledgeable about the local conditions in relation to landslides.

Conditions that may exacerbate or mitigate the severity and effects of landslides include erosion, unstable slopes, earthquakes, increase of weight of slopes, hydrologic factors and human activity. Human activities are responsible for initiating or intensifying certain conditions where otherwise there would have been little or no risk. Activities that increase vulnerability by triggering landslides include:

- Excavations and development in unstable slope materials.
- Haphazard construction or improper use of pipelines.
- Disruption of surface or subsurface drainage (streams and springs) e.g. by filling.
- Overuse of fill materials on slopes, particularly at the heads of existing slide masses.
- Removal of materials at the bases of slopes.
- Vibrations from heavy traffic, blasting, and driving piles near unstable slopes.

Landslide vulnerability is highly site-specific, but this HMP provides an estimate of structures or critical facilities that may be vulnerable to landslides by being located on slopes of 15% or steeper. Table 4.3.5-1 shows vulnerable structures and critical facilities vulnerable to landslides, and Table 4.3.5-2 shows the vulnerability by structure type.

Table 4.3.5-1 Structure and Critical Facilities Vulnerable to Landslides.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES ON SLOPES OVER 15%	PERCENT STRUCTURES ON SLOPES OVER 15%	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES ON SLOPES OVER 15%	PERCENT CRITICAL FACILITIES ON SLOPES OVER 15%
Aleppo Township	622	70	11.3%	6	0	0.0%
Aspinwall Borough	1,205	16	1.3%	7	0	0.0%
Avalon Borough	1,611	90	5.6%	6	0	0.0%
Baldwin Borough	7,939	238	3.0%	24	2	8.3%
Baldwin Township	947	39	4.1%	2	1	50.0%
Bell Acres Borough	610	22	3.6%	6	1	16.7%
Bellevue Borough	2,785	112	4.0%	11	0	0.0%
Ben Avon Borough	744	29	3.9%	3	0	0.0%
Ben Avon Heights Borough	143	6	4.2%	1	0	0.0%
Bethel Park, Municipality of	12,562	415	3.3%	33	1	3.0%
Blawnox Borough	669	64	9.6%	7	0	0.0%
Brackenridge Borough	1,483	16	1.1%	10	0	0.0%
Braddock Borough	1,799	80	4.4%	13	0	0.0%
Braddock Hills Borough	864	95	11.0%	2	0	0.0%
Bradford Woods Borough	500	12	2.4%	3	0	0.0%
Brentwood Borough	4,239	358	8.4%	14	0	0.0%
Bridgeville Borough	2,160	190	8.8%	8	0	0.0%
Carnegie Borough	3,499	150	4.3%	17	0	0.0%
Castle Shannon Borough	3,153	181	5.7%	9	1	11.1%
Chalfant Borough	422	60	14.2%	2	0	0.0%
Cheswick Borough	880	37	4.2%	7	0	0.0%
Churchill Borough	1,499	155	10.3%	9	2	22.2%
Clairton City	4,331	258	6.0%	14	1	7.1%
Collier Township	4,149	212	5.1%	21	2	9.5%
Coraopolis Borough	2,601	147	5.7%	13	1	7.7%
Crafton Borough	2,338	82	3.5%	9	0	0.0%
Crescent Township	1,135	37	3.3%	4	1	25.0%
Dormont Borough	3,458	130	3.8%	8	0	0.0%
Dravosburg Borough	798	57	7.1%	4	0	0.0%
Duquesne, City of	3,308	124	3.7%	15	0	0.0%
East Deer Township	784	63	8.0%	12	0	0.0%
East McKeesport Borough	1,047	54	5.2%	5	0	0.0%

Table 4.3.5-1 Structure and Critical Facilities Vulnerable to Landslides.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES ON SLOPES OVER 15%	PERCENT STRUCTURES ON SLOPES OVER 15%	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES ON SLOPES OVER 15%	PERCENT CRITICAL FACILITIES ON SLOPES OVER 15%
East Pittsburgh Borough	803	47	5.9%	5	1	20.0%
Edgewood Borough	1,334	47	3.5%	6	0	0.0%
Edgeworth Borough	667	6	0.9%	5	0	0.0%
Elizabeth Borough	677	41	6.1%	8	0	0.0%
Elizabeth Township	5,864	317	5.4%	26	1	3.8%
Emsworth Borough	918	62	6.8%	3	0	0.0%
Etna Borough	1,611	143	8.9%	7	0	0.0%
Fawn Township	1,096	41	3.7%	9	1	11.1%
Findlay Township	2,789	82	2.9%	20	0	0.0%
Forest Hills Borough	3,154	475	15.1%	13	0	0.0%
Forward Township	1,667	146	8.8%	17	0	0.0%
Fox Chapel Borough	1,951	66	3.4%	11	0	0.0%
Franklin Park Borough	5,267	152	2.9%	10	0	0.0%
Frazer Township	675	65	9.6%	12	2	16.7%
Glassport Borough	2,115	127	6.0%	11	0	0.0%
Glen Osborne Borough	231	9	3.9%	2	1	50.0%
Glenfield Borough	112	7	6.3%	0	0	0.0%
Green Tree Borough	2,109	55	2.6%	7	0	0.0%
Hampton Township	7,202	161	2.2%	35	2	5.7%
Harmar Township	1,818	70	3.9%	24	1	4.0%
Harrison Township	5,099	40	0.8%	22	1	4.5%
Haysville Borough	49	3	6.1%	1	1	100.0%
Heidelberg Borough	639	46	7.2%	4	0	0.0%
Homestead Borough	1,582	23	1.5%	7	0	0.0%
Indiana Township	3,348	211	6.3%	28	1	3.6%
Ingram Borough	1,301	49	3.8%	7	1	14.3%
Jefferson Hills Borough	5,121	303	5.9%	24	3	12.5%
Kennedy Township	3,585	226	6.3%	14	2	14.3%
Kilbuck Township	370	31	8.4%	3	1	33.3%
Leet Township	637	27	4.2%	4	0	0.0%
Leetsdale Borough	611	50	8.2%	12	0	0.0%
Liberty Borough	1,153	19	1.6%	8	0	0.0%
Lincoln Borough	573	33	5.8%	4	0	0.0%
Marshall Township	3,479	88	2.5%	13	1	7.7%
McCandless, Town of	10,876	279	2.6%	40	1	2.5%
McDonald Borough	184	6	3.3%	2	0	0.0%

Table 4.3.5-1 Structure and Critical Facilities Vulnerable to Landslides.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES ON SLOPES OVER 15%	PERCENT STRUCTURES ON SLOPES OVER 15%	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES ON SLOPES OVER 15%	PERCENT CRITICAL FACILITIES ON SLOPES OVER 15%
McKees Rocks Borough	2,838	241	8.5%	9	0	0.0%
McKeesport, City of	10,265	396	3.9%	43	3	7.0%
Millvale Borough	1,736	307	17.7%	5	0	0.0%
Monroeville, Municipality of	11,215	240	2.1%	66	5	7.6%
Moon Township	10,065	353	3.5%	31	0	0.0%
Mount Lebanon, Municipality of	11,586	1275	11.0%	38	1	2.6%
Mount Oliver Borough	1,506	96	6.4%	4	0	0.0%
Munhall Borough	5,167	329	6.4%	17	1	5.9%
Neville Township	599	0	0.0%	22	0	0.0%
North Braddock Borough	2,920	413	14.1%	14	1	7.1%
North Fayette Township	6,948	186	2.7%	29	1	3.4%
North Versailles Township	4,687	311	6.6%	14	0	0.0%
Oakdale Borough	3,954	270	6.8%	25	1	4.0%
Oakmont Borough	673	29	4.3%	3	0	0.0%
O'Hara Township	2,848	103	3.6%	17	2	11.8%
Ohio Township	2,424	190	7.8%	15	1	6.7%
Penn Hills, Municipality of	19,504	1538	7.9%	52	3	5.8%
Pennsbury Village Borough	503	2	0.4%	3	2	66.7%
Pine Township	4,688	123	2.6%	14	1	7.1%
Pitcairn Borough	1,389	142	10.2%	6	0	0.0%
Pittsburgh, City of	130,310	8792	6.7%	505	30	5.9%
Pleasant Hills Borough	3,239	117	3.6%	10	1	10.0%
Plum Borough	10,864	212	2.0%	42	4	9.3%
Port Vue Borough	1,824	206	11.3%	5	1	20.0%
Rankin Borough	784	27	3.4%	3	0	0.0%
Reserve Township	1,554	169	10.9%	8	3	37.5%
Richland Township	4,553	65	1.4%	17	1	5.9%
Robinson Township	6,093	227	3.7%	29	3	10.3%
Ross Township	13,249	567	4.3%	35	3	8.6%
Rosslyn Farms Borough	212	12	5.7%	3	0	0.0%
Scott Township	6,160	517	8.4%	21	2	9.5%
Sewickley Borough	1,551	53	3.4%	12	0	0.0%
Sewickley Heights	425	22	5.2%	3	0	0.0%
Sewickley Hills Borough	265	23	8.7%	3	2	66.7%
Shaler Township	12,428	407	3.3%	24	3	12.5%
Sharpsburg Borough	1,570	14	0.9%	7	0	0.0%

Table 4.3.5-1 Structure and Critical Facilities Vulnerable to Landslides.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES ON SLOPES OVER 15%	PERCENT STRUCTURES ON SLOPES OVER 15%	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES ON SLOPES OVER 15%	PERCENT CRITICAL FACILITIES ON SLOPES OVER 15%
South Fayette Township	6,421	263	4.1%	23	1	4.3%
South Park Township	5,127	141	2.8%	17	2	11.8%
South Versailles Township	163	2	1.2%	3	0	0.0%
Springdale Borough	1,573	39	2.5%	14	3	21.4%
Springdale Township	860	31	3.6%	4	0	0.0%
Stowe Township	3,161	210	6.6%	13	0	0.0%
Swissvale Borough	4,109	169	4.1%	12	0	0.0%
Tarentum Borough	2,109	117	5.5%	19	0	0.0%
Thornburg Borough	190	20	10.5%	3	0	0.0%
Trafford Borough	51	0	0.0%	2	0	0.0%
Turtle Creek Borough	2,165	193	8.9%	13	1	7.7%
Upper St. Clair Township	7,419	391	5.3%	19	2	10.5%
Verona Borough	1,264	46	3.6%	7	0	0.0%
Versailles Borough	669	35	5.2%	5	1	20.0%
Wall Borough	370	71	19.2%	2	0	0.0%
West Deer Township	5,424	132	2.4%	22	6	27.3%
West Elizabeth Borough	291	5	1.7%	5	0	0.0%
West Homestead Borough	1,112	73	6.6%	5	2	40.0%
West Mifflin Borough	8,856	662	7.5%	54	2	3.7%
West View Borough	2,669	192	7.2%	13	0	0.0%
Whitaker Borough	618	35	5.7%	1	0	0.0%
White Oak Borough	3,739	125	3.3%	11	1	9.1%
Whitehall Borough	5,426	121	2.2%	16	1	6.3%
Wilkins Township	2,761	294	10.6%	13	0	0.0%
Wilkinsburg Borough	7,156	668	9.3%	25	2	8.0%
Wilmerding Borough	848	65	7.7%	4	0	0.0%
GRAND TOTAL	**530,098**	**29,226**	**5.5%**	**2,208**	**133**	**6.0%**

Table 4.3.5-2 Structures Vulnerable to Landslides by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Aleppo Township	622	0	0	0	0	0	69	1	0	70
Aspinwall Borough	1,205	0	0	0	0	0	16	0	0	16
Avalon Borough	1,611	0	1	0	0	2	87	0	0	90
Baldwin Borough	7,939	0	16	1	0	3	217	0	1	238
Baldwin Township	947	0	4	0	2	0	33	0	0	39
Bell Acres Borough	610	1	0	1	0	0	20	0	0	22
Bellevue Borough	2,785	0	5	0	0	2	105	0	0	112
Ben Avon Borough	744	0	0	1	0	0	28	0	0	29
Ben Avon Heights Borough	143	0	0	0	0	0	6	0	0	6
Bethel Park, Municipality of	12,562	0	10	2	2	3	395	3	0	415
Blawnox Borough	669	0	3	0	3	1	57	0	0	64
Brackenridge Borough	1,483	0	0	0	0	0	16	0	0	16
Braddock Borough	1,799	0	12	2	1	3	62	0	0	80
Braddock Hills Borough	864	0	2	0	0	1	92	0	0	95
Bradford Woods Borough	500	0	0	0	0	0	12	0	0	12
Brentwood Borough	4,239	0	31	0	0	16	311	0	0	358
Bridgeville Borough	2,160	0	4	0	1	2	183	0	0	190
Carnegie Borough	3,499	0	3	9	0	0	138	0	0	150
Castle Shannon Borough	3,153	0	5	2	0	6	167	1	0	181
Chalfant Borough	422	0	1	0	0	1	58	0	0	60
Cheswick Borough	880	0	0	1	0	0	36	0	0	37
Churchill Borough	1,499	0	1	0	0	0	154	0	0	155
Clairton City	4,331	1	6	1	0	1	248	0	1	258
Collier Township	4,149	0	4	1	1	2	203	1	0	212
Coraopolis Borough	2,601	1	3	3	0	2	138	0	0	147
Crafton Borough	2,338	0	0	0	0	1	81	0	0	82
Crescent Township	1,135	0	0	0	0	3	34	0	0	37
Dormont Borough	3,458	0	5	0	0	1	124	0	0	130
Dravosburg Borough	798	0	1	0	0	0	56	0	0	57
Duquesne, City of	3,308	0	4	5	0	1	114	0	0	124
East Deer Township	784	0	3	0	0	0	60	0	0	63
East McKeesport Borough	1,047	0	0	1	0	0	53	0	0	54

Table 4.3.5-2 Structures Vulnerable to Landslides by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
East Pittsburgh Borough	803	0	3	32	0	0	12	0	0	47
Edgewood Borough	1,334	0	1	2	0	0	44	0	0	47
Edgeworth Borough	667	0	0	0	0	0	6	0	0	6
Elizabeth Borough	677	0	0	0	0	1	40	0	0	41
Elizabeth Township	5,864	0	7	3	1	0	305	1	0	317
Emsworth Borough	918	0	2	1	0	0	59	0	0	62
Etna Borough	1,611	0	1	1	0	0	138	3	0	143
Fawn Township	1,096	2	1	0	0	0	38	0	0	41
Findlay Township	2,789	1	3	0	0	1	76	1	0	82
Forest Hills Borough	3,154	0	21	3	0	0	450	1	0	475
Forward Township	1,667	5	1	0	1	1	138	0	0	146
Fox Chapel Borough	1,951	0	0	0	0	0	66	0	0	66
Franklin Park Borough	5,267	7	5	0	0	0	139	0	1	152
Frazer Township	675	1	3	0	0	0	61	0	0	65
Glassport Borough	2,115	1	2	0	0	2	122	0	0	127
Glen Osborne Borough	231	0	0	0	0	0	9	0	0	9
Glenfield Borough	112	0	3	0	0	0	3	1	0	7
Green Tree Borough	2,109	0	3	1	0	0	51	0	0	55
Hampton Township	7,202	1	7	1	2	1	149	0	0	161
Harmar Township	1,818	0	3	3	0	0	60	4	0	70
Harrison Township	5,099	0	2	0	0	0	38	0	0	40
Haysville Borough	49	0	0	0	0	0	2	0	1	3
Heidelberg Borough	639	0	1	0	0	0	45	0	0	46
Homestead Borough	1,582	0	2	0	0	0	20	1	0	23
Indiana Township	3,348	14	9	1	4	0	181	0	2	211
Ingram Borough	1,301	0	1	0	0	0	48	0	0	49
Jefferson Hills Borough	5,121	0	12	1	0	0	290	0	0	303
Kennedy Township	3,585	0	5	0	0	2	218	1	0	226
Kilbuck Township	370	3	0	0	0	1	27	0	0	31
Leet Township	637	1	1	0	0	0	25	0	0	27
Leetsdale Borough	611	0	1	0	1	0	48	0	0	50
Liberty Borough	1,153	2	0	0	0	1	16	0	0	19

Table 4.3.5-2 Structures Vulnerable to Landslides by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Lincoln Borough	573	3	1	0	0	0	28	0	1	33
Marshall Township	3,479	0	7	0	0	0	81	0	0	88
McCandless, Town of	10,876	1	11	0	0	0	267	0	0	279
McDonald Borough	184	0	1	0	0	0	5	0	0	6
McKees Rocks Borough	2,838	1	23	0	1	4	212	0	0	241
McKeesport, City of	10,265	0	18	9	3	2	359	4	1	396
Millvale Borough	1,736	0	4	1	1	1	300	0	0	307
Monroeville, Municipality of	11,215	1	10	0	2	1	223	2	1	240
Moon Township	10,065	0	8	4	0	0	341	0	0	353
Mount Lebanon, Municipality of	11,586	1	20	4	0	6	1243	1	0	1,275
Mount Oliver Borough	1,506	0	2	0	1	5	88	0	0	96
Munhall Borough	5,167	0	8	2	3	3	312	1	0	329
Neville Township	599	0	0	0	0	0	0	0	0	0
North Braddock Borough	2,920	3	2	6	3	1	397	1	0	413
North Fayette Township	6,948	0	21	0	0	1	164	0	0	186
North Versailles Township	4,687	0	10	9	1	3	288	0	0	311
Oakdale Borough	3,954	0	1	1	0	0	267	0	1	270
Oakmont Borough	673	0	1	0	0	0	28	0	0	29
O'Hara Township	2,848	0	0	0	0	1	102	0	0	103
Ohio Township	2,424	1	10	1	1	2	175	0	0	190
Penn Hills, Municipality of	19,504	5	40	6	2	7	1472	6	0	1,538
Pennsbury Village Borough	503	0	0	0	0	0	2	0	0	2
Pine Township	4,688	1	16	2	0	0	102	2	0	123
Pitcairn Borough	1,389	0	1	0	0	3	138	0	0	142
Pittsburgh, City of	130,310	0	295	897	26	87	7446	35	6	8,792
Pleasant Hills Borough	3,239	0	10	1	0	5	101	0	0	117
Plum Borough	10,864	3	52	1	5	2	146	2	1	212
Port Vue Borough	1,824	0	4	0	1	0	201	0	0	206
Rankin Borough	784	0	2	2	0	0	23	0	0	27
Reserve Township	1,554	0	2	1	0	1	165	0	0	169
Richland Township	4,553	0	14	1	0	1	49	0	0	65

Table 4.3.5-2 Structures Vulnerable to Landslides by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Robinson Township	6,093	0	15	0	2	1	201	8	0	227
Ross Township	13,249	3	43	3	2	6	504	6	0	567
Rosslyn Farms Borough	212	0	0	0	0	0	12	0	0	12
Scott Township	6,160	1	12	0	2	3	494	4	1	517
Sewickley Borough	1,551	0	0	1	0	0	52	0	0	53
Sewickley Heights	425	1	0	0	0	0	21	0	0	22
Sewickley Hills Borough	265	0	0	0	0	0	23	0	0	23
Shaler Township	12,428	1	7	0	1	4	393	1	0	407
Sharpsburg Borough	1,570	0	0	0	0	0	14	0	0	14
South Fayette Township	6,421	1	6	1	1	3	248	1	2	263
South Park Township	5,127	0	4	1	1	2	133	0	0	141
South Versailles Township	163	0	0	0	0	0	2	0	0	2
Springdale Borough	1,573	0	3	0	0	2	34	0	0	39
Springdale Township	860	0	1	0	0	0	29	0	1	31
Stowe Township	3,161	0	8	1	0	2	199	0	0	210
Swissvale Borough	4,109	0	3	0	0	0	166	0	0	169
Tarentum Borough	2,109	0	4	0	0	0	113	0	0	117
Thornburg Borough	190	0	0	0	0	0	20	0	0	20
Trafford Borough	51	0	0	0	0	0	0	0	0	0
Turtle Creek Borough	2,165	16	2	1	0	2	171	1	0	193
Upper St. Clair Township	7,419	1	4	5	0	1	378	2	0	391
Verona Borough	1,264	0	0	0	0	0	46	0	0	46
Versailles Borough	669	0	1	0	0	0	34	0	0	35
Wall Borough	370	4	0	5	0	0	62	0	0	71
West Deer Township	5,424	1	2	0	1	1	127	0	0	132
West Elizabeth Borough	291	0	0	0	0	0	5	0	0	5
West Homestead Borough	1,112	0	4	2	1	0	66	0	0	73
West Mifflin Borough	8,856	4	15	1	0	1	641	0	0	662
West View Borough	2,669	0	8	1	3	12	168	0	0	192
Whitaker Borough	618	0	1	0	0	0	34	0	0	35
White Oak Borough	3,739	0	6	0	0	2	117	0	0	125
Whitehall Borough	5,426	0	4	0	1	1	115	0	0	121

Table 4.3.5-2 Structures Vulnerable to Landslides by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Wilkins Township	2,761	1	0	1	0	1	291	0	0	294
Wilkinsburg Borough	7,156	1	6	0	1	1	657	0	2	668
Wilmerding Borough	848	0	1	0	0	0	64	0	0	65
GRAND TOTAL	**530,098**	**96**	**978**	**1,050**	**85**	**242**	**26,656**	**96**	**23**	**29,226**

4.3.6 Pandemic and Infectious Disease

4.3.6.1 Location and Extent

Pandemic is defined as a disease affecting or attacking the population of an extensive region, including several countries, and/or continent(s). It is further described as extensively epidemic. Generally, pandemic diseases cause sudden, pervasive illness in all age groups on a global scale. Infectious diseases are also highly virulent, but are not spread person-to-person.

Pandemic and infectious disease events cover a wide geographical area and can affect large populations, potentially including the entire population of the county. The exact size and extent of an infected population is dependent upon how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in denser areas where there are large concentrations of people. The transmission rate of infectious disease will depend on the mode of transmission of a given illness. Pandemic events can also occur after other natural disasters, particularly floods, when there is the potential for bacteria to grow and contaminate water.

Allegheny County is primarily concerned with two diseases with pandemic and infectious potential: West Nile Virus and influenza. West Nile Virus is a vector-borne disease that can cause headache, high fever, neck stiffness, disorientation, tremors, convulsions, muscle weakness, paralysis, and, in its most serious form, death. The virus spreads via mosquito bite and is aided by warm temperatures and wet climates conducive to mosquito breeding. West Nile Virus has been detected in all 67 counties throughout Pennsylvania at least once in the past 10 years. The virus is highly temporal with most cases occurring between April and October (DEP-WNCP, 2009).

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 the Commonwealth 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. The estimated morbidity and mortality during an influenza pandemic within 12-16 weeks nationwide and in Pennsylvania are shown in Table 4.3.6-1.

Table 4.3.6-1 Estimated Morbidity and Mortality during an Influenza Pandemic within 12-16 Weeks.

	UNITED STATES	PENNSYLVANIA
Require Outpatient Care	50 Million	1.6 Million
Hospitalizations	2 Million	37,800
Deaths	500,000	9,100

4.3.6.2 Range of Magnitude

The magnitude of a pandemic or infectious disease threat in the Allegheny County will range significantly depending on the aggressiveness of the virus in question and the ease of transmission. In the case of West Nile Virus, slightly less than 80% of cases are clinically asymptomatic. Approximately 20% of cases result in mild infection, called West Nile Fever, lasting two to seven days. However, one in 150 cases result in severe neurological disease or death. Since the appearance of West Nile Virus in Pennsylvania in 2000, the worst year statewide was 2003 when 237 Pennsylvanians were infected with the virus and 9 people died. The worst years in Allegheny County were 2002 with 21 human infections, 2003 with ten human infections, and 2005 with six human infections (PA DEP, 2015). The virus is typically more serious in older adults.

Pandemic influenza is more easily transmitted from person-to-person than West Nile, 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 (see Table 4.3.6-3). The severity of illness from the 2009-10 H1N1 influenza flu virus varied, with the gravest cases occurring mainly among those considered at high risk. High risk populations considered more vulnerable include children, the elderly, pregnant women, and chronic disease patients with reduced immune system capacity. Most people infected with H1N1 in 2009 recovered without needing medical treatment, and this flu strain is now included in flu shots. According to the CDC, about 70% of those who hospitalized with the 2009 H1N1 flu virus in the United States belonged to a high risk group (CDC, 2009). This pattern is expected to continue with future novel flu strains.

The magnitude of a pandemic may be exacerbated by the fact that an influenza pandemic will cause outbreaks across the United States, 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.

The 1918 Spanish flu pandemic remains the worst case pandemic event on record both in Pennsylvania and worldwide. 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). As the densest city in the Commonwealth, Philadelphia was particularly hurt from this event.

There are no true environmental impacts of pandemics and infectious disease threats, but there will be significant economic and social costs beyond the possibility of disease-related deaths. Widespread illness may increase the likelihood of shortages of personnel to perform essential community services. In addition, high rates of illness and worker absenteeism occur within the business community, and these contribute to social and economic disruption. On a national scale, the Congressional Budget Office Estimates that a severe pandemic could cost the US economy more than $600 million, or 5% of the Gross Domestic Product (US DHHS 2005). 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.

4.3.6.3 Past Occurrence

West Nile Virus arrived in the United States in 1999 and was first detected in Pennsylvania in 2000 when mosquito pools, dead birds, and/ or horses in 19 counties tested positive for the virus. Since then, the number of positive counties, human cases, and West Nile deaths has fluctuated with the temperature and precipitation each year. Table 4.3.6-2 illustrates the virus' presence in Allegheny County, human infection, and mortality since 2001.

Table 4.3.6-2 Previous West Nile Virus Occurrences in Allegheny County 2000-June 2015.

YEAR	VIRUS DETECTED?	POSITIVE HUMAN CASES	HUMAN DEATHS
2001	No	0	0
2002	Yes	22	4
2003	Yes	10	0
2004	Yes	0	0
2005	Yes	6	0
2006	Yes	0	0
2007	Yes	1	0
2008	Yes	0	0
2009	Yes	0	0
2010	Yes	0	0
2011	Yes	1	0
2012	No	0	0
2013	Yes	0	0
2014	Yes	1	0
2015 (through June)	No	0	0

While West Nile Virus occurrences are fairly recent, the United States Department of Health and Human Services estimates that influenza pandemics have occurred for at least 300 years at unpredictable intervals. There have been several pandemic influenza outbreaks over the past 100 years. A list of events worldwide is shown in Table 4.3.6-3.

Table 4.3.6-3 List of Previous Significant Outbreaks of Influenza over the Past Century (Global Security, 2009; WHO, 2009; Roos, 2012).

DATE	PANDEMIC NAME/SUBTYPE	WORLDWIDE DEATHS (APPROXIMATE)
1918-1920	Spanish Flu / H1N1	50 million
1957-1958	Asian Flu / H2N2	1.5-2 million
1968-1969	Hong Kong Flu / H3N2	1 million
2009-2011	Swine Flu / A/H1N1	284,000

Deaths occurred in the United States as a result of the Spanish Flu, Asian flu, and Hong Kong Flu outbreaks, which can be used as examples of the worst case scenario. The Spanish Flu claimed 500,000 lives in the United States, and there were 350,000 cases in Pennsylvania – 150,000 were in Philadelphia alone. 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 flu season, when H1N1 was a primary concern. The World Health Organization declared a pandemic in June 2009. More recently, records from the Allegheny County health department indicate that during the 2013-14 flu season, there were over 2,400 cases and 15 fatalities due to the flu; the 2014-15 season was more severe, with over 5,100 cases and 25 fatalities (ACHD, 2015).

4.3.6.4 Future Occurrence

Future occurrences of West Nile Virus are unclear. Instances of the virus have been generally decreasing due to aggressive planning and eradication efforts, but some scientists suggest that as global temperatures rise and extreme weather conditions increase due to climate change, the range of the virus in the United States will grow (Epstein, 2001).

As with West Nile Virus, the precise timing of pandemic influenza is uncertain, but occurrences are most likely when the Influenza Type A virus makes a dramatic change, or antigenic shift, that results in a new or "novel" virus to which the population has no immunity. This emergence of a novel virus is the first step toward a pandemic.

Future pandemics may also emerge from other diseases, especially invasive pathogens that Pennsylvanians do not have natural immunity to. However, looking at the number of historical incidences of pandemic-potential diseases, the probability of future pandemic events can be considered *possible* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.6.5 Vulnerability Assessment

In general, municipalities that are more densely populated are more vulnerable to disease threats when the disease is directly spread from human to human, but every jurisdiction has some vulnerability to pandemic and infectious disease threats. Colleges and universities with large residential student populations may also be more vulnerable, as a pandemic is more likely to spread through human contact in these settings.

There are some occupation-specific risks that may make some employees more vulnerable, though. For example, those working in direct patient care situations are more likely to be exposed to a pandemic disease; similarly, county employees working outdoors for extended periods of time in the warm months may be more vulnerable to West Nile Virus.

Municipal losses in a pandemic or infectious disease outbreak stem from lost wages and productivity, not losses to buildings or land. Losses are difficult to estimate because the exact rates of absenteeism and cost of treating a widespread disease will depend on the virus or bacterium in question, the availability of vaccination or treatment, and the severity of symptoms. For historical context, though, the Asian and Hong Kong Flu pandemics killed over 1.5 million people worldwide and caused an estimated $32 billion loss due to lost productivity and medical expenses (Smith, 2004). With Pennsylvania's economy so integral to the national economy, economic losses from a pandemic or infectious disease threat could be significant.

The facilities of the county are not likely to be damaged by a pandemic disease outbreak. However, high rates of absenteeism associated with a pandemic or an infectious disease will likely lead to significant economic costs in lost productivity and increased medical costs in nearly all county agencies as well as likely shortages of personnel to perform essential community services. On a national scale, the Congressional Budget Office Estimates that a severe pandemic could cost the US economy more than $600 million, or 5% of the Gross Domestic Product (US DHHS 2005). 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 Allegheny County Health Department is charged with influenza surveillance and planning. The Health Department conducts proactive planning for influenza and other infectious diseases that will reduce overall vulnerability to future pandemic events. These services include:

- Health services and treatment
- Surveillance
- Immunization
- Laboratory identification
- Communications
- Emergency preparedness
- Distributing antiviral medications.

4.3.7 Radon Exposure

4.3.7.1 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, PA while it was still under construction and not yet functional, showed that readings on a construction worker at the plant frequently exceeded expected radiation levels. However, only natural, nonfission-product radioactivity was detected on him.

Subsequent testing of the employee's home in the Reading Prong section of Pennsylvania showed extremely high radon levels around 2,500 pCi/L (pico Curies per Liter). To put this amount in perspective, the Environmental Protection Agency (EPA) guidelines state that actions should be taken if radon levels exceed 4 pCi/L in a home, and uranium miners have a maximum exposure of 67 pCi/L. As a result of this event, the Reading Prong became the focus of the first large-scale radon scare in the world.

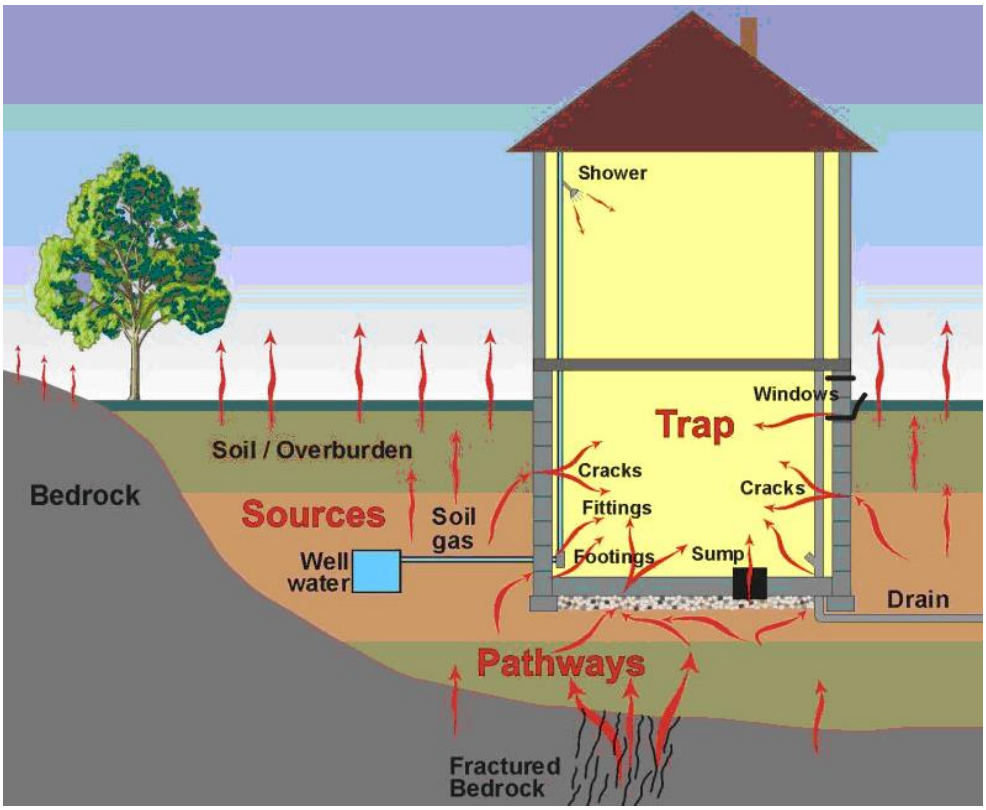
Radon is a gas that cannot be seen or smelled. It is a noble gas that originates by the natural radioactive decay of uranium and thorium. Like other noble gases (e.g., helium, neon, and argon), radon forms essentially no chemical compounds and tends to exist as a gas or as a dissolved atomic constituent in groundwater. Two isotopes of radon are significant in nature, 222Rn and 220Rn, formed in the radioactive decay series of 238U and 232Th, respectively. The isotope thoron (i.e. 220Rn) 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. 222Rn), 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. 226Ra), 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 are now recognized (shown in Figure 4.3.7-1):

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

Figure 4.3.7-1 Sketch of Radon Entry Points into a House (Arizona Geological Survey, 2006).



High radon levels were initially thought to be exacerbated in houses that are tightly sealed, but it is now recognized that rates of air flow into and out of houses, 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 house, caused by a furnace, fan, thermal "chimney" effect, or wind effects, require that air be drawn into

the house to compensate. If the upper part of the house 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 house, 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 house.

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 house. Soil depth and moisture content, mineral host and form for radium, and other soil properties may also be important. For houses built on bedrock, fractured zones may supply air having radon concentrations similar to those in deep soil.

Areas where houses 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 (>50 ppm) around uranium deposits and prospects. Although very high levels of radon can occur in such areas, the hazard normally is 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 houses 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 that have normal uranium content but properties that promote high radon levels in houses. This group is incompletely understood at present. Relatively high soil permeability can lead to high radon, the clearest example being houses built on glacial eskers. Limestone-dolomite soils also appear to be predisposed for high radon levels in houses, 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. The importance of carbonate soils is indicated by the fact that radon contents in 93 percent of a sample of houses built on limestone-dolomite soils near State College, Centre County, exceeded 4 pCi/L, and 21 percent exceeded 20 pCi/L, even though the uranium values in the underlying bedrock are all in the normal range of 0.5 to 5 ppm uranium.

The second factor listed above is most likely the cause of radon levels in Allegheny County, although high test results may be a result of multiple factors. Figures 4.3.7-2 and 4.3.7-3 show the radon test data available for Allegheny County by zip code. Most communities have average basement radon readings of over the threshold of action of 4 pCi/L. Communities with no data available did not have a sufficient sample size.

Figure 4.3.7-2 Allegheny Average Basement Radon Test Results.

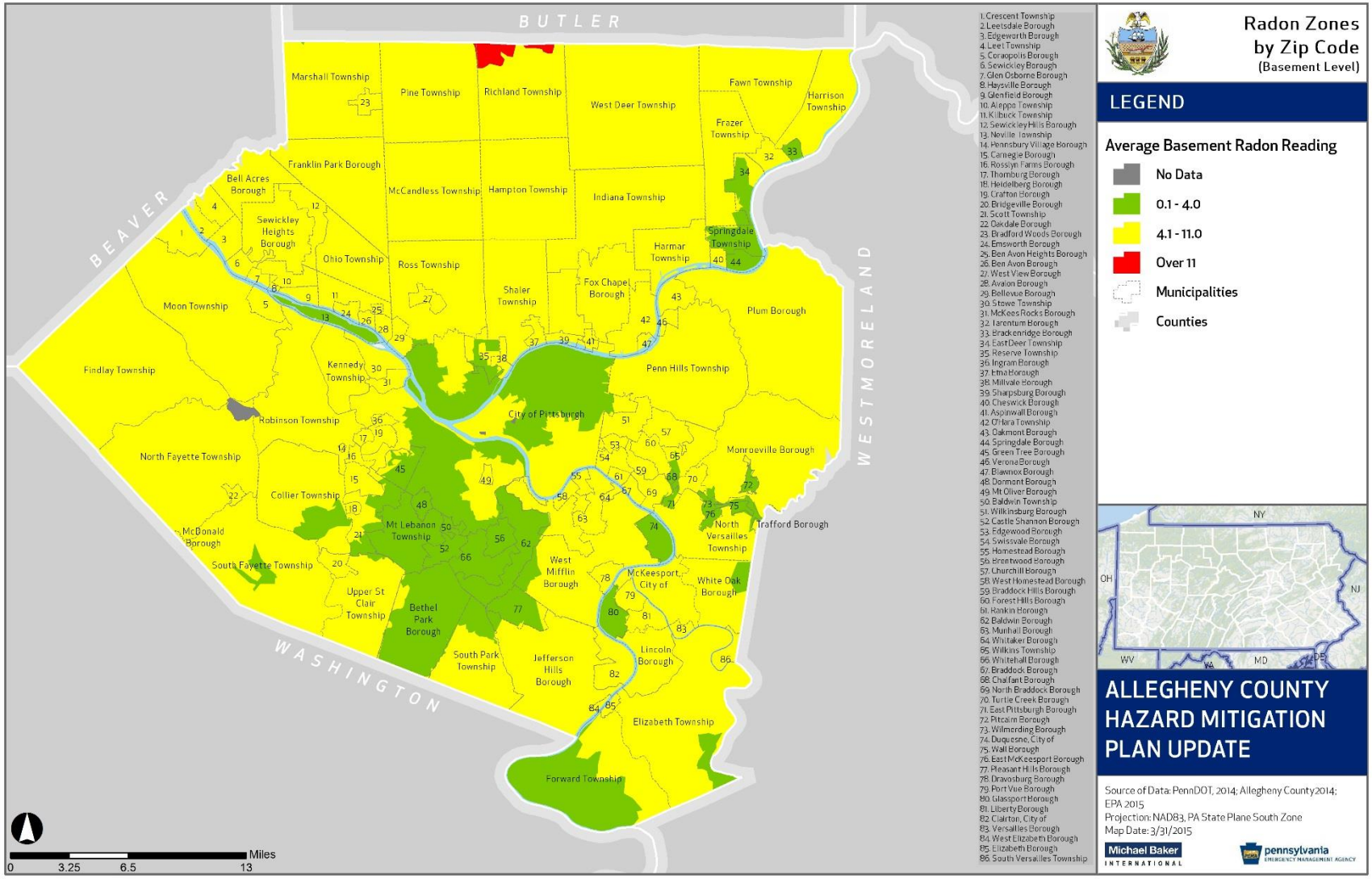
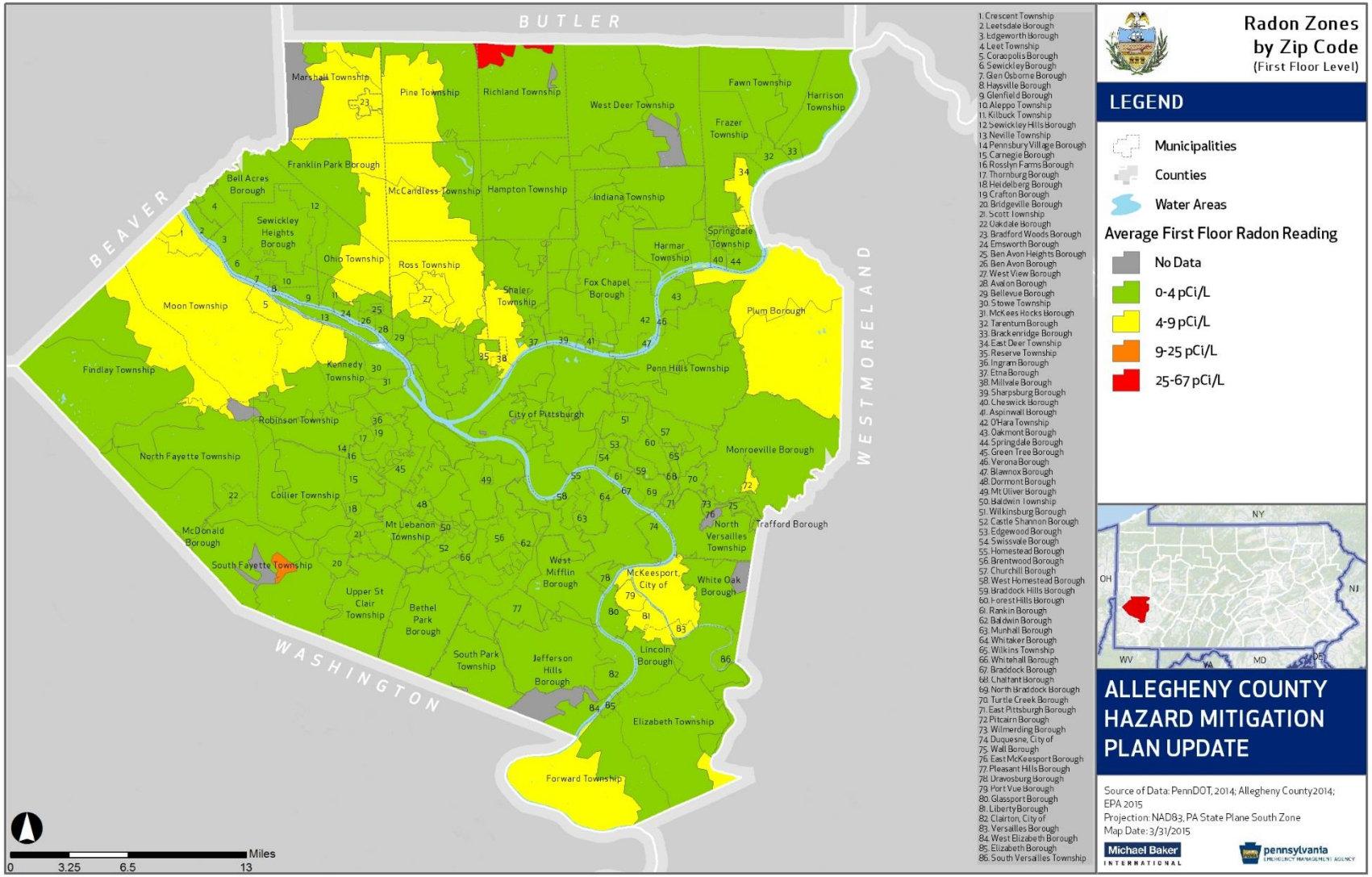


Figure 4.3.7-3 Average First Floor Radon Test Results.



4.3.7.2 Range of Magnitude

Exposure to radon is the second leading cause of lung cancer after smoking. It is the number one cause of lung cancer among non-smokers. Radon is responsible for about 21,000 lung cancer deaths every year; approximately 2,900 of which occur among people who have never smoked. Lung cancer is the only known effect on human health from exposure to radon in air and thus far, there is no evidence that children are at greater risk of lung cancer than are adults (EPA, March 2010). The main hazard is actually from the radon daughter products (218Po, 214Pb, 214Bi), which may become attached to lung tissue and induce lung cancer by their radioactive decay.

According to the EPA, the average radon concentration in the indoor air of homes nationwide is about 1.3 pCi/L. The EPA recommends homes be fixed if the radon level is 4 pCi/L or more. However, because there is no known safe level of exposure to radon, the EPA also recommends that Americans consider fixing their home for radon levels between 2 pCi/L and 4 pCi/L. Table 4.3.7-1 shows the relationship between various radon levels, probability of lung cancer, comparable risks from other hazards, and action thresholds. As is shown in Table 4.3.7-1, a smoker exposed to radon has a much higher risk of lung cancer.

Table 4.3.7-1 Radon Risk for Smokers and Non-Smokers (EPA, March 2010).

RADON LEVEL (CCI/L)	IF 1,000 PEOPLE WERE EXPOSED TO THIS LEVEL OVER A LIFETIME…*	RISK OF CANCER FROM RADON EXPOSURE COMPARES TO…**	ACTION THRESHOLD
SMOKERS			
20	About 260 people could get lung cancer	250 times the risk of drowning	Fix Structure
10	About 150 people could get lung cancer	200 times the risk of dying in a home fire	
8	About 120 people could get lung cancer	30 times the risk of dying in a fall	
4	About 62 people could get lung cancer	5 times the risk of dying in a car crash	
2	About 32 people could get lung cancer	6 times the risk of dying from poison	Consider fixing structure between 2 and 4 pCi/L
1.3	About 20 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2pCi/L is difficult
0.4	About 3 people could get lung cancer	(Average outdoor radon level)	
NON-SMOKERS			
20	About 36 people could get lung cancer	35 times the risk of drowning	Fix Structure
10	About 18 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 fixing structure 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

Table 4.3.7-1 Radon Risk for Smokers and Non-Smokers (EPA, March 2010).			
RADON LEVEL (CCI/L)	IF 1,000 PEOPLE WERE EXPOSED TO THIS LEVEL OVER A LIFETIME…*	RISK OF CANCER FROM RADON EXPOSURE COMPARES TO…**	ACTION THRESHOLD
0.4	-	(Average outdoor radon level)	
NOTE: Risk may be lower for former smokers. ** Lifetime risk of lung cancer deaths from EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003).* *** Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.*			

The worst-case scenario for radon exposure would be that a large area of tightly sealed homes provided residents high levels of exposure over a prolonged period of time without the resident being aware. This worst-case scenario exposure then could lead to a large number of people with cancer attributed to the radon exposure.

4.3.7.3 Past Occurrence

Current data on abundance and distribution of radon as it affects individual houses in the state of Pennsylvania in general is considered incomplete and potentially biased. Allegheny County is no exception. The EPA has estimated that the national average indoor radon concentration is 1.3 pCi/L and the level for action is 4.0 pCi/L; however they have estimated that the average indoor concentration in Pennsylvania basements is about 7.1 pCi/L and 3.6 pCi/L on the first floor (PADEP, 2011).

The Pennsylvania Department of Environmental Protection Bureau of Radiation Protection provides information for homeowners on how to test for radon in their houses. If a test results in radon concentrations over 4 pCi/L, then the Bureau works to help the homeowners make repairs to their houses to mitigate against high radon levels. The total number tests reported to the Bureau since 1990 and their results are provided by zip code on the Bureau's website. However, this information is only provided if over 30 tests total were reported in order to best approximate the average for the area.

In Allegheny County, 163 zip codes had sufficient tests reported to the Bureau to list their findings, which are shown in Table 4.3.7-2. This table includes zip codes that are located partially in Allegheny County, like Aliquippa, and does not include the 63 ZIP codes for which insufficient data was collected or data did not exist.

Table 4.3.7-2 Radon Level Tests and Results in Allegheny County Zip Codes (PADEP, 2015).					
ZIP CODE	MUNICIPALITY	LOCATION OF TEST	NUMBER OF TESTS	MAXIMUM RESULT (PCI/L)	AVERAGE RESULT (PCI/L)
15001	Aliquippa	Basement	1736	125.2	7
15001	Aliquippa	First floor	96	47.3	4.3
15003	Ambridge	Top of Form	472	95.7	6.9
15005	Baden	Top of Form	746	104.3	6.7
15005	Baden	Top of Form	39	14.7	3.4
15014	Brackenridge	Top of Form	63	9.8	2.9

Table 4.3.7-2 Radon Level Tests and Results in Allegheny County Zip Codes (PADEP, 2015).

ZIP CODE	MUNICIPALITY	LOCATION OF TEST	NUMBER OF TESTS	MAXIMUM RESULT (PCI/L)	AVERAGE RESULT (PCI/L)
15015	Bradfordwoods	Top of Form	281	205.7	10.4
15015	Bradfordwoods	Top of Form	39	39.4	5.7
15017	Bridgeville	Top of Form	1519	156.5	4.1
15017	Bridgeville	Top of Form	126	10.2	1.8
15024	Cheswick	Top of Form	457	604	7.4
15024	Cheswick	Top of Form	31	10	2.7
15025	Clairton	Top of Form	667	47.8	4.7
15025	Clairton	First floor	35	12.1	2.9
15026	Clinton	Basement	139	51	8.7
15035	East MC Keesport	Basement	54	14	3.6
15037	Elizabeth	Basement	394	45.9	4.3
15044	Gibsonia	Basement	3773	269.7	7.4
15044	Gibsonia	First floor	320	68.5	3.6
15045	Glassport	Basement	80	26	3.5
15049	Harwick	Basement	40	17	3.1
15051	Indianola	Basement	30	20.1	5.2
15056	Leetsdale	Basement	64	33.8	6.1
15057	MC Donald	Basement	561	94.3	4.4
15063	Monongahela	Basement	382	76	5
15065	Natrona Heights	Basement	348	101	6
15067	New Eagle	Basement	65	64.3	4.9
15068	New Kensington	Basement	1499	221.4	5.9
15068	New Kensington	First floor	51	25.3	3.6
15071	Oakdale	Basement	506	116.8	4.2
15071	Oakdale	First floor	33	20.2	2.4
15084	Tarentum	Basement	255	64.9	6.7
15085	Trafford	Basement	487	57	4.9
15086	Warrendale	Basement	65	72	7.6
15089	West Newton	Basement	166	75	6
15089	West Newton	First floor	43	20.2	4.5
15090	Wexford	Basement	5290	229.5	8.5
15090	Wexford	First floor	623	66.5	5.3
15101	Allison Park	Basement	3135	111.1	7.3
15101	Allison Park	First floor	324	40.2	3.8
15102	Bethel Park	Basement	3371	78.2	3.8
15102	Bethel Park	First floor	313	26.7	2
15104	Braddock	First floor	313	26.7	2
15106	Carnegie	Basement	962	128	4.4
15106	Carnegie	First floor	71	19.4	2.6
15108	Coraopolis	Basement	3891	604	6.2
15108	Coraopolis	First floor	364	69.7	4.2

Table 4.3.7-2 Radon Level Tests and Results in Allegheny County Zip Codes (PADEP, 2015).

ZIP CODE	MUNICIPALITY	LOCATION OF TEST	NUMBER OF TESTS	MAXIMUM RESULT (PCI/L)	AVERAGE RESULT (PCI/L)
15110	Duquesne	Basement	43	9.2	2.5
15112	East Pittsburgh	Basement	91	25.3	3.8
15116	Glenshaw	Basement	1650	309	6.9
15116	Glenshaw	First floor	120	17.3	3.5
15120	Homestead	Basement	704	73.4	4.3
15120	Homestead	First floor	53	9.4	2.4
15122	West Mifflin	Basement	881	31.5	4.1
15122	West Mifflin	First floor	33	6.6	2.2
15126	Imperial	Basement	582	151	4.8
15126	Imperial	First floor	53	34.8	3.2
15129	South Park	Basement	771	93.1	4.6
15129	South Park	First floor	70	12.2	2.1
15131	McKeesport	Basement	505	58.9	4.4
15132	McKeesport	Basement	298	70.5	5.9
15133	McKeesport	Basement	206	34.4	4.1
15135	McKeesport	Basement	168	35.7	4.5
15136	McKees Rocks	Basement	1071	86.5	4
15136	McKees Rocks	First floor	76	23.6	2.9
15137	North Versailles	Basement	359	97.7	5
15139	Oakmont	Basement	449	155.9	3.9
15139	Oakmont	First floor	34	9.5	1.4
15140	Pitcairn	Basement	92	22.8	3.9
15142	Presto	Basement	294	78.6	3.7
15143	Sewickley	Basement	3629	173	6.4
15143	Sewickley	First floor	391	60.7	4
15144	Springdale	Basement	162	18.6	3.1
15145	Turtle Creek	Basement	217	66.1	4.9
15146	Monroeville	Basement	2272	601	5.7
15146	Monroeville	First floor	109	19.6	2.3
15147	Verona	Basement	682	190	4.7
15148	Wilmerding	Basement	40	7.9	2.8
15201	Pittsburgh	Basement	677	80.4	3
15202	Pittsburgh	Basement	1379	190.2	4.1
15202	Pittsburgh	First floor	81	13.7	1.9
15203	Pittsburgh	Basement	611	51.4	2.6
15203	Pittsburgh	First floor	46	12.8	1.7
15204	Pittsburgh	Basement	247	164	5.4
15205	Pittsburgh	Basement	1204	125.4	3.9
15205	Pittsburgh	First floor	91	25.9	3
15206	Pittsburgh	Basement	1508	601	3.5
15206	Pittsburgh	First floor	104	11.3	1.8

Table 4.3.7-2 Radon Level Tests and Results in Allegheny County Zip Codes (PADEP, 2015).

ZIP CODE	MUNICIPALITY	LOCATION OF TEST	NUMBER OF TESTS	MAXIMUM RESULT (PCI/L)	AVERAGE RESULT (PCI/L)
15207	Pittsburgh	Basement	448	54.7	4.1
15208	Pittsburgh	Basement	641	48.6	3.6
15208	Pittsburgh	First floor	50	4.5	1.7
15209	Pittsburgh	Basement	809	55.9	5.5
15209	Pittsburgh	First floor	82	51.8	4.6
15210	Pittsburgh	Basement	686	43	4.1
15211	Pittsburgh	Basement	513	29.1	3.5
15212	Pittsburgh	Basement	1223	61.4	3.9
15212	Pittsburgh	First floor	65	12.7	2.5
15213	Pittsburgh	Basement	470	66.3	3.7
15213	Pittsburgh	First floor	56	5.5	1.4
15214	Pittsburgh	Basement	748	100	5.1
15214	Pittsburgh	First floor	46	20.1	3.6
15215	Pittsburgh	Basement	1430	48.1	3.9
15215	Pittsburgh	First floor	129	18.8	2.4
15216	Pittsburgh	Basement	2095	33.4	3.1
15216	Pittsburgh	First floor	173	10.7	1.9
15217	Pittsburgh	Basement	3575	103.1	4.6
15217	Pittsburgh	First floor	355	27.3	2.4
15218	Pittsburgh	Basement	1519	72.3	4
15218	Pittsburgh	First floor	79	9.9	2.1
15219	Pittsburgh	Basement	122	25.6	3.7
15220	Pittsburgh	Basement	1184	38.5	3.6
15220	Pittsburgh	First floor	90	20.2	2.5
15221	Pittsburgh	Basement	1884	126	4.5
15221	Pittsburgh	First floor	115	13.1	2.6
15222	Pittsburgh	Basement	60	29.4	3.9
15223	Pittsburgh	Basement	386	35.6	4.8
15224	Pittsburgh	Basement	321	14.3	2.1
15226	Pittsburgh	Basement	955	35.6	3.4
15226	Pittsburgh	First floor	32	4.7	1.7
15227	Pittsburgh	Basement	1852	56.1	3.6
15227	Pittsburgh	First floor	130	7.2	1.9
15228	Pittsburgh	Basement	3532	44	3.5
15228	Pittsburgh	First floor	482	28.7	2.2
15229	Pittsburgh	Basement	1569	121	6.5
15229	Pittsburgh	First floor	112	67	5
15232	Pittsburgh	Basement	967	61.5	2.9
15232	Pittsburgh	First floor	92	11.1	1.4
15233	Pittsburgh	Basement	61	8.8	2.4
15234	Pittsburgh	Basement	1327	44.2	3.5

Table 4.3.7-2 Radon Level Tests and Results in Allegheny County Zip Codes (PADEP, 2015).

ZIP CODE	MUNICIPALITY	LOCATION OF TEST	NUMBER OF TESTS	MAXIMUM RESULT (PCI/L)	AVERAGE RESULT (PCI/L)
15234	Pittsburgh	First floor	118	15.3	2.2
15235	Pittsburgh	Basement	2776	98.6	4.7
15235	Pittsburgh	First floor	102	10.6	2.4
15236	Pittsburgh	Basement	2569	49.1	3.5
15236	Pittsburgh	First floor	228	9.8	2
15237	Pittsburgh	Basement	6534	237.9	7.1
15237	Pittsburgh	First floor	678	52.2	4.2
15238	Pittsburgh	Basement	2639	604	7.8
15238	Pittsburgh	First floor	287	44.7	3.7
15239	Pittsburgh	Basement	1446	611.6	5
15239	Pittsburgh	First floor	52	26.9	4.2
15241	Pittsburgh	Basement	3891	69	4
15241	Pittsburgh	First floor	501	32	2.4
15243	Pittsburgh	Basement	2130	28	3.4
15243	Pittsburgh	First floor	252	17.4	2.4
15317	Canonsburg	Basement	3673	117.5	4.1
15317	Canonsburg	First floor	321	50.2	2.9
15321	Cecil	Basement	114	31.1	4.6
15332	Finleyville	Basement	295	45.8	5.1
15367	Venetia	Basement	1044	91.8	4.3
15367	Venetia	First floor	68	16.7	2.6
15642	Irwin	Basement	3066	94.9	4.5
15642	Irwin	First floor	110	24.1	3.4
15668	Murrysville	Basement	1758	102	6.6
15668	Murrysville	First floor	80	58.6	3.9
16046	Mars	Basement	2188	149.2	5.8
16046	Mars	First floor	255	23.1	2.9
16055	Sarver	Basement	329	111.9	12.2
16056	Saxonburg	Basement	184	169.2	9.8
16059	Valencia	Basement	395	258	11.4
16059	Valencia	First floor	30	72.2	10.8
16066	Cranberry Township	Basement	4406	94.4	5.3
16066	Cranberry Township	First floor	182	41.9	3.1

4.3.7.4 Future Occurrence

Radon exposure in Allegheny County remains a probability given present soil, geologic, and geomorphic factors. Future occurrence of high radon level hazards can be considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

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

4.3.7.5 Vulnerability Assessment

Structures in Allegheny County, particularly in high vulnerability areas as shown in Figures 4.3.7-2 and 4.3.7-3, could be susceptible to moderate levels of radon. Smokers can be up to ten times more vulnerable to lung cancer from high levels of radon depending on the level of radon they are exposed to. Older houses that have crawl spaces or unfinished basements are more vulnerable as well because of the increased exposure to soils which could be releasing higher levels of radon gas. Additionally, houses that rely on wells for their water may face an additional risk, although this type of exposure is low and rare in Pennsylvania.

Proper testing for radon levels should be completed throughout Allegheny County, especially in the areas of higher incidence levels and for vulnerable populations that face the contributing risks described above. This testing will determine the level of vulnerability that residents face in their homes, as well as in their businesses and schools. The Pennsylvania Department of Environmental Protection Bureau of Radiation Protection provides short and long term tests to determine radon levels as well as information on how to mitigate high levels of radon in a building. According to the EPA, repairs to protect against radon can cost on average the same as routine house repairs (EPA, October 2010). As seen in Figures 4.3.7-2 and 4.3.7-3, areas with the highest reported tests were primarily located in the southern portions of the County, while much of the northern portion of the county has moderate basement radon levels. However, first floor radon levels were highest throughout the south-central portion of the County.

4.3.8 Subsidence, Sinkhole

4.3.8.1 Location and Extent

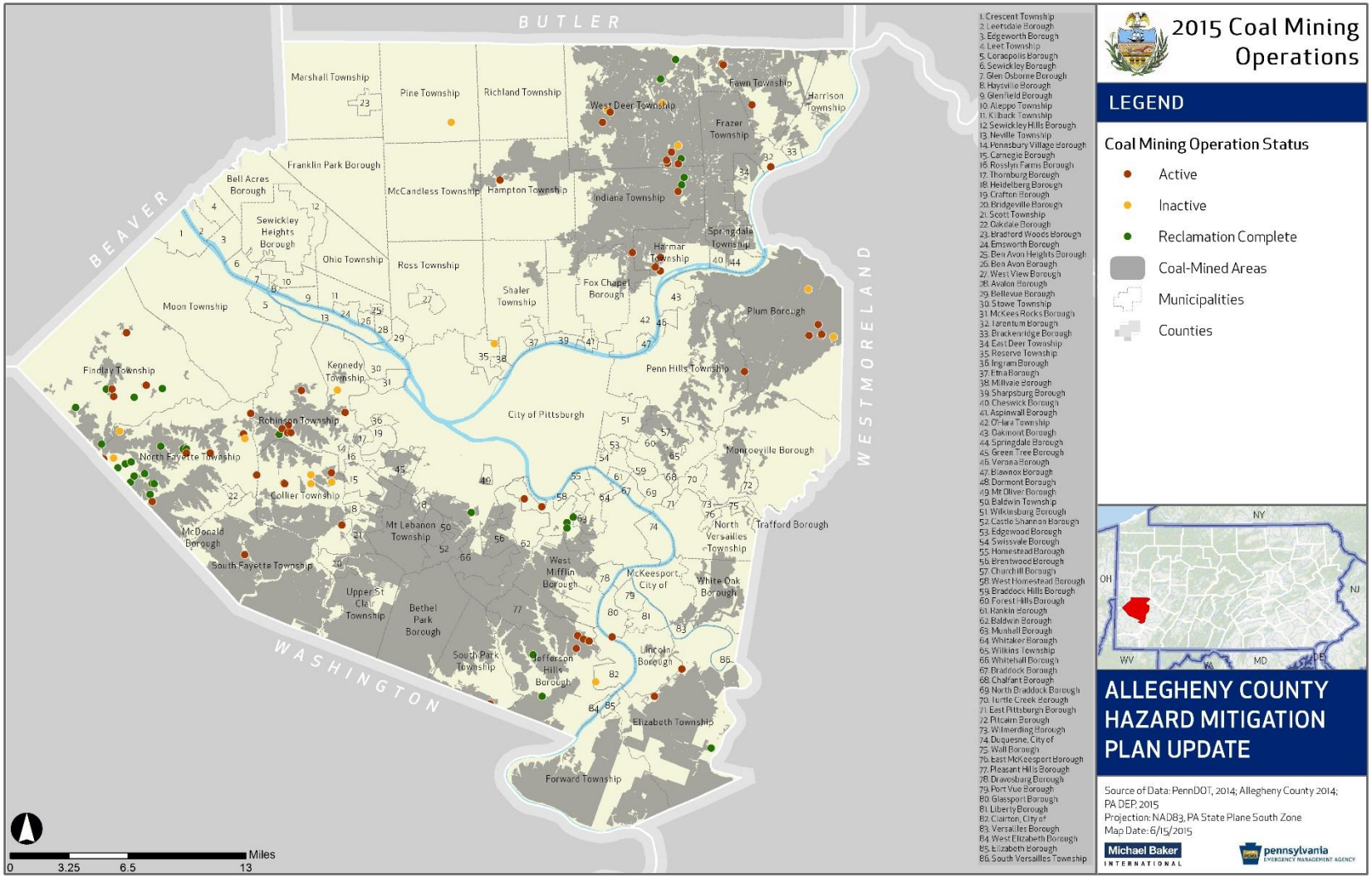
There are two common causes of subsidence in Pennsylvania: 1) mining activity and 2) dissolution of carbonate rock such as limestone or dolomite. In some parts of Pennsylvania, sinkholes are found in areas underlain by carbonate bedrock. Although Allegheny County is partially underlain by carbonate rock, those particular formations are not conducive to dissolution. Cave subsidence is not reported to be a major problem in the County (Pittsburgh Geological Society, 1977). Hence this plan addresses only mine subsidence.

Sub-surface (i.e. underground) extraction of materials such as oil, gas, coal, metal ores (i.e. copper, iron, and zinc), clay, shale, limestone, or water may result in slow-moving or abrupt shifts in the ground surface.

According to the Pennsylvania Department of Environmental Protection (DEP) website, there are two distinct coal fields in Pennsylvania known as the Anthracite and Bituminous coal regions. Bituminous coal is mined in 21 Pennsylvania counties, including Allegheny County. Allegheny County faces the problem of mine subsidence in all the areas of the County that have been undermined. These areas are shown in Figure 4.3.8-1. These mine subsidence areas include surface and deep coal and non-coal mined areas. The coal mined areas cover almost the entire southern half of the County and some portion in the northeastern part of the county.

Sinkholes generally develop where the cover above a mine is thin. Piggott and Eynon (1978) indicated that sinkhole development normally occurs where the interval to the ground surface is less than three to five times the thickness of the extracted seam and the maximum interval is up to ten times the thickness of the extracted seam. In western Pennsylvania, most sinkholes develop where the soil and rock above a mine are less than fifty feet thick (Bruhn et al., 1978). A study of subsidence in the Pittsburgh area revealed that the majority of sinkholes, which constituted about 95% of all reported subsidence incidents, occurred on sites located less than sixty feet above mine level (Bruhn et al., 1981).

Figure 4.3.8-1 Areas of Allegheny County Vulnerable to Mine Subsidence, (Allegheny County 2011).



4.3.8.2 Range of Magnitude

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

Voids in the earth's subsurface are created where coal was mined. The condition removes a significant portion of the support of the overlying rock strata that usually causes the rock strata to fall or subside into the voids that may damage dwellings or other surface structures above the affected areas. Mining locations across the county should be carefully noted and avoided as site for new construction, unless the proper measures are taken to ensure the mine's soundness.

In general, the deeper the mine, the lower the risk of damage due to subsidence. Significant subsidence usually will occur when the depth of the soil and rock strata above the mined out area is less than 100 feet and more than 20 percent of the coal has been removed. Subsidence will occur quite rapidly if all the coal is removed, though subsidence will usually cease within one year after the coal has been removed particularly when modern mining methods are employed. If the mined out area is supported by pillars of coal, subsidence may not occur for several years or may not occur at all. Longwall mining, where a broad face of coal is removed at once, has also become prevalent. The associated subsidence is generally not as severe, and more predictable.

The worst mine subsidence event in recent history in Allegheny County occurred in 2013, when 69 homes in Hyde Park sustained mine subsidence damage. PA DEP responded to the subsidence by filling the mine voids at a cost of $3.7 million (Thomas, 2013).

4.3.8.3 Past Occurrence

PA DEP expects that mine-related subsidence is and will continue to be a regular occurrence in Allegheny County with the extent of mined areas. According to the Hazards Vulnerability Analysis done by Allegheny County Emergency Services, isolated incidents throughout the coal regions over the years have occurred when houses, garages, and trees are swallowed up by subsidence holes. Lengths of local streets and highways, and countless building foundations have been damaged.

There is no comprehensive list of mine subsidence events in Allegheny County, but a review of news stories includes some of the following occurrences:

- In 2013, 10 homes in Mount Oliver sustained mine subsidence damage.

- In 2014, a portion of Monroeville Trestle Road in Plum Borough was closed due to mine subsidence.
- In June 2015, a baseball field in Upper St Clair Township dropped three feet due, cancelling play for an extended period.

4.3.8.4 Future Occurrence

There is currently no reliable information regarding the probability of future occurrences of mine subsidence. One way of estimating probability of future occurrence would be to project the historical trends into the future, but there is no comprehensive documentation of previous occurrences for mine subsidence events in the County. PA DEP indicates that mine subsidence events are constant, though they vary in intensity and damage (Thomas, 2013). Overall, mine subsidence can be considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

4.3.8.5 Vulnerability Assessment

Allegheny County faces the problem of mine subsidence in all the areas of the County that have been mined. Deep coal mining has occurred under approximately 250 square miles or 35% of the land surface of Allegheny County (ACES, 1995). A mined area may be differentially prone to subsidence based on its geology and depth of coal seam, but reliable information about the different locations of varying depths of coal seam is not available. Geologists agree that all areas that are mined are prone to subsidence; therefore the coal mined areas are shown as vulnerable to mine subsidence.

In 1994, mine subsidence occurred in Shaler Township in areas not previously known to be undermined. Since that time, there has been a countywide campaign to enable residents to be covered by mine subsidence insurance. Mine subsidence insurance has been available in Pennsylvania since 1987; this insurance coverage is available to both residential and commercial structures up to $50,000 for a single structure. As recently as April 2015, PA DEP targeted education and outreach campaigns to Allegheny County homeowners relating to purchasing mine subsidence insurance (MSI). MSI is incredibly affordable, with premiums starting at $10 for $5,000 of coverage, and discounts are available for senior citizens. Additional information about mine subsidence insurance can be found online at: http://www.dep.state.pa.us/dep/deputate/minres/bmr/MSIpage/msi_info.htm.

Table 4.3.8-1 shows the structures and critical facilities in Allegheny County potentially vulnerable to mine subsidence – those underlain by coal mined areas. Five communities are almost completely undermined: Baldwin Township, Bethel Park, Castle Shannon, Mount Lebanon, and Pleasant Hills; 20 have over half of all structures vulnerable to mine subsidence. Table 4.3.8-2 shows the vulnerable structures by structure type.

Table 4.3.8-1 Structure and Critical Facilities Vulnerable to Mine Subsidence.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN UNDERMINED AREAS	PERCENT STRUCTURES IN UNDERMINED AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN UNDERMINED AREAS	PERCENT CRITICAL FACILITIES IN UNDERMINED AREAS
Aleppo Township	622	0	0.0%	6	0	0.0%

Table 4.3.8-1 Structure and Critical Facilities Vulnerable to Mine Subsidence.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN UNDERMINED AREAS	PERCENT STRUCTURES IN UNDERMINED AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN UNDERMINED AREAS	PERCENT CRITICAL FACILITIES IN UNDERMINED AREAS
Aspinwall Borough	1,205	0	0.0%	7	0	0.0%
Avalon Borough	1,611	0	0.0%	6	0	0.0%
Baldwin Borough	7,939	4,879	61.5%	24	17	70.8%
Baldwin Township	947	914	96.5%	2	2	100.0%
Bell Acres Borough	610	0	0.0%	6	0	0.0%
Bellevue Borough	2,785	0	0.0%	11	0	0.0%
Ben Avon Borough	744	0	0.0%	3	0	0.0%
Ben Avon Heights Borough	143	0	0.0%	1	0	0.0%
Bethel Park, Municipality of	12,562	12,318	98.1%	33	30	90.9%
Blawnox Borough	669	0	0.0%	7	0	0.0%
Brackenridge Borough	1,483	105	7.1%	10	1	10.0%
Braddock Borough	1,799	0	0.0%	13	0	0.0%
Braddock Hills Borough	864	0	0.0%	2	0	0.0%
Bradford Woods Borough	500	0	0.0%	3	0	0.0%
Brentwood Borough	4,239	3,364	79.4%	14	13	92.9%
Bridgeville Borough	2,160	961	44.5%	8	0	0.0%
Carnegie Borough	3,499	154	4.4%	17	0	0.0%
Castle Shannon Borough	3,153	3,127	99.2%	9	9	100.0%
Chalfant Borough	422	0	0.0%	2	0	0.0%
Cheswick Borough	880	40	4.5%	7	1	14.3%
Churchill Borough	1,499	784	52.3%	9	7	77.8%
Clairton City	4,331	0	0.0%	14	0	0.0%
Collier Township	4,149	1,745	42.1%	21	4	19.0%
Coraopolis Borough	2,601	0	0.0%	13	0	0.0%
Crafton Borough	2,338	0	0.0%	9	0	0.0%
Crescent Township	1,135	0	0.0%	4	0	0.0%
Dormont Borough	3,458	1,454	42.0%	8	2	25.0%
Dravosburg Borough	798	23	2.9%	4	0	0.0%
Duquesne, City of	3,308	0	0.0%	15	0	0.0%
East Deer Township	784	175	22.3%	12	0	0.0%
East McKeesport Borough	1,047	0	0.0%	5	0	0.0%
East Pittsburgh Borough	803	0	0.0%	5	0	0.0%
Edgewood Borough	1,334	0	0.0%	6	0	0.0%
Edgeworth Borough	667	0	0.0%	5	0	0.0%
Elizabeth Borough	677	0	0.0%	8	0	0.0%
Elizabeth Township	5,864	2,783	47.5%	26	12	46.2%

Table 4.3.8-1 Structure and Critical Facilities Vulnerable to Mine Subsidence.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN UNDERMINED AREAS	PERCENT STRUCTURES IN UNDERMINED AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN UNDERMINED AREAS	PERCENT CRITICAL FACILITIES IN UNDERMINED AREAS
Emsworth Borough	918	0	0.0%	3	0	0.0%
Etna Borough	1,611	0	0.0%	7	0	0.0%
Fawn Township	1,096	451	41.1%	9	4	44.4%
Findlay Township	2,789	27	1.0%	20	0	0.0%
Forest Hills Borough	3,154	437	13.9%	13	2	15.4%
Forward Township	1,667	873	52.4%	17	5	29.4%
Fox Chapel Borough	1,951	399	20.5%	11	0	0.0%
Franklin Park Borough	5,267	0	0.0%	10	0	0.0%
Frazer Township	675	588	87.1%	12	10	83.3%
Glassport Borough	2,115	0	0.0%	11	0	0.0%
Glen Osborne Borough	231	0	0.0%	2	0	0.0%
Glenfield Borough	112	0	0.0%	0	0	0.0%
Green Tree Borough	2,109	840	39.8%	7	3	42.9%
Hampton Township	7,202	1,625	22.6%	35	6	17.1%
Harmar Township	1,818	791	43.5%	24	8	32.0%
Harrison Township	5,099	772	15.1%	22	8	36.4%
Haysville Borough	49	0	0.0%	1	0	0.0%
Heidelberg Borough	639	39	6.1%	4	0	0.0%
Homestead Borough	1,582	0	0.0%	7	0	0.0%
Indiana Township	3,348	2,540	75.9%	28	23	82.1%
Ingram Borough	1,301	0	0.0%	7	0	0.0%
Jefferson Hills Borough	5,121	3,158	61.7%	24	13	54.2%
Kennedy Township	3,585	173	4.8%	14	0	0.0%
Kilbuck Township	370	0	0.0%	3	0	0.0%
Leet Township	637	0	0.0%	4	0	0.0%
Leetsdale Borough	611	0	0.0%	12	0	0.0%
Liberty Borough	1,153	0	0.0%	8	0	0.0%
Lincoln Borough	573	22	3.8%	4	0	0.0%
Marshall Township	3,479	0	0.0%	13	0	0.0%
McCandless, Town of	10,876	21	0.2%	40	0	0.0%
McDonald Borough	184	57	31.0%	2	0	0.0%
McKees Rocks Borough	2,838	0	0.0%	9	0	0.0%
McKeesport, City of	10,265	300	2.9%	43	1	2.3%
Millvale Borough	1,736	0	0.0%	5	0	0.0%
Monroeville, Municipality of	11,215	1,679	15.0%	66	3	4.5%
Moon Township	10,065	0	0.0%	31	0	0.0%

Table 4.3.8-1 Structure and Critical Facilities Vulnerable to Mine Subsidence.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN UNDERMINED AREAS	PERCENT STRUCTURES IN UNDERMINED AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN UNDERMINED AREAS	PERCENT CRITICAL FACILITIES IN UNDERMINED AREAS
Mount Lebanon, Municipality of	11,586	11,419	98.6%	38	38	100.0%
Mount Oliver Borough	1,506	301	20.0%	4	1	25.0%
Munhall Borough	5,167	847	16.4%	17	0	0.0%
Neville Township	599	0	0.0%	22	0	0.0%
North Braddock Borough	2,920	0	0.0%	14	0	0.0%
North Fayette Township	6,948	1,533	22.1%	29	5	17.2%
North Versailles Township	4,687	62	1.3%	14	0	0.0%
Oakdale Borough	3,954	26	0.7%	25	0	0.0%
Oakmont Borough	673	0	0.0%	3	0	0.0%
O'Hara Township	2,848	0	0.0%	17	0	0.0%
Ohio Township	2,424	0	0.0%	15	0	0.0%
Penn Hills, Municipality of	19,504	5,214	26.7%	52	11	21.2%
Pennsbury Village Borough	503	0	0.0%	3	0	0.0%
Pine Township	4,688	0	0.0%	14	0	0.0%
Pitcairn Borough	1,389	0	0.0%	6	0	0.0%
Pittsburgh, City of	130,310	7,566	5.8%	505	8	1.6%
Pleasant Hills Borough	3,239	3,131	96.7%	10	7	70.0%
Plum Borough	10,864	6,493	59.8%	42	23	53.5%
Port Vue Borough	1,824	46	2.5%	5	0	0.0%
Rankin Borough	784	0	0.0%	3	0	0.0%
Reserve Township	1,554	0	0.0%	8	0	0.0%
Richland Township	4,553	0	0.0%	17	0	0.0%
Robinson Township	6,093	1,918	31.5%	29	9	31.0%
Ross Township	13,249	0	0.0%	35	0	0.0%
Rosslyn Farms Borough	212	0	0.0%	3	0	0.0%
Scott Township	6,160	3,770	61.2%	21	6	28.6%
Sewickley Borough	1,551	0	0.0%	12	0	0.0%
Sewickley Heights	425	0	0.0%	3	0	0.0%
Sewickley Hills Borough	265	0	0.0%	3	0	0.0%
Shaler Township	12,428	399	3.2%	24	0	0.0%
Sharpsburg Borough	1,570	0	0.0%	7	0	0.0%
South Fayette Township	6,421	4,978	77.5%	23	13	56.5%
South Park Township	5,127	2,671	52.1%	17	3	17.6%
South Versailles Township	163	0	0.0%	3	0	0.0%
Springdale Borough	1,573	48	3.1%	14	0	0.0%
Springdale Township	860	663	77.1%	4	4	100.0%

Table 4.3.8-1 Structure and Critical Facilities Vulnerable to Mine Subsidence.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN UNDERMINED AREAS	PERCENT STRUCTURES IN UNDERMINED AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN UNDERMINED AREAS	PERCENT CRITICAL FACILITIES IN UNDERMINED AREAS
Stowe Township	3,161	0	0.0%	13	0	0.0%
Swissvale Borough	4,109	0	0.0%	12	0	0.0%
Tarentum Borough	2,109	23	1.1%	19	1	5.3%
Thornburg Borough	190	64	33.7%	3	0	0.0%
Trafford Borough	51	0	0.0%	2	0	0.0%
Turtle Creek Borough	2,165	0	0.0%	13	0	0.0%
Upper St. Clair Township	7,419	6,592	88.9%	19	13	68.4%
Verona Borough	1,264	0	0.0%	7	0	0.0%
Versailles Borough	669	9	1.3%	5	0	0.0%
Wall Borough	370	1	0.3%	2	0	0.0%
West Deer Township	5,424	3,721	68.6%	22	15	68.2%
West Elizabeth Borough	291	0	0.0%	5	0	0.0%
West Homestead Borough	1,112	0	0.0%	5	0	0.0%
West Mifflin Borough	8,856	2,368	26.7%	54	23	42.6%
West View Borough	2,669	0	0.0%	13	0	0.0%
Whitaker Borough	618	0	0.0%	1	0	0.0%
White Oak Borough	3,739	786	21.0%	11	5	45.5%
Whitehall Borough	5,426	4,634	85.4%	16	14	87.5%
Wilkins Township	2,761	683	24.7%	13	2	15.4%
Wilkinsburg Borough	7,156	619	8.7%	25	0	0.0%
Wilmerding Borough	848	0	0.0%	4	0	0.0%
GRAND TOTAL	**530,098**	**118,203**	**22.3%**	**2,208**	**386**	**17.4%**

Table 4.3.8-2 Structures Vulnerable to Mine Subsidence by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Aleppo Township	622	0	0	0	0	0	0	0	0	0
Aspinwall Borough	1,205	0	0	0	0	0	0	0	0	0
Avalon Borough	1,611	0	0	0	0	0	0	0	0	0
Baldwin Borough	7,939	0	110	21	14	10	4724	0	0	4,879
Baldwin Township	947	0	24	2	3	0	885	0	0	914
Bell Acres Borough	610	0	0	0	0	0	0	0	0	0
Bellevue Borough	2,785	0	0	0	0	0	0	0	0	0
Ben Avon Borough	744	0	0	0	0	0	0	0	0	0
Ben Avon Heights Borough	143	0	0	0	0	0	0	0	0	0
Bethel Park, Municipality of	12,562	0	440	39	42	57	11671	66	3	12,318
Blawnox Borough	669	0	0	0	0	0	0	0	0	0
Brackenridge Borough	1,483	0	2	0	0	0	103	0	0	105
Braddock Borough	1,799	0	0	0	0	0	0	0	0	0
Braddock Hills Borough	864	0	0	0	0	0	0	0	0	0
Bradford Woods Borough	500	0	0	0	0	0	0	0	0	0
Brentwood Borough	4,239	0	145	13	3	39	3163	1	0	3,364
Bridgeville Borough	2,160	0	9	1	0	4	947	0	0	961
Carnegie Borough	3,499	0	2	0	0	0	139	13	0	154
Castle Shannon Borough	3,153	0	147	7	5	39	2895	34	0	3,127
Chalfant Borough	422	0	0	0	0	0	0	0	0	0
Cheswick Borough	880	0	0	0	0	0	40	0	0	40
Churchill Borough	1,499	0	5	5	0	0	772	1	1	784
Clairton City	4,331	0	0	0	0	0	0	0	0	0
Collier Township	4,149	1	16	4	1	1	1721	0	1	1,745
Coraopolis Borough	2,601	0	0	0	0	0	0	0	0	0
Crafton Borough	2,338	0	0	0	0	0	0	0	0	0
Crescent Township	1,135	0	0	0	0	0	0	0	0	0
Dormont Borough	3,458	0	65	4	2	54	1327	0	2	1,454
Dravosburg Borough	798	0	8	0	0	0	15	0	0	23
Duquesne, City of	3,308	0	0	0	0	0	0	0	0	0
East Deer Township	784	0	6	0	0	0	169	0	0	175
East McKeesport Borough	1,047	0	0	0	0	0	0	0	0	0

Table 4.3.8-2 Structures Vulnerable to Mine Subsidence by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
East Pittsburgh Borough	803	0	0	0	0	0	0	0	0	0
Edgewood Borough	1,334	0	0	0	0	0	0	0	0	0
Edgeworth Borough	667	0	0	0	0	0	0	0	0	0
Elizabeth Borough	677	0	0	0	0	0	0	0	0	0
Elizabeth Township	5,864	22	45	12	6	2	2691	4	1	2,783
Emsworth Borough	918	0	0	0	0	0	0	0	0	0
Etna Borough	1,611	0	0	0	0	0	0	0	0	0
Fawn Township	1,096	12	8	5	2	0	424	0	0	451
Findlay Township	2,789	1	8	1	3	0	13	0	1	27
Forest Hills Borough	3,154	0	1	1	0	0	434	1	0	437
Forward Township	1,667	48	19	3	6	1	793	3	0	873
Fox Chapel Borough	1,951	0	2	1	0	0	396	0	0	399
Franklin Park Borough	5,267	0	0	0	0	0	0	0	0	0
Frazer Township	675	17	50	2	3	2	512	1	1	588
Glassport Borough	2,115	0	0	0	0	0	0	0	0	0
Glen Osborne Borough	231	0	0	0	0	0	0	0	0	0
Glenfield Borough	112	0	0	0	0	0	0	0	0	0
Green Tree Borough	2,109	0	56	7	5	0	771	0	1	840
Hampton Township	7,202	5	97	7	6	4	1504	1	1	1,625
Harmar Township	1,818	2	18	6	15	14	721	15	0	791
Harrison Township	5,099	0	29	7	6	7	722	1	0	772
Haysville Borough	49	0	0	0	0	0	0	0	0	0
Heidelberg Borough	639	0	0	0	0	0	39	0	0	39
Homestead Borough	1,582	0	0	0	0	0	0	0	0	0
Indiana Township	3,348	64	82	21	24	11	2324	6	8	2,540
Ingram Borough	1,301	0	0	0	0	0	0	0	0	0
Jefferson Hills Borough	5,121	2	31	9	1	3	3105	4	3	3,158
Kennedy Township	3,585	0	11	1	2	0	159	0	0	173
Kilbuck Township	370	0	0	0	0	0	0	0	0	0
Leet Township	637	0	0	0	0	0	0	0	0	0
Leetsdale Borough	611	0	0	0	0	0	0	0	0	0
Liberty Borough	1,153	0	0	0	0	0	0	0	0	0

Table 4.3.8-2 Structures Vulnerable to Mine Subsidence by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Lincoln Borough	573	2	0	1	0	0	19	0	0	22
Marshall Township	3,479	0	0	0	0	0	0	0	0	0
McCandless, Town of	10,876	0	0	0	0	0	21	0	0	21
McDonald Borough	184	0	1	0	0	0	56	0	0	57
McKees Rocks Borough	2,838	0	0	0	0	0	0	0	0	0
McKeesport, City of	10,265	0	11	0	1	2	286	0	0	300
Millvale Borough	1,736	0	0	0	0	0	0	0	0	0
Monroeville, Municipality of	11,215	0	82	5	3	3	1586	0	0	1,679
Moon Township	10,065	0	0	0	0	0	0	0	0	0
Mount Lebanon, Municipality of	11,586	5	237	34	0	34	11098	11	0	11,419
Mount Oliver Borough	1,506	0	3	0	0	7	291	0	0	301
Munhall Borough	5,167	0	5	0	0	1	840	1	0	847
Neville Township	599	0	0	0	0	0	0	0	0	0
North Braddock Borough	2,920	0	0	0	0	0	0	0	0	0
North Fayette Township	6,948	15	123	7	26	18	1342	2	0	1,533
North Versailles Township	4,687	0	0	0	0	0	62	0	0	62
Oakdale Borough	3,954	0	0	0	0	0	26	0	0	26
Oakmont Borough	673	0	0	0	0	0	0	0	0	0
O'Hara Township	2,848	0	0	0	0	0	0	0	0	0
Ohio Township	2,424	0	0	0	0	0	0	0	0	0
Penn Hills, Municipality of	19,504	6	141	14	6	7	5038	2	0	5,214
Pennsbury Village Borough	503	0	0	0	0	0	0	0	0	0
Pine Township	4,688	0	0	0	0	0	0	0	0	0
Pitcairn Borough	1,389	0	0	0	0	0	0	0	0	0
Pittsburgh, City of	130,310	0	167	7	2	127	7252	9	2	7,566
Pleasant Hills Borough	3,239	0	123	9	22	12	2965	0	0	3,131
Plum Borough	10,864	73	339	23	53	11	5978	16	0	6,493
Port Vue Borough	1,824	0	0	0	0	0	46	0	0	46
Rankin Borough	784	0	0	0	0	0	0	0	0	0
Reserve Township	1,554	0	0	0	0	0	0	0	0	0
Richland Township	4,553	0	0	0	0	0	0	0	0	0

Table 4.3.8-2 Structures Vulnerable to Mine Subsidence by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Robinson Township	6,093	1	290	7	9	9	1464	137	1	1,918
Ross Township	13,249	0	0	0	0	0	0	0	0	0
Rosslyn Farms Borough	212	0	0	0	0	0	0	0	0	0
Scott Township	6,160	0	63	2	0	0	3507	198	0	3,770
Sewickley Borough	1,551	0	0	0	0	0	0	0	0	0
Sewickley Heights	425	0	0	0	0	0	0	0	0	0
Sewickley Hills Borough	265	0	0	0	0	0	0	0	0	0
Shaler Township	12,428	0	1	1	0	0	397	0	0	399
Sharpsburg Borough	1,570	0	0	0	0	0	0	0	0	0
South Fayette Township	6,421	12	111	2	10	2	4835	5	1	4,978
South Park Township	5,127	5	51	4	5	11	2576	19	0	2,671
South Versailles Township	163	0	0	0	0	0	0	0	0	0
Springdale Borough	1,573	0	1	0	0	0	47	0	0	48
Springdale Township	860	2	6	2	2	4	645	1	1	663
Stowe Township	3,161	0	0	0	0	0	0	0	0	0
Swissvale Borough	4,109	0	0	0	0	0	0	0	0	0
Tarentum Borough	2,109	0	0	0	0	0	23	0	0	23
Thornburg Borough	190	0	0	0	0	0	64	0	0	64
Trafford Borough	51	0	0	0	0	0	0	0	0	0
Turtle Creek Borough	2,165	0	0	0	0	0	0	0	0	0
Upper St. Clair Township	7,419	64	85	24	2	3	6409	5	0	6,592
Verona Borough	1,264	0	0	0	0	0	0	0	0	0
Versailles Borough	669	0	5	0	1	0	3	0	0	9
Wall Borough	370	0	0	0	0	0	0	0	1	1
West Deer Township	5,424	85	93	11	16	25	3487	3	1	3,721
West Elizabeth Borough	291	0	0	0	0	0	0	0	0	0
West Homestead Borough	1,112	0	0	0	0	0	0	0	0	0
West Mifflin Borough	8,856	0	150	52	26	6	2131	2	1	2,368
West View Borough	2,669	0	0	0	0	0	0	0	0	0
Whitaker Borough	618	0	0	0	0	0	0	0	0	0
White Oak Borough	3,739	0	21	5	0	4	756	0	0	786
Whitehall Borough	5,426	0	62	6	2	5	4505	54	0	4,634

Table 4.3.8-2 Structures Vulnerable to Mine Subsidence by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Wilkins Township	2,761	1	6	2	0	1	673	0	0	683
Wilkinsburg Borough	7,156	0	1	0	0	0	618	0	0	619
Wilmerding Borough	848	0	0	0	0	0	0	0	0	0
GRAND TOTAL	**530,098**	**445**	**3,614**	**397**	**335**	**540**	**112,225**	**616**	**31**	**118,203**

4.3.9 Tornado, Windstorm

4.3.9.1 Location and Extent

Tornadoes and wind storms can occur throughout Allegheny County, though events are usually localized. However, severe thunderstorms may result in conditions favorable to the formation of numerous or long-lived tornadoes. Tornadoes can occur at any time during the day or night, but are most frequent during late afternoon into early evening, the warmest hours of the day, and most likely to occur during the spring and early summer months of March through June.

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

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

4.3.9.2 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.

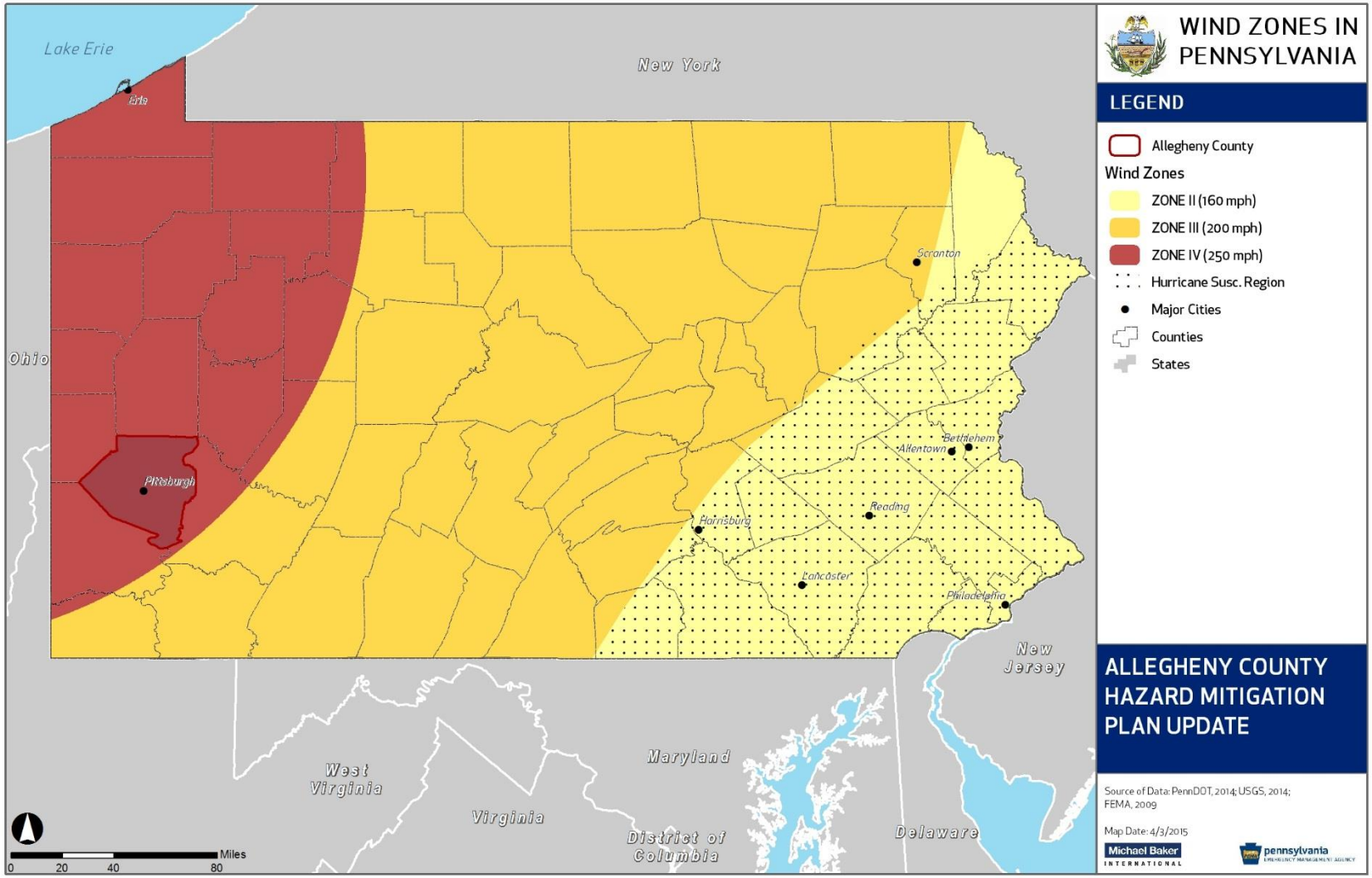
Damages and deaths can be especially significant when tornadoes move through populated, developed areas. The destruction caused by tornadoes ranges from minor to extreme damage depending on the intensity, size and duration of the storm. Typically, tornadoes cause the greatest damages to structures of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

The Enhanced Fujita Scale, also known as the “EF-Scale,” measures tornado strength and associated damages. The EF-Scale is an update to the earlier Fujita Scale, also known as the “F-Scale,” that was published in 1971. It classifies United States tornadoes into six intensity categories, as shown in Table 4.3.8-1, based upon the estimated maximum winds occurring within the wind vortex. Since its implementation by the National Weather Service in 2007, the EF-Scale has become the definitive metric for estimating wind speeds within tornadoes based upon damage to buildings and structures. F-Scale categories with corresponding EF-Scale wind speeds are provided in Table 4.3.9-1 since the magnitude of previous tornado occurrences is based on the F-Scale.

Table 4.3.9-1	Enhanced Fujita Scale (EF-Scale) Categories with Associated Wind Speeds and Description of Damages.		
EF-SCALE NUMBER	**WIND SPEED (MPH)**	**F-SCALE NUMBER**	**TYPE OF DAMAGE POSSIBLE**
EF0	65–85	F0-F1	**Minor damage**: Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	F1	**Moderate damage**: Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111–135	F1-F2	**Considerable damage**: Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136–165	F2-F3	**Severe damage**: Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166–200	F3	**Devastating damage**: Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	F3-F6	**Extreme damage**: Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (300 ft); steel reinforced concrete structure badly damaged; high-rise buildings have significant structural deformation.

Figure 4.3.9-1 shows the wind speed zones developed by the American Society of Civil Engineers based on tornado and hurricane historical events. These wind speed zones are intended to guide the design and evaluation of the structural integrity of shelters and critical facilities. All of Allegheny County falls within Zone IV. Shelters and critical facilities should be able to withstand a 3-second gust of up to 250 mph, regardless of whether the gust is the result of a tornado, coastal storm, or windstorm event. Therefore, these structures should be able to withstand the wind speeds experienced in an F5 tornado event.

Figure 4.3.9-1 Wind Zone Associated with Allegheny County.



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

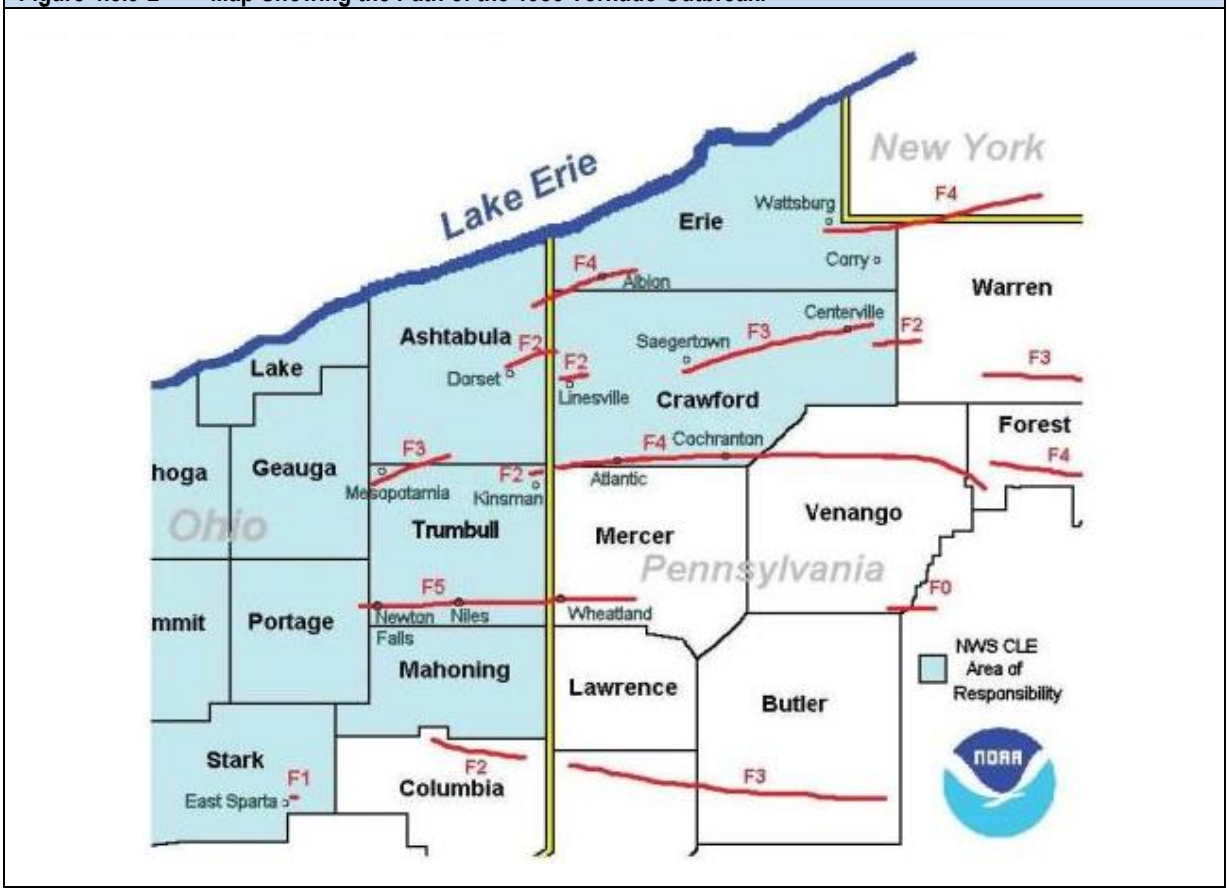
Another example of the worst case scenario occurred on August 3, 1963 when an F3 tornado ripped through Allegheny County, causing two deaths, 70 injuries, and 25 million in property damage.

Since tornado events are typically localized, environmental impacts are rarely widespread. The impacts of windstorms on the environment typically take place over a larger area. In either case, where these events occur, severe damage to plant species is likely. This includes uprooting or total destruction of trees and an increased threat of wildfire in areas where dead trees are not removed. Hazardous material facilities should meet design requirements for the wind zones identified in Figure 4.3.9-1 in order to prevent release of hazardous materials into the environment.

4.3.9.3 Past Occurrence

Tornadoes have occurred throughout Pennsylvania. Western and southeastern sections of the Commonwealth have been struck more frequently. On May 31, 1985 a very rare outbreak of 21 tornadoes tracked across northeast Ohio and northwest Pennsylvania, including Erie, Warren, Crawford, Forest, Mercer, Venango, Mercer, and Butler counties (just north of Allegheny County), killing 76 people (Figure 4.3.9-2). One of these tornadoes was rated an F6 while six were rated F4s on the old Fujita Scale. The deadliest tornado touched down near Jamestown, PA as an F4 on the old Fujita Scale, killing 23 people and destroying 371 homes. It stayed on the ground for over an hour and produced a 56-mile long damage path.

Figure 4.3.9-2 Map Showing the Path of the 1985 Tornado Outbreak.



On August 3, 1963 an F3 tornado ripped through Allegheny County, causing two deaths, 70 injuries, and 25 million dollars in property damage, while another outbreak of tornadoes on June 3, 1980 included an F4 tornado that caused 250 million dollars of damage to property and injured 20 people.

Table 4.3.9-2 lists previous tornado events that have occurred in Allegheny County. Figure 4.3.9-3 depicts the locations of tornado touchdowns and paths.

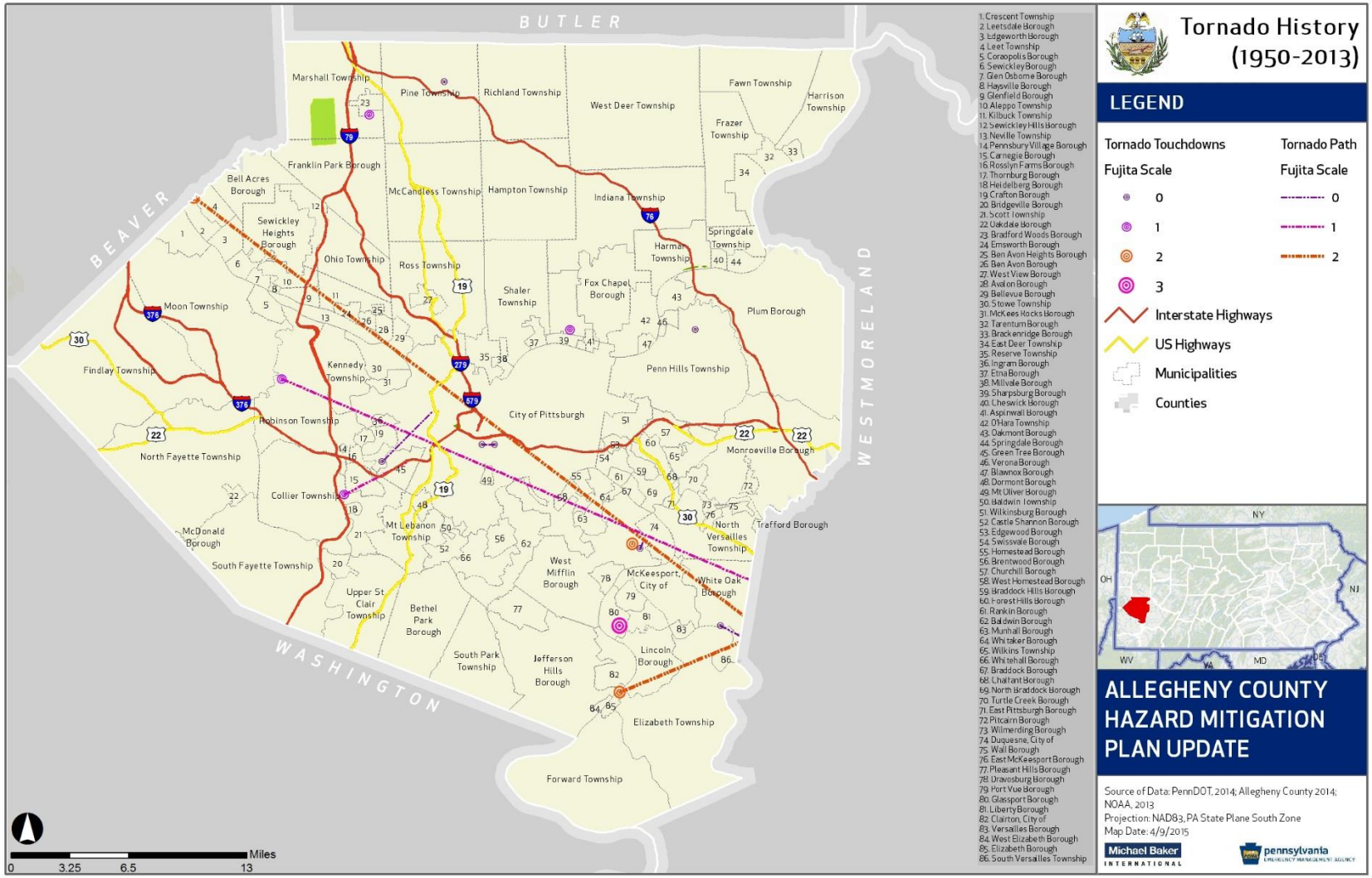
Table 4.3.9-2 History of Tornadoes in Allegheny County (NCDC 2015).

LOCATION	DATE	F-SCALE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
Duquesne	September 27, 2012	EF0	0	0	50,000
Unknown	August 9, 2007	F0	0	0	100,000
Carnegie	June 12, 2003	F0	0	0	30,000
Carnegie	June 2, 1998	F1	0	50	13,000,000
Greenrock	June 2, 1998	F0	0	0	5,000
County-wide	July 13, 1992	F0	0	0	3,000
County-wide	May 22, 1983	F2	0	0	2,667,000
County-wide	June 21, 1981	F1	0	0	25,000
County-wide	June 3, 1980	F4	0	20	250,017,000
County-wide	July 7, 1977	F0	0	0	0

Table 4.3.9-2 History of Tornadoes in Allegheny County (NCDC 2015).

LOCATION	DATE	F-SCALE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
County-wide	April 25, 1976	F0	0	0	4,000
Unknown	June 4, 1975	Unknown	0	0	25,000
County-wide	July 31, 1970	F1	0	0	4,000
County-wide	August 3, 1963	F3	2	70	30,000,000
County-wide	May 13, 1956	F2	0	5	250,000
County-wide	June 10, 1954	F0	0	0	0

Figure 4.3.9-3 Tornado History for Allegheny County.



Windstorm events may be the result of thunderstorms, hurricanes, tropical storms, winter storms, or nor'easters. There have been nearly 400 events with wind speeds of greater than 50 knots in Allegheny County since 1955. These events frequently occurred in conjunction with thunderstorms. Table 4.3.9-3 lists only windstorm events that have caused deaths, injuries, and property damage.

Table 4.3.9-3 History of Windstorms in Allegheny County (NCDC, 2015).

LOCATION	DATE	TYPE OF EVENT	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
Allegheny Co.	7/15/1995	Thunderstorm Wind	52	0	0	$1,000
Allegheny (Zone)	4/30/1996	High Wind	51	0	0	$25,000
Allegheny (Zone)	10/30/1996	High Wind	54	0	0	$20,000
Allegheny (Zone)	2/22/1997	High Wind	63	0	0	$4,000
Allegheny (Zone)	2/27/1997	High Wind	52	0	0	$20,000
Allegheny Co.	6/30/1998	Thunderstorm Wind	74	0	10	$41,000,000
Allegheny Co.	4/9/1999	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	4/22/1999	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	5/24/1999	Thunderstorm Wind	52	0	0	$1,000
Allegheny Co.	7/9/1999	Thunderstorm Wind	60	0	0	$50,000
Allegheny (Zone)	1/10/2000	High Wind	50	0	0	$1,000
Allegheny (Zone)	1/10/2000	High Wind	50	0	0	$2,000
Allegheny (Zone)	12/12/2000	High Wind	50	0	0	$100,000
Allegheny (Zone)	12/14/2001	High Wind	50	0	0	$5,000
Allegheny Co.	5/31/2002	Thunderstorm Wind	91	1	54	$10,000,000
Allegheny Co.	6/8/2003	Thunderstorm Wind	52	0	0	$15,000
Allegheny Co.	6/8/2003	Thunderstorm Wind	78	0	0	$20,000
Allegheny Co.	6/8/2003	Thunderstorm Wind	55	0	0	$10,000
Allegheny Co.	6/8/2003	Thunderstorm Wind	52	0	0	$1,000
Allegheny Co.	6/8/2003	Thunderstorm Wind	55	0	0	$15,000
Allegheny Co.	6/8/2003	Thunderstorm Wind	52	0	0	$1,000
Allegheny Co.	6/12/2003	Thunderstorm Wind	50	0	0	$7,000
Allegheny Co.	7/4/2003	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	7/8/2003	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	7/8/2003	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	7/8/2003	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	7/8/2003	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	7/10/2003	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	7/10/2003	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	7/21/2003	Thunderstorm Wind	50	0	0	$2,000
Allegheny (Zone)	7/21/2003	High Wind	50	0	0	$1,000
Allegheny Co.	8/16/2003	Thunderstorm Wind	50	0	0	$8,000
Allegheny Co.	10/14/2003	Thunderstorm Wind	60	0	0	$5,000
Allegheny Co.	11/12/2003	Thunderstorm Wind	50	0	0	$2,000

Table 4.3.9-3 History of Windstorms in Allegheny County (NCDC, 2015).

LOCATION	DATE	TYPE OF EVENT	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
Allegheny Co.	11/12/2003	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	5/21/2004	Thunderstorm Wind	52	0	0	$10,000
Allegheny Co.	6/14/2004	Thunderstorm Wind	52	0	0	$40,000
Allegheny Co.	6/17/2004	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	8/4/2004	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	8/19/2004	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	8/19/2004	Thunderstorm Wind	61	0	0	$5,000
Allegheny Co.	8/20/2004	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	8/29/2004	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	4/20/2005	Thunderstorm Wind	50	0	0	$6,000
Allegheny Co.	5/23/2005	Thunderstorm Wind	52	0	0	$30,000
Allegheny Co.	6/11/2005	Thunderstorm Wind	50	0	0	$6,000
Allegheny Co.	6/28/2005	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/30/2005	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	7/5/2005	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	7/5/2005	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	7/13/2005	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	7/25/2005	Thunderstorm Wind	50	0	0	$20,000
Allegheny Co.	7/25/2005	Thunderstorm Wind	50	0	0	$30,000
Allegheny Co.	7/26/2005	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	7/26/2005	Thunderstorm Wind	50	0	0	$6,000
Allegheny Co.	8/13/2005	Thunderstorm Wind	50	0	0	$20,000
Allegheny Co.	8/20/2005	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	8/20/2005	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	8/20/2005	Thunderstorm Wind	50	0	0	$6,000
Allegheny Co.	11/6/2005	Thunderstorm Wind	50	0	0	$8,000
Allegheny Co.	11/9/2005	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	5/26/2006	Thunderstorm Wind	52	0	0	$8,000
Allegheny Co.	6/22/2006	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	6/22/2006	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	7/30/2006	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	8/3/2006	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	12/1/2006	Thunderstorm Wind	50	0	0	$5,000
Allegheny (Zone)	12/1/2006	High Wind	55	0	0	$75,000
Allegheny Co.	6/13/2007	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/19/2007	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/19/2007	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	6/19/2007	Thunderstorm Wind	50	0	0	$3,000

Table 4.3.9-3 History of Windstorms in Allegheny County (NCDC, 2015).

LOCATION	DATE	TYPE OF EVENT	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
Allegheny Co.	6/19/2007	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	6/21/2007	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	6/21/2007	Thunderstorm Wind	50	0	0	$4,000
Allegheny Co.	6/27/2007	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	7/17/2007	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	7/17/2007	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	8/8/2007	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	8/8/2007	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	8/9/2007	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	8/9/2007	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	8/9/2007	Thunderstorm Wind	74	0	0	$250,000
Allegheny Co.	8/9/2007	Thunderstorm Wind	50	0	0	$30,000
Allegheny Co.	8/9/2007	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	8/9/2007	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	9/26/2007	Thunderstorm Wind	50	0	0	$30,000
Allegheny (Zone)	1/30/2008	High Wind	50	0	0	$75,000
Allegheny (Zone)	2/6/2008	High Wind	50	0	0	$75,000
Allegheny (Zone)	2/10/2008	High Wind	50	0	0	$100,000
Allegheny Co.	6/16/2008	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	6/16/2008	Thunderstorm Wind	50	0	0	$75,000
Allegheny Co.	6/26/2008	Thunderstorm Wind	50	0	0	$75,000
Allegheny Co.	6/26/2008	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	6/26/2008	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	6/28/2008	Thunderstorm Wind	50	0	0	$75,000
Allegheny Co.	6/28/2008	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	6/28/2008	Thunderstorm Wind	50	0	0	$100,000
Allegheny Co.	6/29/2008	Thunderstorm Wind	50	0	0	$125,000
Allegheny Co.	6/29/2008	Thunderstorm Wind	50	0	0	$75,000
Allegheny Co.	6/29/2008	Thunderstorm Wind	50	0	0	$75,000
Allegheny (Zone)	9/14/2008	High Wind	58	0	0	$10,000
Allegheny Co.	2/11/2009	Thunderstorm Wind	50	0	0	$50,000
Allegheny (Zone)	2/12/2009	High Wind	50	0	0	$300,000
Allegheny Co.	6/26/2009	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	4/16/2010	Thunderstorm Wind	55	0	1	$4,000
Allegheny Co.	4/16/2010	Thunderstorm Wind	55	0	0	$200,000
Allegheny Co.	4/16/2010	Thunderstorm Wind	50	0	0	$75,000
Allegheny Co.	4/16/2010	Thunderstorm Wind	57	0	0	$75,000
Allegheny Co.	4/16/2010	Thunderstorm Wind	50	0	0	$25,000

Table 4.3.9-3 History of Windstorms in Allegheny County (NCDC, 2015).

LOCATION	DATE	TYPE OF EVENT	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
Allegheny Co.	4/16/2010	Thunderstorm Wind	60	0	0	$100,000
Allegheny Co.	4/16/2010	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	4/25/2010	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	5/11/2010	Thunderstorm Wind	50	0	0	$100,000
Allegheny Co.	5/28/2010	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	6/2/2010	Thunderstorm Wind	50	0	0	$75,000
Allegheny Co.	6/2/2010	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	6/2/2010	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	6/2/2010	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	6/23/2010	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	7/21/2010	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	9/22/2010	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	9/22/2010	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	9/22/2010	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	9/22/2010	Thunderstorm Wind	60	0	0	$15,000
Allegheny Co.	10/26/2010	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	10/26/2010	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	10/26/2010	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	10/26/2010	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	5/26/2011	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	5/26/2011	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	7/4/2011	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	7/11/2011	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	7/18/2011	Thunderstorm Wind	52	0	0	$30,000
Allegheny Co.	7/22/2011	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	7/22/2011	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	7/28/2011	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	8/19/2011	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	8/19/2011	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	8/19/2011	Thunderstorm Wind	50	0	0	$25,000
Allegheny (Zone)	2/24/2012	High Wind	50	0	0	$20,000
Allegheny Co.	5/29/2012	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	5/29/2012	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	5/29/2012	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	6/29/2012	Thunderstorm Wind	60	0	0	$5,000
Allegheny Co.	6/29/2012	Thunderstorm Wind	60	0	0	$2,500
Allegheny Co.	6/29/2012	Thunderstorm Wind	60	0	0	$5,000
Allegheny Co.	7/18/2012	Thunderstorm Wind	50	0	0	$15,000

Table 4.3.9-3 History of Windstorms in Allegheny County (NCDC, 2015).

LOCATION	DATE	TYPE OF EVENT	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
Allegheny Co.	7/18/2012	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	7/18/2012	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	7/26/2012	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	7/26/2012	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	7/26/2012	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	7/26/2012	Thunderstorm Wind	50	0	0	$40,000
Allegheny Co.	8/8/2012	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	8/9/2012	Thunderstorm Wind	50	0	0	$250
Allegheny Co.	9/8/2012	Thunderstorm Wind	57	0	0	$5,000
Allegheny Co.	9/8/2012	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	9/8/2012	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	9/8/2012	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	9/8/2012	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	9/8/2012	Thunderstorm Wind	66	0	0	$25,000
Allegheny Co.	9/8/2012	Thunderstorm Wind	61	0	0	$5,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$40,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$20,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$60,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$40,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$40,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$45,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$20,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$40,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$40,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$20,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$35,000

Table 4.3.9-3 History of Windstorms in Allegheny County (NCDC, 2015).

LOCATION	DATE	TYPE OF EVENT	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
Allegheny Co.	9/22/2012	Thunderstorm Wind	50	0	0	$45,000
Allegheny Co.	9/27/2012	Thunderstorm Wind	50	0	0	$10,000
Allegheny (Zone)	9/27/2012	High Wind	50	0	0	$35,000
Allegheny Co.	9/27/2012	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	9/27/2012	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	1/30/2013	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	1/30/2013	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	1/30/2013	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	4/16/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	4/16/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	5/10/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	5/10/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$2,500
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$500
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/13/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$500
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$500
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$500
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$500
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$500
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/25/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/28/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/28/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/28/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	6/28/2013	Thunderstorm Wind	50	0	0	$1,000

Table 4.3.9-3 History of Windstorms in Allegheny County (NCDC, 2015).

LOCATION	DATE	TYPE OF EVENT	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
Allegheny Co.	7/10/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	7/10/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	7/10/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	7/10/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	7/10/2013	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	7/16/2013	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	7/17/2013	Thunderstorm Wind	50	0	0	$20,000
Allegheny Co.	7/17/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	7/17/2013	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	7/17/2013	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	7/23/2013	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	7/23/2013	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	9/11/2013	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	9/12/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	9/12/2013	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	9/12/2013	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	9/12/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	11/1/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	11/1/2013	Thunderstorm Wind	50	0	0	$50,000
Allegheny Co.	11/1/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	11/1/2013	Thunderstorm Wind	50	0	0	$20,000
Allegheny Co.	11/1/2013	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	11/1/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	11/1/2013	Thunderstorm Wind	50	0	0	$35,000
Allegheny Co.	11/17/2013	Thunderstorm Wind	50	0	0	$75,000
Allegheny Co.	11/17/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	11/17/2013	Thunderstorm Wind	50	0	0	$20,000
Allegheny Co.	11/17/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	11/17/2013	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	12/22/2013	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	5/27/2014	Thunderstorm Wind	50	0	0	$250
Allegheny Co.	5/27/2014	Thunderstorm Wind	50	0	0	$250
Allegheny Co.	5/27/2014	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	5/27/2014	Thunderstorm Wind	50	0	0	$250
Allegheny Co.	5/27/2014	Thunderstorm Wind	50	0	0	$500
Allegheny Co.	5/27/2014	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	5/27/2014	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/3/2014	Thunderstorm Wind	50	0	0	$2,000

Table 4.3.9-3 History of Windstorms in Allegheny County (NCDC, 2015).

LOCATION	DATE	TYPE OF EVENT	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE ($)
Allegheny Co.	6/11/2014	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	6/11/2014	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	6/11/2014	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	6/11/2014	Thunderstorm Wind	50	0	0	$500
Allegheny Co.	6/11/2014	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	6/18/2014	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	6/18/2014	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	6/18/2014	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	6/18/2014	Thunderstorm Wind	50	0	0	$3,000
Allegheny Co.	6/18/2014	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	6/24/2014	Thunderstorm Wind	74	0	0	$100,000
Allegheny Co.	6/24/2014	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	6/24/2014	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	6/24/2014	Thunderstorm Wind	50	0	0	$10,000
Allegheny Co.	7/8/2014	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	7/13/2014	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	7/13/2014	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	7/13/2014	Thunderstorm Wind	50	0	0	$25,000
Allegheny Co.	7/13/2014	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	7/13/2014	Thunderstorm Wind	50	0	0	$15,000
Allegheny Co.	7/13/2014	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	7/13/2014	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	8/12/2014	Thunderstorm Wind	50	0	0	$2,000
Allegheny Co.	8/12/2014	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	8/12/2014	Thunderstorm Wind	50	0	0	$1,000
Allegheny Co.	8/12/2014	Thunderstorm Wind	50	0	0	$5,000
Allegheny Co.	8/12/2014	Thunderstorm Wind	50	0	0	$500
Allegheny Co.	8/12/2014	Thunderstorm Wind	50	0	0	$500
TOTAL				**1**	**65**	**$57,113,000**

4.3.9.4 Future Occurrence

The frequency of tornadoes and windstorms is expected to remain constant across Allegheny County. These storms can affect the entire county, windstorms especially can occur across the entire county during one event. The probability of a tornado or windstorm directly affecting Allegheny County is relatively high, and there have been some significant past damages. 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. The probability of the County and its municipalities experiencing severe winds is difficult to quantify, but is considered relatively high. The degree of damage and impact to the county will vary as it has in years past.

Overall, the probably of future tornado and windstorms should be considered *likely* according to the Risk Factor Methodology (see Table 4.4 -1).

4.3.9.5 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.

The primary structure type vulnerable to a tornado or windstorm is mobile homes due to their lightweight, unanchored design. Table 4.3.9-4 provides the number of structures on mobile home parcels by municipality. These should be considered an estimate of mobile homes (see Section 2.5 for data limitations).

Table 4.3.9-4 Estimated Mobile Homes Per Municipality.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES ON MOBILE HOME PARCELS	PERCENT MOBILE HOMES
Aleppo Township	622	0	0.0%
Aspinwall Borough	1,205	0	0.0%
Avalon Borough	1,611	0	0.0%
Baldwin Borough	7,939	0	0.0%
Baldwin Township	947	0	0.0%
Bell Acres Borough	610	6	1.0%
Bellevue Borough	2,785	0	0.0%
Ben Avon Borough	744	0	0.0%
Ben Avon Heights Borough	143	0	0.0%
Bethel Park, Municipality of	12,562	3	0.0%
Blawnox Borough	669	2	0.3%
Brackenridge Borough	1,483	3	0.2%
Braddock Borough	1,799	0	0.0%
Braddock Hills Borough	864	4	0.5%
Bradford Woods Borough	500	0	0.0%
Brentwood Borough	4,239	0	0.0%
Bridgeville Borough	2,160	0	0.0%
Carnegie Borough	3,499	1	0.0%
Castle Shannon Borough	3,153	0	0.0%
Chalfant Borough	422	1	0.2%
Cheswick Borough	880	0	0.0%
Churchill Borough	1,499	0	0.0%
Clairton City	4,331	0	0.0%

Table 4.3.9-4 Estimated Mobile Homes Per Municipality.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES ON MOBILE HOME PARCELS	PERCENT MOBILE HOMES
Collier Township	4,149	321	7.7%
Coraopolis Borough	2,601	2	0.1%
Crafton Borough	2,338	0	0.0%
Crescent Township	1,135	35	3.1%
Dormont Borough	3,458	0	0.0%
Dravosburg Borough	798	3	0.4%
Duquesne, City of	3,308	10	0.3%
East Deer Township	784	1	0.1%
East McKeesport Borough	1,047	1	0.1%
East Pittsburgh Borough	803	1	0.1%
Edgewood Borough	1,334	0	0.0%
Edgeworth Borough	667	0	0.0%
Elizabeth Borough	677	1	0.1%
Elizabeth Township	5,864	86	1.5%
Emsworth Borough	918	0	0.0%
Etna Borough	1,611	0	0.0%
Fawn Township	1,096	54	4.9%
Findlay Township	2,789	71	2.5%
Forest Hills Borough	3,154	0	0.0%
Forward Township	1,667	274	16.4%
Fox Chapel Borough	1,951	0	0.0%
Franklin Park Borough	5,267	1	0.0%
Frazer Township	675	43	6.4%
Glassport Borough	2,115	1	0.0%
Glen Osborne Borough	231	0	0.0%
Glenfield Borough	112	0	0.0%
Green Tree Borough	2,109	0	0.0%
Hampton Township	7,202	5	0.1%
Harmar Township	1,818	102	5.6%
Harrison Township	5,099	6	0.1%
Haysville Borough	49	0	0.0%
Heidelberg Borough	639	2	0.3%
Homestead Borough	1,582	0	0.0%
Indiana Township	3,348	164	4.9%
Ingram Borough	1,301	0	0.0%
Jefferson Hills Borough	5,121	63	1.2%
Kennedy Township	3,585	3	0.1%
Kilbuck Township	370	1	0.3%

Table 4.3.9-4 Estimated Mobile Homes Per Municipality.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES ON MOBILE HOME PARCELS	PERCENT MOBILE HOMES
Leet Township	637	0	0.0%
Leetsdale Borough	611	0	0.0%
Liberty Borough	1,153	1	0.1%
Lincoln Borough	573	20	3.5%
Marshall Township	3,479	1	0.0%
McCandless, Town of	10,876	3	0.0%
McDonald Borough	184	1	0.5%
McKees Rocks Borough	2,838	2	0.1%
McKeesport, City of	10,265	1	0.0%
Millvale Borough	1,736	0	0.0%
Monroeville, Municipality of	11,215	6	0.1%
Moon Township	10,065	39	0.4%
Mount Lebanon, Municipality of	11,586	0	0.0%
Mount Oliver Borough	1,506	0	0.0%
Munhall Borough	5,167	1	0.0%
Neville Township	599	1	0.2%
North Braddock Borough	2,920	0	0.0%
North Fayette Township	6,948	917	13.2%
North Versailles Township	4,687	39	0.8%
Oakdale Borough	3,954	3	0.1%
Oakmont Borough	673	0	0.0%
O'Hara Township	2,848	0	0.0%
Ohio Township	2,424	2	0.1%
Penn Hills, Municipality of	19,504	11	0.1%
Pennsbury Village Borough	503	0	0.0%
Pine Township	4,688	0	0.0%
Pitcairn Borough	1,389	3	0.2%
Pittsburgh, City of	130,310	152	0.1%
Pleasant Hills Borough	3,239	0	0.0%
Plum Borough	10,864	241	2.2%
Port Vue Borough	1,824	1	0.1%
Rankin Borough	784	0	0.0%
Reserve Township	1,554	0	0.0%
Richland Township	4,553	39	0.9%
Robinson Township	6,093	321	5.3%
Ross Township	13,249	2	0.0%
Rosslyn Farms Borough	212	0	0.0%
Scott Township	6,160	2	0.0%

Table 4.3.9-4 Estimated Mobile Homes Per Municipality.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES ON MOBILE HOME PARCELS	PERCENT MOBILE HOMES
Sewickley Borough	1,551	0	0.0%
Sewickley Heights	425	0	0.0%
Sewickley Hills Borough	265	0	0.0%
Shaler Township	12,428	77	0.6%
Sharpsburg Borough	1,570	0	0.0%
South Fayette Township	6,421	12	0.2%
South Park Township	5,127	1	0.0%
South Versailles Township	163	12	7.4%
Springdale Borough	1,573	3	0.2%
Springdale Township	860	78	9.1%
Stowe Township	3,161	1	0.0%
Swissvale Borough	4,109	0	0.0%
Tarentum Borough	2,109	6	0.3%
Thornburg Borough	190	0	0.0%
Trafford Borough	51	1	2.0%
Turtle Creek Borough	2,165	0	0.0%
Upper St. Clair Township	7,419	0	0.0%
Verona Borough	1,264	2	0.2%
Versailles Borough	669	0	0.0%
Wall Borough	370	3	0.8%
West Deer Township	5,424	164	3.0%
West Elizabeth Borough	291	39	13.4%
West Homestead Borough	1,112	0	0.0%
West Mifflin Borough	8,856	284	3.2%
West View Borough	2,669	0	0.0%
Whitaker Borough	618	0	0.0%
White Oak Borough	3,739	47	1.3%
Whitehall Borough	5,426	0	0.0%
Wilkins Township	2,761	0	0.0%
Wilkinsburg Borough	7,156	0	0.0%
Wilmerding Borough	848	0	0.0%
GRAND TOTAL	**530,098**	**3,810**	**0.7%**

4.3.10 Wildfire

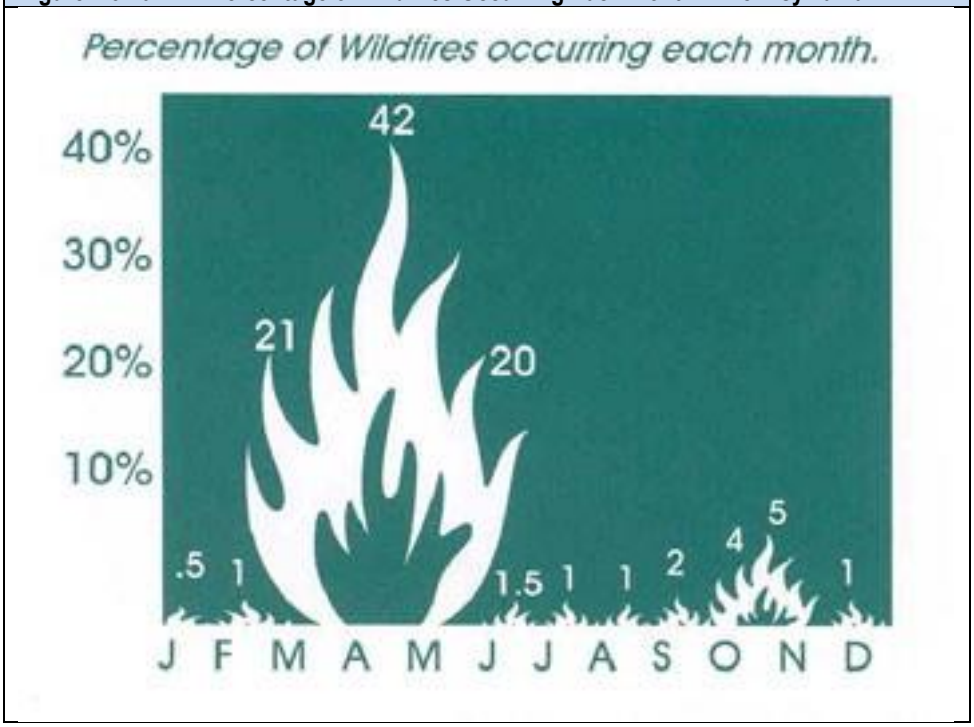
4.3.10.1 Location and Extent

Wildfires take place in less developed or completely undeveloped areas, spreading rapidly through vegetative fuels. They can occur any time of the year, but mostly occur during long, dry, hot spells. Any small fire, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by

human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in open fields, grass, dense brush, and forests.

Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands. The greatest potential for wildfires is in the spring months of March, April, and May, and the autumn months of October and November; 83% of all Pennsylvania wildfires occur in these two time periods. In the spring, bare trees allow sunlight to reach the forest floor, drying fallen leaves and other ground debris. In the fall, dried leaves are also fuel for fires. Most fires are caused by human carelessness or negligence, especially debris burning. However, some are precipitated by lightning strikes and, in rare instances, spontaneous combustion. Figure 4.3.10-1 shows the percentage of wildfires occurring every month in Pennsylvania, showing the spikes in March, April, and May (DCNR, 2015).

Figure 4.3.10-1 Percentage of Wildfires Occurring Each Month in Pennsylvania.



4.3.10.2 Range of Magnitude

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

In addition to the risk wildfires pose to the general public and to property owners, the safety of firefighters is also a concern. Although loss of life among firefighters does not occur often in Pennsylvania, it is always a risk. More common firefighting injuries includes falls, sprains, abrasions, or heat-related injuries such as

dehydration. Response to wildfires also exposes emergency responders to the risk of motor vehicle accidents and can place them in remote areas away from the communities that they are chartered to protect.

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

Wildfires 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 largest wildfire in Pennsylvania in recent years burned 10,000 acres in the north-central area of the Commonwealth. This fire was controlled within a week. It destroyed five cabins, but there was no loss of life. Several other fires have burned over 2,000 acres each and again have been controlled within a week of the reported start. This kind of a scenario is unlikely in Allegheny County, where the largest wildfire reported to DCNR burned 3 acres, but is illustrative of a worst-case scenario.

4.3.10.3 Past Occurrence

The table below provides information on the wildfires in Allegheny County reported to DCNR from 2005-2008. The Bureau estimates that these reported events may only be approximately 15% of the total number of events that have actually occurred over that time.

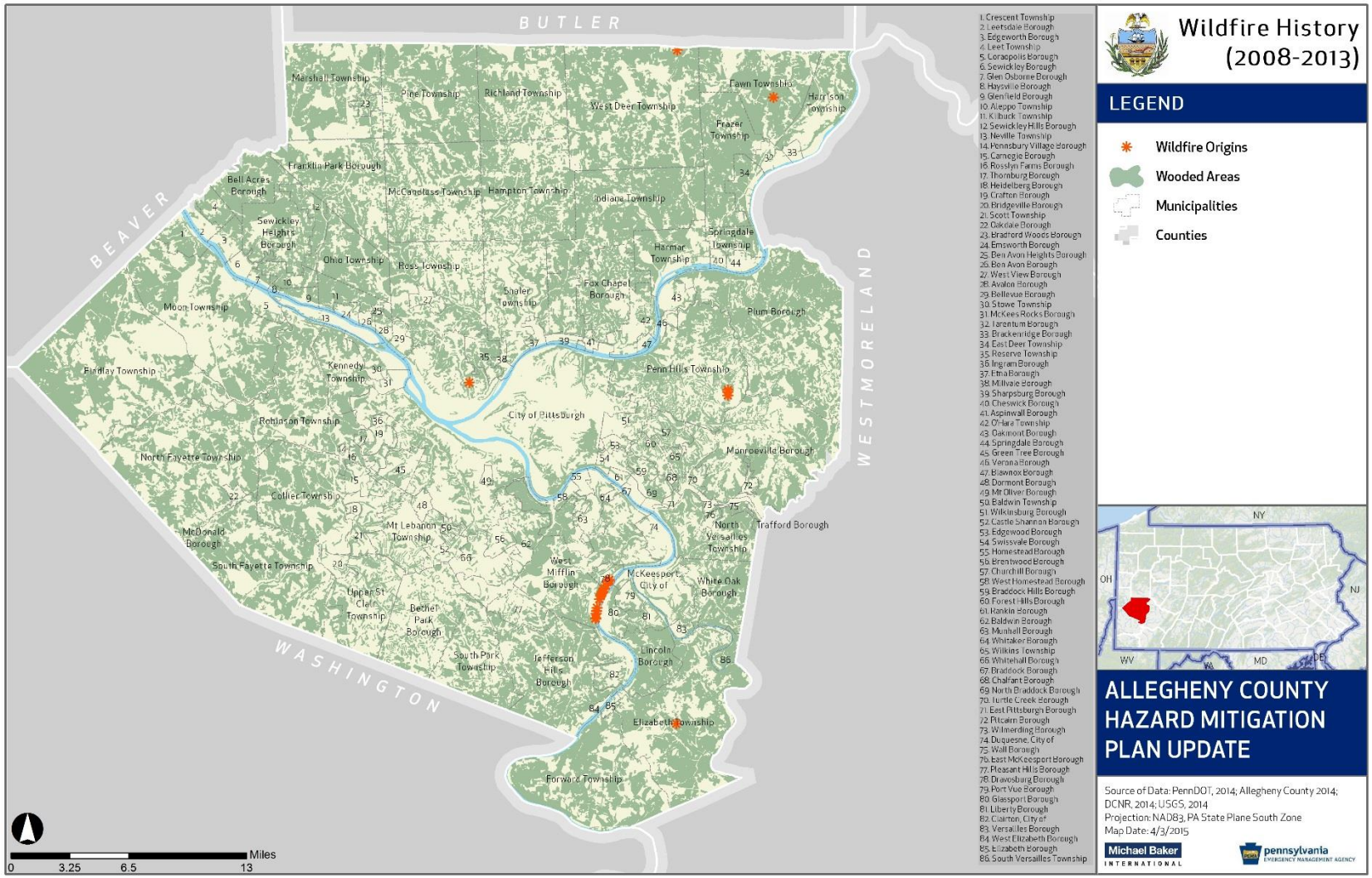
Table 4.3.10-1 Previous Wildfire Events for Allegheny County Reported to DCNR, 2005-2013.

YEAR	MUNICIPALITY	TOTAL ACRES BURNED
2005	Elizabeth Township	0.50
2008	Fawn Township	3.0
2013	Pittsburgh, City of	0.1
2013	West Deer Township	0.5
2013	Elizabeth Township	1.0
2013	Penn Hills Township	0.1
2013	Penn Hills Township	0.1
2013	Penn Hills Township	0.1
2013	Dravosburg Borough	0.1
2013	Dravosburg Borough	0.1
2013	Dravosburg Borough	0.1
2013	Dravosburg Borough	0.1
2013	Dravosburg Borough	0.1
2013	Dravosburg Borough	0.1
2013	Dravosburg Borough	0.1
2013	Dravosburg Borough	0.1
2013	Dravosburg Borough	0.1
2013	Dravosburg Borough	0.1
2013	West Mifflin Borough	0.1

Table 4.3.10-1 Previous Wildfire Events for Allegheny County Reported to DCNR, 2005-2013.		
YEAR	MUNICIPALITY	TOTAL ACRES BURNED
2013	West Mifflin Borough	0.1
2013	West Mifflin Borough	0.1
2013	West Mifflin Borough	0.1
2013	West Mifflin Borough	0.1
2013	West Mifflin Borough	0.1
2013	West Mifflin Borough	0.1
2013	West Mifflin Borough	0.1

Figure 4.3.10-2 shows the geography of the aforementioned wildfires from 2008-2013 (a point location for the 2005 event was not available) overlaid on the county's wooded areas. Because most of Allegheny County is developed, the risk for wildfires is relatively low.

Figure 4.3.10-2 Wildfire Origins for Allegheny County, (PA DCNR, Bureau of Forestry, 2010).



Comprehensive information on wildfire events occurring on private land is not available. However, Allegheny County has had an active social media since 2013 and actively reports occurrences of wildfires and brush fires. While not a comprehensive accounting of wildfires since 2013, these tweets provide additional past occurrences, as shown in Table 4.3.10-2. Brush fires tend to be more common, and they are suppressed by volunteer fire departments without any response or assistance from the Bureau of Forestry.

Table 4.3.10-2 Wildfires and Brush Fires Reported on Allegheny County's Twitter Feed, @Allegheny_Co.

DATE	LOCATION	DESCRIPTION
11/29/2015	Elizabeth Twp	Brush fire on hillside. FD & Police closing down Douglas Run Rd from Nichols Hill to Tastee Freeze
11/10/2015	Etna	Brush fire near railroad tracks behind Enterprise; Allegheny Valley RR has been advised & traffic stopped in area.
4/29/2015	Baldwin Borough	900 block Agnew Rd. - large brush fire.
4/21/2015	Ross Township	700 block Rochester Road - tree and live wires down starting a brush fire.
4/21/2015	Fox Chapel	100 block Evergreen Road - Tree down on live wires. The tree is on fire causing a larger brush fire.
4/18/2015	Marshall	Large brush fire - 100 block Crea Lane, 2 acre brush fire. Units are on the scene.
4/15/2015	McKeesport	25th/Walnut - Brush fire.
4/12/2015	Indiana Township	100 blk Eisele Road - large brush fire
4/6/2015	Clairton City	600 blk Grandview Ave - Brush fire. Emergency crews on the scene.
4/6/2015	Indiana Township	5000 blk Silent Meadow Ct. - Brush fire. Emergency crews on scene.
4/2/2015	Sewickley Heights	500 blk Scaife Road - Large brush fire.
5/6/2014	Scott Township	Brush fire near 800 blk of Hope Hollow Rd. Fire Dept. on scene.
4/21/2014	Richland	Brush fire near 5800 block of Valencia Rd, near train tracks.
4/17/2014	Plum Borough	Coxcomb Hill Rd closed btwn driving range on Kerr Rd to Rte 909. Pole & wires down/brush fire in area of Coxcomb & Rampart.
4/13/2014	Marshall	Brush Fire, Pleasant Hills Rd. in area behind municipal building. Spreading towards Knob Hill Park. Several fire depts assisting.
4/6/2014	South Fayette Township	4200 blk Battle Ridge: large brush fire with approximately 4-5 acres involved.
3/11/2014	Bellevue/Ross	Large brush fire in woods near Union Ave, Glarius Ave & Ravenswood Ave; multiple fire agencies on scene.
5/20/2013	Frazier/East Deer	Agan Park nr Riddle Run Rd, Frazer/East Deer. Brush fire due to transformer explosion on hillside near Freeport Rd. No known power outages.
5/6/2013	Pittsburgh	2200 block of East St, Pgh. Brush fire & power lines down on guardrail, which may be electrified. FD on scene. Duquesne Light notified.
4/22/2013	Plum Borough	200 block of Plum St, Plum Borough. Football-field sized brush fire. No injuries reported at this time.
4/18/2013	Robinson Township	Forest Grove Rd & Coraopolis Rd, Robinson Twp. Explosion/fire at Duquesne Light substation. Brush fire ignited. No injuries/damage reported.
4/9/2013	Robinson Township	3000 block of McMillan Rd, Robinson Twp. Report of smoldering wildfire near structure. PD on scene.
4/8/2013	Fawn Township	200 block of Swager Ln, Fawn Twp. Reports of a large brush fire in progress.

4.3.10.4 Future Occurrence

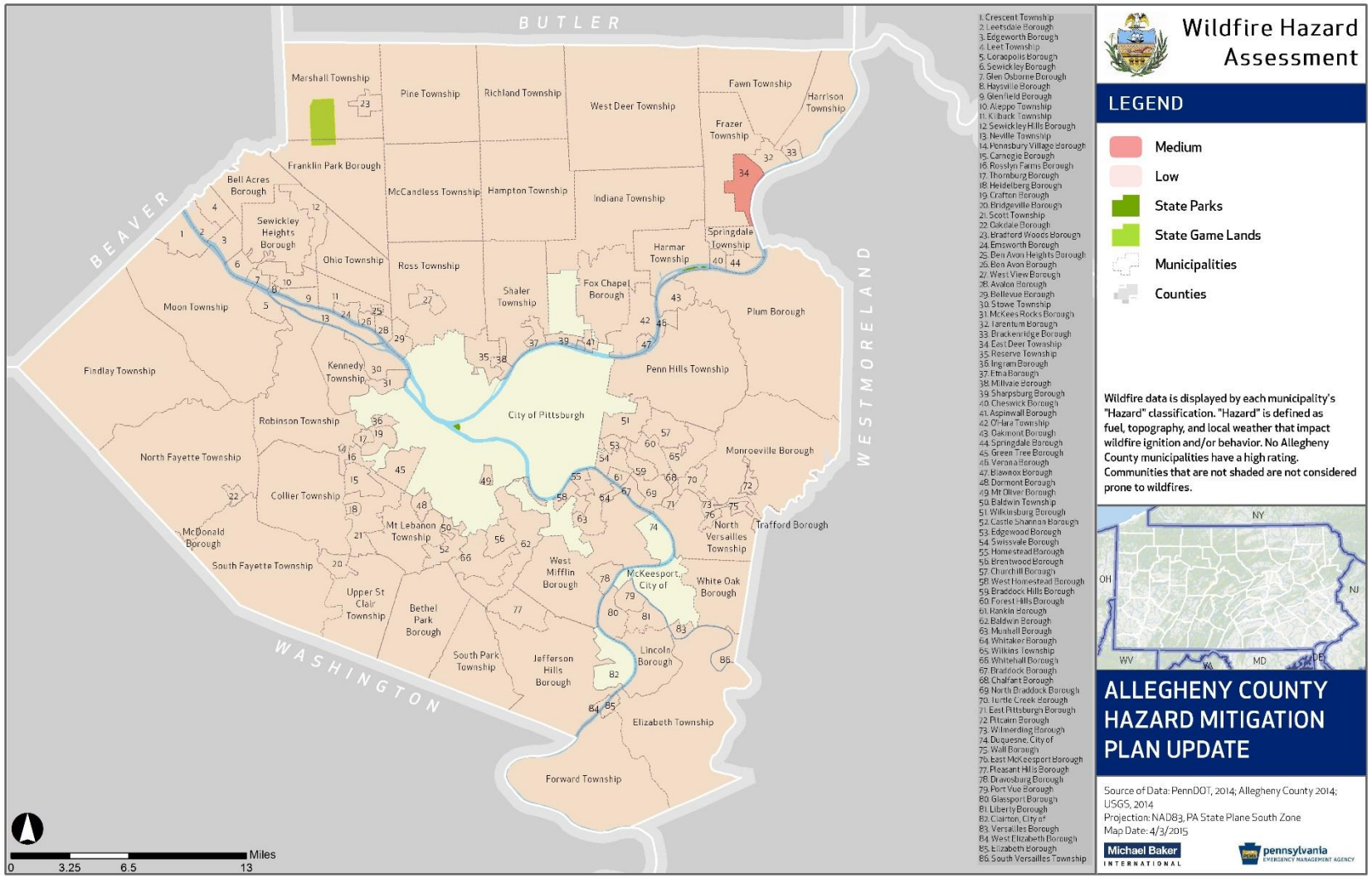
Wildfire events will occur in Pennsylvania every year but are not likely to grow from small, contained brush fires to actual wildfires in Allegheny County in any given year. The likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. As a result, the probably of future wildfires should be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4 -1).

It is important to note that 98% of wildfires in Pennsylvania are human-caused (PADCNR-BOF, 2010). Thus, there is rationale for including this hazard under the summary of human-made hazards. Nonetheless, the critical inference to draw from this statistic is the fact that the occurrence of future wildfire events will strongly depend on patterns of human activity. 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.

4.3.10.5 Vulnerability Assessment

The Pennsylvania Bureau of Forestry has conducted an independent wildfire hazard risk assessment for the various municipalities across Allegheny County. Results of that assessment are shown in Figure 4.3.10-3. 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, Allegheny County as a whole has a low risk to wildfires; only East Deer Township has a medium risk. Wildfire hazard risk was not calculated for Allegheny County's cities (Pittsburgh, Clairton, Duquesne, McKeesport, etc.).

Figure 4.3.10-3 Allegheny Risk to Wildfire, (DCNR Bureau of Forestry, 2010).



Because there is ignition potential in wooded areas, this plan evaluates the number and type of structures and critical facilities vulnerable to wildfires by highlighting those located within the county's wooded areas. Table 4.3.10-3 shows the total structures and critical facilities in wooded areas, and Table 4.3.10-4 shows the structures by generalized land use type. While these structures may be vulnerable, Allegheny County has had a general ban on open burning since 1970. This ordinance sets standards that require outdoor burns to be at least 10 feet from the nearest structure or inhabited area and prohibit the burning of trash, leaves, and debris. Continued enforcement of this ban will assist in preventing future fires.

Table 4.3.10-3 Structure and Critical Facilities Vulnerable to Wildfires.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN WOODED AREAS	PERCENT STRUCTURES IN WOODED AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN WOODED AREAS	PERCENT CRITICAL FACILITIES IN WOODED AREAS
Aleppo Township	622	34	5.5%	6	0	0.0%
Aspinwall Borough	1,205	1	0.1%	7	0	0.0%
Avalon Borough	1,611	2	0.1%	6	0	0.0%
Baldwin Borough	7,939	45	0.6%	24	0	0.0%
Baldwin Township	947	2	0.2%	2	0	0.0%
Bell Acres Borough	610	75	12.3%	6	3	50.0%
Bellevue Borough	2,785	4	0.1%	11	0	0.0%
Ben Avon Borough	744	1	0.1%	3	0	0.0%
Ben Avon Heights Borough	143	3	2.1%	1	0	0.0%
Bethel Park, Municipality of	12,562	363	2.9%	33	0	0.0%
Blawnox Borough	669	4	0.6%	7	0	0.0%
Brackenridge Borough	1,483	0	0.0%	10	0	0.0%
Braddock Borough	1,799	6	0.3%	13	0	0.0%
Braddock Hills Borough	864	14	1.6%	2	0	0.0%
Bradford Woods Borough	500	12	2.4%	3	1	33.3%
Brentwood Borough	4,239	1	0.0%	14	0	0.0%
Bridgeville Borough	2,160	1	0.0%	8	0	0.0%
Carnegie Borough	3,499	182	5.2%	17	0	0.0%
Castle Shannon Borough	3,153	7	0.2%	9	2	22.2%
Chalfant Borough	422	12	2.8%	2	0	0.0%
Cheswick Borough	880	2	0.2%	7	0	0.0%
Churchill Borough	1,499	5	0.3%	9	0	0.0%
Clairton City	4,331	57	1.3%	14	0	0.0%
Collier Township	4,149	781	18.8%	21	1	4.8%
Coraopolis Borough	2,601	2	0.1%	13	0	0.0%
Crafton Borough	2,338	5	0.2%	9	0	0.0%
Crescent Township	1,135	178	15.7%	4	0	0.0%
Dormont Borough	3,458	0	0.0%	8	0	0.0%
Dravosburg Borough	798	3	0.4%	4	1	25.0%

Table 4.3.10-3 Structure and Critical Facilities Vulnerable to Wildfires.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN WOODED AREAS	PERCENT STRUCTURES IN WOODED AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN WOODED AREAS	PERCENT CRITICAL FACILITIES IN WOODED AREAS
Duquesne, City of	3,308	6	0.2%	15	0	0.0%
East Deer Township	784	19	2.4%	12	0	0.0%
East McKeesport Borough	1,047	2	0.2%	5	0	0.0%
East Pittsburgh Borough	803	1	0.1%	5	0	0.0%
Edgewood Borough	1,334	0	0.0%	6	0	0.0%
Edgeworth Borough	667	5	0.7%	5	1	20.0%
Elizabeth Borough	677	1	0.1%	8	0	0.0%
Elizabeth Township	5,864	166	2.8%	26	3	11.5%
Emsworth Borough	918	5	0.5%	3	0	0.0%
Etna Borough	1,611	4	0.2%	7	0	0.0%
Fawn Township	1,096	31	2.8%	9	1	11.1%
Findlay Township	2,789	283	10.1%	20	1	5.0%
Forest Hills Borough	3,154	48	1.5%	13	1	7.7%
Forward Township	1,667	43	2.6%	17	1	5.9%
Fox Chapel Borough	1,951	78	4.0%	11	0	0.0%
Franklin Park Borough	5,267	853	16.2%	10	1	10.0%
Frazer Township	675	57	8.4%	12	2	16.7%
Glassport Borough	2,115	4	0.2%	11	0	0.0%
Glen Osborne Borough	231	11	4.8%	2	0	0.0%
Glenfield Borough	112	4	3.6%	0	0	0.0%
Green Tree Borough	2,109	20	0.9%	7	0	0.0%
Hampton Township	7,202	762	10.6%	35	1	2.9%
Harmar Township	1,818	136	7.5%	24	1	4.0%
Harrison Township	5,099	113	2.2%	22	0	0.0%
Haysville Borough	49	1	2.0%	1	0	0.0%
Heidelberg Borough	639	0	0.0%	4	0	0.0%
Homestead Borough	1,582	0	0.0%	7	0	0.0%
Indiana Township	3,348	634	18.9%	28	2	7.1%
Ingram Borough	1,301	0	0.0%	7	0	0.0%
Jefferson Hills Borough	5,121	609	11.9%	24	0	0.0%
Kennedy Township	3,585	368	10.3%	14	1	7.1%
Kilbuck Township	370	16	4.3%	3	0	0.0%
Leet Township	637	42	6.6%	4	0	0.0%
Leetsdale Borough	611	7	1.1%	12	0	0.0%
Liberty Borough	1,153	5	0.4%	8	0	0.0%
Lincoln Borough	573	24	4.2%	4	1	25.0%

Table 4.3.10-3 Structure and Critical Facilities Vulnerable to Wildfires.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN WOODED AREAS	PERCENT STRUCTURES IN WOODED AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN WOODED AREAS	PERCENT CRITICAL FACILITIES IN WOODED AREAS
Marshall Township	3,479	824	23.7%	13	4	30.8%
McCandless, Town of	10,876	526	4.8%	40	2	5.0%
McDonald Borough	184	3	1.6%	2	0	0.0%
McKees Rocks Borough	2,838	3	0.1%	9	0	0.0%
McKeesport, City of	10,265	47	0.5%	43	1	2.3%
Millvale Borough	1,736	2	0.1%	5	0	0.0%
Monroeville, Municipality of	11,215	425	3.8%	66	2	3.0%
Moon Township	10,065	1,066	10.6%	31	0	0.0%
Mount Lebanon, Municipality of	11,586	92	0.8%	38	1	2.6%
Mount Oliver Borough	1,506	0	0.0%	4	0	0.0%
Munhall Borough	5,167	26	0.5%	17	0	0.0%
Neville Township	599	0	0.0%	22	0	0.0%
North Braddock Borough	2,920	16	0.5%	14	0	0.0%
North Fayette Township	6,948	1,160	16.7%	29	7	24.1%
North Versailles Township	4,687	120	2.6%	14	0	0.0%
Oakdale Borough	3,954	227	5.7%	25	0	0.0%
Oakmont Borough	673	1	0.1%	3	0	0.0%
O'Hara Township	2,848	38	1.3%	17	0	0.0%
Ohio Township	2,424	960	39.6%	15	0	0.0%
Penn Hills, Municipality of	19,504	142	0.7%	52	1	1.9%
Pennsbury Village Borough	503	0	0.0%	3	0	0.0%
Pine Township	4,688	1,522	32.5%	14	0	0.0%
Pitcairn Borough	1,389	10	0.7%	6	0	0.0%
Pittsburgh, City of	130,310	883	0.7%	505	7	1.4%
Pleasant Hills Borough	3,239	138	4.3%	10	1	10.0%
Plum Borough	10,864	850	7.8%	42	4	9.3%
Port Vue Borough	1,824	8	0.4%	5	0	0.0%
Rankin Borough	784	2	0.3%	3	0	0.0%
Reserve Township	1,554	13	0.8%	8	0	0.0%
Richland Township	4,553	833	18.3%	17	2	11.8%
Robinson Township	6,093	674	11.1%	29	3	10.3%
Ross Township	13,249	248	1.9%	35	2	5.7%
Rosslyn Farms Borough	212	1	0.5%	3	0	0.0%
Scott Township	6,160	56	0.9%	21	0	0.0%
Sewickley Borough	1,551	5	0.3%	12	0	0.0%
Sewickley Heights	425	29	6.8%	3	1	33.3%

Table 4.3.10-3 Structure and Critical Facilities Vulnerable to Wildfires.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN WOODED AREAS	PERCENT STRUCTURES IN WOODED AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN WOODED AREAS	PERCENT CRITICAL FACILITIES IN WOODED AREAS
Sewickley Hills Borough	265	61	23.0%	3	2	66.7%
Shaler Township	12,428	387	3.1%	24	1	4.2%
Sharpsburg Borough	1,570	0	0.0%	7	0	0.0%
South Fayette Township	6,421	1,385	21.6%	23	1	4.3%
South Park Township	5,127	172	3.4%	17	2	11.8%
South Versailles Township	163	2	1.2%	3	1	33.3%
Springdale Borough	1,573	2	0.1%	14	0	0.0%
Springdale Township	860	12	1.4%	4	0	0.0%
Stowe Township	3,161	15	0.5%	13	0	0.0%
Swissvale Borough	4,109	10	0.2%	12	0	0.0%
Tarentum Borough	2,109	4	0.2%	19	1	5.3%
Thornburg Borough	190	2	1.1%	3	1	33.3%
Trafford Borough	51	1	2.0%	2	0	0.0%
Turtle Creek Borough	2,165	4	0.2%	13	0	0.0%
Upper St. Clair Township	7,419	295	4.0%	19	1	5.3%
Verona Borough	1,264	66	5.2%	7	0	0.0%
Versailles Borough	669	1	0.1%	5	0	0.0%
Wall Borough	370	5	1.4%	2	0	0.0%
West Deer Township	5,424	531	9.8%	22	5	22.7%
West Elizabeth Borough	291	0	0.0%	5	0	0.0%
West Homestead Borough	1,112	1	0.1%	5	0	0.0%
West Mifflin Borough	8,856	51	0.6%	54	4	7.4%
West View Borough	2,669	1	0.0%	13	0	0.0%
Whitaker Borough	618	2	0.3%	1	0	0.0%
White Oak Borough	3,739	56	1.5%	11	1	9.1%
Whitehall Borough	5,426	176	3.2%	16	0	0.0%
Wilkins Township	2,761	33	1.2%	13	1	7.7%
Wilkinsburg Borough	7,156	9	0.1%	25	0	0.0%
Wilmerding Borough	848	4	0.5%	4	0	0.0%
GRAND TOTAL	**530,098**	**20,398**	**3.8%**	**2,208**	**84**	**3.8%**

Table 4.3.10-4 Structures Vulnerable to Wildfires by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURE	AGRICUL-TURAL	COMMER-CIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Aleppo Township	622	0	1	0	0	0	18	15	0	34
Aspinwall Borough	1,205	0	0	0	0	0	1	0	0	1
Avalon Borough	1,611	0	1	0	0	0	1	0	0	2
Baldwin Borough	7,939	0	0	0	0	0	44	0	1	45
Baldwin Township	947	0	0	0	0	0	2	0	0	2
Bell Acres Borough	610	0	0	1	0	0	74	0	0	75
Bellevue Borough	2,785	0	0	0	0	0	4	0	0	4
Ben Avon Borough	744	0	0	0	0	0	1	0	0	1
Ben Avon Heights Borough	143	0	0	0	0	0	3	0	0	3
Bethel Park, Municipality of	12,562	0	9	1	0	0	326	27	0	363
Blawnox Borough	669	0	1	0	0	0	3	0	0	4
Brackenridge Borough	1,483	0	0	0	0	0	0	0	0	0
Braddock Borough	1,799	0	0	0	0	0	6	0	0	6
Braddock Hills Borough	864	0	0	0	0	0	14	0	0	14
Bradford Woods Borough	500	0	0	0	0	0	11	1	0	12
Brentwood Borough	4,239	0	0	0	0	0	1	0	0	1
Bridgeville Borough	2,160	0	0	0	0	0	1	0	0	1
Carnegie Borough	3,499	0	1	0	0	0	173	8	0	182
Castle Shannon Borough	3,153	0	3	0	0	0	4	0	0	7
Chalfant Borough	422	0	0	0	0	0	12	0	0	12
Cheswick Borough	880	0	0	0	0	0	2	0	0	2
Churchill Borough	1,499	0	0	0	0	0	5	0	0	5
Clairton City	4,331	1	0	1	0	0	51	0	4	57
Collier Township	4,149	0	2	0	2	0	777	0	0	781
Coraopolis Borough	2,601	0	0	0	0	0	2	0	0	2
Crafton Borough	2,338	0	0	1	0	0	4	0	0	5
Crescent Township	1,135	0	1	0	0	0	177	0	0	178
Dormont Borough	3,458	0	0	0	0	0	0	0	0	0
Dravosburg Borough	798	0	1	0	0	0	2	0	0	3
Duquesne, City of	3,308	0	1	0	0	0	5	0	0	6
East Deer Township	784	0	0	0	0	0	19	0	0	19
East McKeesport Borough	1,047	0	0	0	0	0	2	0	0	2

Table 4.3.10-4 Structures Vulnerable to Wildfires by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURE	AGRICUL-TURAL	COMMER-CIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
East Pittsburgh Borough	803	0	0	0	0	0	1	0	0	1
Edgewood Borough	1,334	0	0	0	0	0	0	0	0	0
Edgeworth Borough	667	0	0	1	0	0	4	0	0	5
Elizabeth Borough	677	0	0	0	0	0	1	0	0	1
Elizabeth Township	5,864	3	3	3	1	0	156	0	0	166
Emsworth Borough	918	0	0	0	0	0	5	0	0	5
Etna Borough	1,611	0	0	0	0	0	2	2	0	4
Fawn Township	1,096	1	1	0	0	0	29	0	0	31
Findlay Township	2,789	5	14	1	7	0	249	7	0	283
Forest Hills Borough	3,154	0	1	2	0	0	44	1	0	48
Forward Township	1,667	4	1	0	0	1	37	0	0	43
Fox Chapel Borough	1,951	1	0	0	0	0	77	0	0	78
Franklin Park Borough	5,267	23	15	5	0	0	805	4	1	853
Frazer Township	675	4	28	0	0	0	24	0	1	57
Glassport Borough	2,115	0	0	0	0	0	4	0	0	4
Glen Osborne Borough	231	0	0	1	0	0	10	0	0	11
Glenfield Borough	112	0	2	0	0	0	2	0	0	4
Green Tree Borough	2,109	0	3	0	0	0	17	0	0	20
Hampton Township	7,202	50	6	0	2	0	704	0	0	762
Harmar Township	1,818	0	5	1	1	0	129	0	0	136
Harrison Township	5,099	0	0	0	0	0	113	0	0	113
Haysville Borough	49	0	0	0	0	0	0	0	1	1
Heidelberg Borough	639	0	0	0	0	0	0	0	0	0
Homestead Borough	1,582	0	0	0	0	0	0	0	0	0
Indiana Township	3,348	39	8	5	4	0	576	0	2	634
Ingram Borough	1,301	0	0	0	0	0	0	0	0	0
Jefferson Hills Borough	5,121	1	6	0	0	0	601	1	0	609
Kennedy Township	3,585	0	27	0	2	0	337	2	0	368
Kilbuck Township	370	4	2	0	1	1	8	0	0	16
Leet Township	637	0	0	0	0	0	42	0	0	42
Leetsdale Borough	611	0	1	0	4	0	2	0	0	7
Liberty Borough	1,153	2	0	0	0	0	3	0	0	5

Table 4.3.10-4 Structures Vulnerable to Wildfires by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURE	AGRICUL-TURAL	COMMER-CIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Lincoln Borough	573	2	0	0	0	0	22	0	0	24
Marshall Township	3,479	10	40	18	1	0	736	18	1	824
McCandless, Town of	10,876	1	42	3	0	0	442	38	0	526
McDonald Borough	184	0	0	0	0	0	3	0	0	3
McKees Rocks Borough	2,838	0	0	0	0	0	3	0	0	3
McKeesport, City of	10,265	0	2	3	0	0	42	0	0	47
Millvale Borough	1,736	0	1	0	0	0	1	0	0	2
Monroeville, Municipality of	11,215	0	19	3	2	0	397	3	1	425
Moon Township	10,065	0	15	5	0	0	1046	0	0	1,066
Mount Lebanon, Municipality of	11,586	2	2	0	0	0	88	0	0	92
Mount Oliver Borough	1,506	0	0	0	0	0	0	0	0	0
Munhall Borough	5,167	0	0	0	0	0	25	1	0	26
Neville Township	599	0	0	0	0	0	0	0	0	0
North Braddock Borough	2,920	1	0	4	0	0	11	0	0	16
North Fayette Township	6,948	1	65	3	2	0	1088	0	1	1,160
North Versailles Township	4,687	0	11	3	2	0	103	1	0	120
Oakdale Borough	3,954	1	1	0	0	0	223	2	0	227
Oakmont Borough	673	0	0	0	0	0	1	0	0	1
O'Hara Township	2,848	0	0	0	0	0	38	0	0	38
Ohio Township	2,424	12	88	1	2	0	857	0	0	960
Penn Hills, Municipality of	19,504	2	13	7	2	1	117	0	0	142
Pennsbury Village Borough	503	0	0	0	0	0	0	0	0	0
Pine Township	4,688	4	103	1	0	0	1394	19	1	1,522
Pitcairn Borough	1,389	0	0	0	0	0	10	0	0	10
Pittsburgh, City of	130,310	0	40	303	4	0	529	6	1	883
Pleasant Hills Borough	3,239	0	1	0	0	0	137	0	0	138
Plum Borough	10,864	4	48	2	10	0	784	1	1	850
Port Vue Borough	1,824	0	0	0	0	0	8	0	0	8
Rankin Borough	784	0	0	1	0	0	1	0	0	2
Reserve Township	1,554	0	0	0	0	0	13	0	0	13
Richland Township	4,553	6	25	7	6	0	789	0	0	833

Table 4.3.10-4 Structures Vulnerable to Wildfires by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURE	AGRICUL-TURAL	COMMER-CIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Robinson Township	6,093	0	94	1	4	0	574	1	0	674
Ross Township	13,249	2	29	3	0	0	214	0	0	248
Rosslyn Farms Borough	212	0	0	0	0	0	1	0	0	1
Scott Township	6,160	0	3	0	0	0	53	0	0	56
Sewickley Borough	1,551	0	0	0	1	0	4	0	0	5
Sewickley Heights	425	0	0	1	0	0	28	0	0	29
Sewickley Hills Borough	265	0	0	2	0	0	59	0	0	61
Shaler Township	12,428	1	2	0	0	0	384	0	0	387
Sharpsburg Borough	1,570	0	0	0	0	0	0	0	0	0
South Fayette Township	6,421	3	20	0	0	0	1359	2	1	1,385
South Park Township	5,127	6	2	0	2	0	162	0	0	172
South Versailles Township	163	0	0	0	0	0	2	0	0	2
Springdale Borough	1,573	0	0	0	1	0	1	0	0	2
Springdale Township	860	0	0	0	0	0	12	0	0	12
Stowe Township	3,161	0	3	0	1	0	11	0	0	15
Swissvale Borough	4,109	0	0	1	0	0	9	0	0	10
Tarentum Borough	2,109	0	0	0	0	0	4	0	0	4
Thornburg Borough	190	0	0	0	0	0	2	0	0	2
Trafford Borough	51	0	1	0	0	0	0	0	0	1
Turtle Creek Borough	2,165	4	0	0	0	0	0	0	0	4
Upper St. Clair Township	7,419	1	4	9	0	0	280	1	0	295
Verona Borough	1,264	0	65	0	0	0	1	0	0	66
Versailles Borough	669	0	0	0	0	0	1	0	0	1
Wall Borough	370	1	0	1	0	0	3	0	0	5
West Deer Township	5,424	10	8	0	8	1	503	1	0	531
West Elizabeth Borough	291	0	0	0	0	0	0	0	0	0
West Homestead Borough	1,112	0	0	0	0	0	1	0	0	1
West Mifflin Borough	8,856	1	10	2	1	0	37	0	0	51
West View Borough	2,669	0	0	0	0	0	1	0	0	1
Whitaker Borough	618	0	0	0	0	0	2	0	0	2
White Oak Borough	3,739	0	4	0	0	0	50	2	0	56
Whitehall Borough	5,426	0	0	0	0	0	176	0	0	176

Table 4.3.10-4 Structures Vulnerable to Wildfires by Generalized Land Use Type.

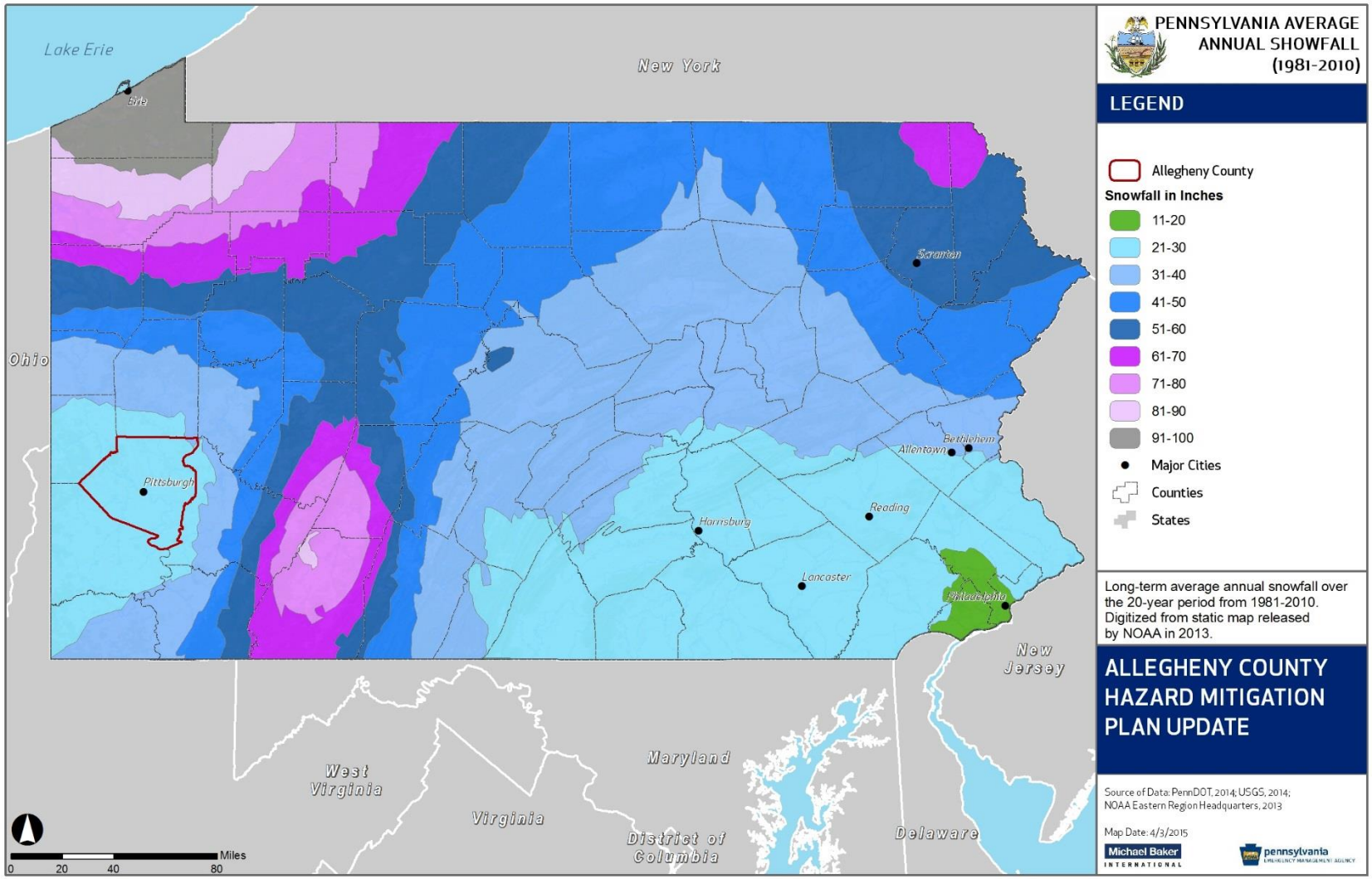
MUNICIPALITY	TOTAL STRUCTURE	AGRICUL-TURAL	COMMER-CIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Wilkins Township	2,761	0	1	1	0	0	31	0	0	33
Wilkinsburg Borough	7,156	0	0	2	0	0	7	0	0	9
Wilmerding Borough	848	0	0	0	0	0	4	0	0	4
GRAND TOTAL	**530,098**	**213**	**906**	**410**	**73**	**4**	**18,611**	**164**	**17**	**20,398**

4.3.11 Winter Storm

4.3.11.1 Location and Extent

Winter storms are regional events that affect most of Pennsylvania on an annual basis. In many cases, surrounding states and even the larger northeastern U.S. region are affected. As such, every county in the Commonwealth, including Allegheny, is subject to severe winter storms. 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 Allegheny County averaged between 21 and 30 inches, shown in Figure 4.3.11-1. This is a reduction in average annual snowfall from the previous twenty-year average annual snowfall observation of between 30 and 40 inches.

Figure 4.3.11-1 Average Annual Snowfall for Allegheny County.



4.3.11.2 Range of Magnitude

Winter storms consist of cold temperatures, heavy snow or ice and sometimes strong winds. They begin as low-pressure systems that move through Pennsylvania either following the jet stream or developing as extra-tropical cyclonic weather systems over the Atlantic Ocean called nor'easters. Due to their regular occurrence, these storms are considered hazards only when they result in damage to specific structures or cause disruption to traffic, communications, electric power, or other utilities.

A winter storm can adversely affect roadways, utilities, business activities, and can cause frostbite or loss of life. These storms may include one or more of the following weather events:

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

Any of the above events can result in the closing of major or secondary roads, particularly in rural locations, stranded motorists, transportation accidents, loss of utility services, and depletion of oil heating supplies. Environmental impacts often include damage to 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. Gradual melting of snow and ice provides excellent groundwater recharge. However, high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

The worst winter storm on record occurred on March 12-13, 1993. This blizzard, often called "the Storm of the Century," stretched from Canada to the Gulf of Mexico but was worst in the Eastern United States, including all of Pennsylvania. This storm caused widespread blackout conditions; snowfall totals ranged from twelve inches in Philadelphia to 20 inches in Harrisburg and Scranton to 24 inches in the Pittsburgh area. This event garnered a Presidential Emergency Declaration; the overall damage estimate for all states in this event was $6.6 billion. This event was the third-largest snowstorm on record for the Pittsburgh weather station with a snowfall of 25.3 inches.

One of the more recent events to hit Allegheny County was in February of 2010. The Pittsburgh Tribune reported that, "Road crews were having trouble keeping up with all the snow. PennDOT said portions of the Parkway West inbound, the Parkway North outbound and Route 19 in both directions were closed

after several accidents. The Port Authority ordered all of its drivers to pull to the side of the road shortly after 9 p.m. because of 'worsening and very dangerous conditions,' spokesman Jim Ritchie said. Allegheny Power was reporting more than 6,800 customers without power last night. Some 4,000 Duquesne Light customers in Beaver and Allegheny counties also were without service."

The February 2010 storm was one of the top 5 ever for the Pittsburgh area – total accumulation neared 22 inches for the event.

4.3.11.3 Past Occurrence

Allegheny County and the Commonwealth of Pennsylvania have 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 accompanying record-breaking frigid temperatures posed a major threat to the lives, safety and well-being of Commonwealth residents and caused major disruptions to the activities of schools, businesses, hospitals and nursing homes.

One of these devastating winter storms occurred in early January 1994 with record snowfall depths in many areas of the Commonwealth, strong winds, and sleet/freezing rains. Numerous storm-related power outages were reported and as many as 600,000 residents were without electricity, in some cases for several days at a time. A ravaging ice storm followed 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 PPL Corporation stated that this was the worst winter storm in the history of the company; related damage-repair costs exceeded $5,000,000.

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

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

In addition to the events described above, other winter storm events are listed in Table 4.3.10-1.

Table 4.3.11-1 History of Winter Storms in Allegheny County (NCDC 2015 and SHELDUS 2011).

DATE	TYPE	PROPERTY DAMAGE ($)
January 3, 2015	Winter Weather	0
December 2, 2014	Winter Weather	0
November 22, 2014	Winter Weather	0

Table 4.3.11-1 History of Winter Storms in Allegheny County (NCDC 2015 and SHELDUS 2011).

DATE	TYPE	PROPERTY DAMAGE ($)
March 2, 2014	Winter Weather	0
February 4, 2014	Winter Storm	0
January 25, 2014	Winter Weather	0
January 2, 2014	Winter Weather	0
November 26, 2013	Winter Weather	0
November 12, 2013	Winter Weather	0
January 25, 2013	Winter Weather	0
January 15, 2013	Winter Weather	0
December 26, 2012	Winter Storm	0
January 20, 2012	Winter Storm	0
February 9, 2010	Winter Storm	0
December 13, 2009	Winter Weather	0
January 27, 2009	Ice Storm, Winter Storm	0
February 29, 2008	Heavy Snow	0
February 12, 2008	Winter Storm	0
February 13, 2007	Heavy Snow, Ice Storm	0
December 15, 2005	Ice Storm	0
March 1, 2005	Heavy Snow	0
January 22, 2005	Ice Storm	14,000
March 16, 2004	Ice Storm	0
February 5. 2004	Ice Storm	0
January 26, 2004	Heavy Snow	0
December 14, 2003	Heavy Snow	0
December 5, 2003	Heavy Snow	0
February 16, 2003	Heavy Snow	0
December 11, 2002	Ice Storm	0
January 20, 2001	Heavy Snow	0
December 13, 2000	Winter Storm	0
March 9, 1999	Heavy Snow	0
January 13, 1999	Winter Storm	0
January 8, 1999	Winter Storm	0
January 2, 1999	Winter Storm	267,000
November 13, 1997	Ice Storm	45,000
January 6, 1996	Heavy Snow	0
January 2, 1996	Ice Storm	0
December 19, 1995	Ice Storm	9,000
December 11, 1995	Extreme Cold	50,000
November 14, 1995	Heavy Snow	22,000
March 8, 1995	Heavy Snow	0
February 15, 1995	Ice	0
February 3, 1995	Heavy Snow	0
January 7, 1995	Ice	0
January 4, 1995	Heavy Snow	0
March 2, 1994	Heavy Snow, Blizzard, Avalanche	5,007,000
February 8, 1994	Ice	22,000
January 17, 1994	Heavy Snow	501,000
January 14, 1994	Extreme Cold	7,000

Table 4.3.11-1 History of Winter Storms in Allegheny County (NCDC 2015 and SHELDUS 2011).		
DATE	TYPE	PROPERTY DAMAGE ($)
January 4, 1994	Heavy Snow	5,007,000
October 31, 1993	Heavy Snow	5,000
March 13, 1993	Blizzard	26,000
December 10, 1992	Heavy Snow	75,000
January 18, 1984	Snow	0
January 17, 1979	Ice	0
January 7, 1979	Ice, Heavy Snow	0
January 26, 1978	Wind, Snow	2,600,000
January 20, 1978	Snow	2,600,000
January 28, 1977	Blizzard	5,000
January 7, 1976	Heavy Snow	1,000
March 14, 1975	Snow, Sleet, Freezing Rain	0
December 1, 1974	Electrical, Heavy Snow	217,000
February 18, 1972	Snow, Wind	1,000
November 25, 1971	Snow	0
April 6, 1971	Snow, Wind	0
January 27, 1971	Snowstorm, Wind	1,000
January 26, 1971	Blizzard, Wind, Lightning	3,000
December 5, 1968	Snow, Wind	1,000
November 12, 1968	Snow, Wind	1,000
January 30, 1966	Blizzard	1,000
January 12, 1964	Snowstorm	7,000
December 29, 1962	Snow, Wind	75,000
December 6, 1962	Snow, Wind	1,000
March 6, 1962	Snow, Wind, Rain	1,000
February 3, 1961	Snowstorm	1,000
January 19, 1961	Snowstorm	1,000
December 11, 1960	Snowstorm	0
December 1, 1960	Snowstorm	0
March 3, 1960	Snow	0
February 18, 1960	Snow, Wind	0

Finally, the Eastern Region Headquarters of NOAA maintains snowfall records since 1884 for the Pittsburgh weather station:

- The largest snow storm on record was a storm dropping over 27 inches of snow on November 24-26, 1950.
- The greatest single-day snowfall was on March 13, 1993, with 23.6 inches.
- The year with the greatest depth of snow on the ground was on January 22, 1978 with 26 inches. This year also included the longest period with at least one inch of snow on the ground (64 days).

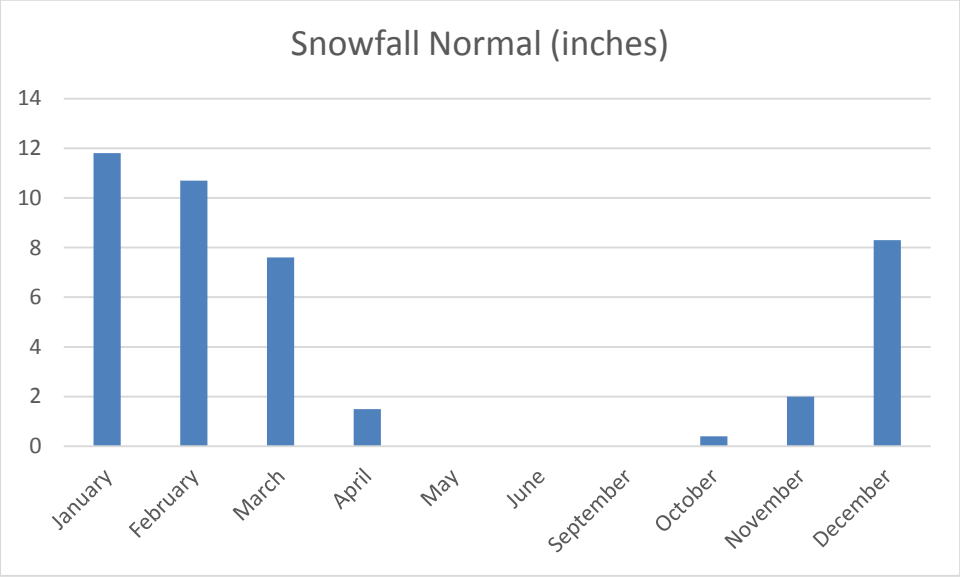
Other snowfall records can be viewed online at: http://www.erh.noaa.gov/pbz/tsnow.htm (NOAA, 2015).

4.3.11.4 Future Occurrence

Winter storms are a regular, annual occurrence in Pennsylvania and should be considered highly likely. Based on the 30-year mean from 1981-2010, NOAA provides the following frequencies of heavy snowfalls at the Pittsburgh weather station:

- Snowfalls of 16 inches or more: once in 15 years
- Snowfalls of 13-15 inches or more: once in 5 years
- Snowfalls of 8-12 inches or more: once every two years
- Snowfalls of 5 inches or more: twice a year.

Figure 4.3.11-2 30-Year Snowfall Normal by Month at the Pittsburgh Weather Station (NOAA, 2015)



The probability of future winter storms can be considered *highly likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.11.5 Vulnerability Assessment

Based on the information available, all communities in Allegheny County are essentially equally vulnerable to the direct impacts of winter storms. Snowfall is expected and normal in wintertime. Residents of the mountainous areas of the County may be more susceptible, especially when emergency medical assistance is required. In addition, the more rural areas of the County are susceptible to isolation caused by winter storms. Areas that are heavily wooded can make emergency response to these areas difficult when roadways are blocked by downed trees and wires.

Vulnerability to the effects of winter storms on buildings is also dependent on the age of the building type, construction material used and condition of the structure. In Allegheny County, 58.8% of the occupied housing units were constructed prior to 1960 with 29% constructed prior to 1939. These older structures may be more prone to damage with severe winter storm events.

HUMAN-MADE HAZARDS

4.3.12 Civil Disturbance

4.3.12.1 Location and Extent

Civil disturbance is a broad term that is typically used by law enforcement to describe one or more forms of disturbance caused by a group of people. Civil disturbances are typically a symptom of, and a form of protest against, major socio-political problems. Civil disturbance hazards include the following:

- **Famine**; involving a widespread scarcity of food leading to malnutrition, increased mortality, and a period of psychosocial instability associated with the scarcity of food, such as riots, theft of food, and the falls of governments caused by political instability borne of an inability to deal with the crisis caused by famine (Brennan, 2014).
- **Economic Collapse, Recession**; Very slow or negative growth (The Economist, 2009).
- **Misinformation**; Erroneous information spread unintentionally (Makkai, 1970).
- **Civil Disturbance, Public Unrest, Mass Hysteria, Riot**; Group acts of violence against property and individuals, for example (18 U.S.C. § 232, 2008).
- **Strike, Labor Dispute**; Controversies related to the terms and conditions of employment, for example (29 U.S.C. § 113, 2008).

Typically the severity of the action coincides with the level of public outrage. In addition to a form of protest against major socio-political problems, civil disturbances can also arise out of union protest, institutional population uprising, or from large celebrations that become disorderly.

The scale and scope of civil disturbance events varies widely. However, government facilities, landmarks, prisons, and universities are common sites where crowds and mobs may gather. Due to the number of educational institutions, headquarters, specifically within the City of Pittsburgh, and Allegheny County Jail, the area is susceptible to these events.

4.3.12.2 Range of Magnitude

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

1. **Casual Crowd:** A casual crowd is merely a group of people who happen to be in the same place at the same time. Violent conduct does not occur.
2. **Cohesive Crowd:** A cohesive crowd consists of members who are involved in some type of unified behavior. Members of this group are involved in some type of common activity, such as

worshipping, dancing, or watching a sporting event. Although they may have intense internal discipline, they require substantial provocation to arouse to action.

3. **Expressive Crowd:** An expressive crowd is one held together by a common commitment or purpose. Although they may not be formally organized, they are assembled as an expression of common sentiment or frustration. Members wish to be seen as a formidable influence. One of the best examples of this type is a group assembled to protest.
4. **Aggressive Crowd:** An aggressive crowd is comprised of individuals who have assembled for a specific purpose. This crowd often has leaders who attempt to arouse the members or motivate them to action. Members are noisy and threatening and will taunt authorities. They may be more impulsive and emotional, and require only minimal stimulation to arouse violence. Examples of this type of crowd could include demonstrators and strikers, though not all demonstrators and strikers are aggressive.

A mob can be defined as a large disorderly crowd or throng. Mobs are usually emotional, loud, tumultuous, violent and lawless. Similar to crowds, mobs have different levels of commitment and can be classified into four categories (Alvarez and Bachman, 2007):

1. **Aggressive Mob:** An aggressive mob is one that attacks, riots and terrorizes. The object of violence may be a person, property, or both. An aggressive mob is distinguished from an aggressive crowd only by lawless activity. Examples of aggressive mobs are the inmate mobs in prisons and jails, mobs that act out their frustrations after political defeat, or violent mobs at political protests or rallies.
2. **Escape Mob:** An escape mob is attempting to flee from something such as a fire, bomb, flood, or other catastrophe. Members of escape mobs are generally difficult to control can be characterized by unreasonable terror.
3. **Acquisitive Mob:** An acquisitive mob is one motivated by a desire to acquire something. Riots caused by other factors often turn into looting sprees. This mob exploits a lack of control by authorities in safeguarding property.
4. **Expressive Mob:** An expressive mob is one that expresses fervor or revelry following some sporting event, religious activity, or celebration. Members experience a release of pent up emotions in highly charged situations.

The worst case scenario for Allegheny County would be an aggressive crowd or an expressive mob protesting on or within a major thoroughfare, most likely formed near a major educational institution or headquarters.

4.3.12.3 Past Occurrence

Perhaps the most visible and recent example of civil disturbance in Allegheny county would be the protesting in Pittsburgh during the 2009 G-20 Summit. The Huffington Post Newspaper reported that on September 24, 2009, police fired canisters of pepper spray and smoke and rubber bullets at marchers protesting the Group of 20 Summit Thursday after anarchists responded to calls to disperse by rolling trash bins, throwing rocks, and breaking windows.

Pittsburgh Police Chief Nate Harper said 17 to 19 protesters were arrested, and Mayor Luke Ravenstahl said swift police decisions resulted in minimal property damage. Officials said there were no reports of injuries. The afternoon march turned chaotic at just about the time that President Barack Obama and first lady Michelle Obama arrived for a meeting with leaders of the world's major economies.

The clashes began after several hundred protesters, many advocating against capitalism, tried to march from an outlying neighborhood toward the convention center where the summit was being held. The protesters clogged streets, banged on drums and chanted, "Ain't no power like the power of the people, 'cause the power of the people don't stop." The marchers included small groups of self-described anarchists, some wearing dark clothes and bandanas and carrying black flags. Others wore helmets and safety goggles.

The impacts of civil disturbance events are contingent upon numerous factors including issues, politics, and method of response. Generally, the impact of civil disturbance events is nominal and short-lived unless acts of sabotage are performed. There may be minor injuries to first responders or participants from physical confrontations, and vandalism may cause minimal damage to property, facilities, and infrastructure. Adequate law enforcement at planned civil disturbance events and around likely target locations like the offices of state agencies minimizes the chances of a small assembly of individuals turning into a significant disturbance.

Another more notable riot event occurred when the residents of the City of Pittsburgh staged a relatively minor riot on February 6, 2006. This is one of many times that the Pittsburgh Steelers won the Super Bowl. Four cars were vandalized and overturned, street signs were torn down, sofas and dumpsters were lit on fire, newspaper stands and trash cans were vandalized and lit on fire, and trees were uprooted. State troopers, mounted police, and numerous officers in riot gear were needed to break up the melee, which resulted in 34 arrests.

Figure 4.3.12-1 Image from KDKA of Vandalized Business in Shadyside.

More recently, on April 10, 2015, 30 people who donned masks ran through Shadyside, smashing windows of more than a half-dozen businesses and an unknown number of automobiles, as seen in Figure 4.3.12-1. The event began as a peaceful march in Bloomfield with individuals holding candles and telling police they were holding a funeral procession for a friend. A few minutes later, there was chaos as the grouped turned a corner. Signs read, “Original Yinsurget… R.I.P. Mike V… Anarchy forever… Forever Anarchy.” As it turned out, self-described anarchist Michael Richard Vesch, of Wilkinsburg, had died. During the war in Iraq, he was a

leader at anti-war protests in front of the Army recruiting center in Oakland and in 2011 and 2012, at the Occupy Pittsburgh protests in Mellon Park, Downtown.

Protestors in the City of Pittsburgh and across the country also held events responding to the decision involving police Officer Darren Wilson's fatal shooting of Michael Brown, 18, on August 9, 2014, in Ferguson, Missouri. Two rallies occurred, one in the afternoon of more than 200 people outside of the Moorhead Federal Building, Downtown and another gathering of approximately 200 people at the

University of Pittsburgh campus in Oakland. Individuals carried protest signs, chanted slogans and expressed anger; both events lasted more than 90 minutes. The afternoon event concluded on Grant Street with participants drawing chalk outlines of one another. However, the Oakland rally ended around 8:30 p.m. with protestors interrupting traffic and spilling on Forbes and Fifth Avenues, as seen in Figure 4.3.12-2.

Figure 4.3.12-2 Image from Pittsburgh Post-Gazette of Rally at the Corner of Bigelow Boulevard and Forbes Avenue.

PEIRS report data indicates that there have been other past occurrences. However, PEIRS was discontinued in 2010 and an exact record of the number of incidents is not available. Refer to Table 4.3.12-1 for occurrences from 2002 to 2009.

Table 4.3.12-1 Civil Disturbance Events Reported to PEIRS, 2002-2009 (PEMA, 2010).

COUNT OF INCIDENT TYPE	YEAR								
INCIDENT TYPE	2002	2003	2004	2005	2006	2007	2008	2009	GRAND TOTAL
LARGE GATHERING		2		2	7	8	9	7	**35**
PROTEST		1	1	1	3	4	1		**11**
RIOT							1	1	**2**
Grand Total		**3**	**1**	**3**	**10**	**14**	**11**	**8**	**48**

**Events totaled through June 2009*

4.3.12.4 Future Occurrence

Civil disturbance is always a possibility as long as there is discrimination or other perceived social or economic injustices. However, it may be possible to recognize the potential for an event to occur in the near-term. For example, an upcoming significant sporting event at one of the colleges or universities in the Commonwealth may result in gathering of large crowds or immediately after significant national news involving political or social debates. Local law enforcement should anticipate these types of events and

be prepared to handle a crowd so that peaceful gatherings are prevented from turning into unruly public disturbances.

4.3.12.5 Vulnerability Assessment

The vulnerability of individual jurisdictions is difficult to determine because civil disturbance hazards are tied to the current political and economic climate. A jurisdiction that is very vulnerable one month may be less vulnerable the next. However, in general, Allegheny County may have higher than average vulnerability in Pennsylvania due to higher concentrations of local, state, and federal facilities.

Jurisdictional losses for civil disturbance events are difficult to predict and can vary significantly in range. For example, the State College Riot in July 1998, fueled by alcohol consumption, resulted in approximately $150,000 in damages. Sites previously identified in this sections are locations where such events are more likely to occur and therefore should be considered more vulnerable. Adequate law enforcement at these locations minimizes the changes of a small assembly of people turning into a significant disturbance. This will ensure improved response times, optimal communications, and containment of the event; as during these events major roadways can be blocked and disturb traffic and larger events may involve the interruption or removal of communication.

More broadly, in the case of large civil disturbance events, the county may incur losses related to work stoppages in addition to any acts of vandalism that my occur. Failure to pursue a program of civil disturbance awareness may result in increased loss of lives and property.

4.3.13 Dam and Lock Failure

Due to data sensitivity, the Dam and Lock Failure Profile is located in Appendix G.

4.3.14 Environmental Hazards

4.3.14.1 Location and Extent

Environmental hazards in Allegheny County focus mainly on hazardous material release, coal mining and oil and gas well drilling. These hazards result from human activities and industries and can result in injury and death to humans and damage to property.

Additional environmental hazards include superfund facilities, manure spills, and product defect or contamination. These are included in the definition of environmental hazards, but were not profiled in the HMP update. Superfund sites are hazards originating from abandoned hazardous waste sites listed on the National Priorities List. The EPA maintains superfund site information which includes hazardous waste sites, potentially hazardous waste sites and remedial activities across the nation, including sites that are on the National Priorities List (NPL) or being considered for the NPL. There are 95 superfund sites in Pennsylvania. Manure spills involve the release of stored or transported agricultural waste. Product defect or contamination includes highly flammable or otherwise unsafe consumer products and dangerous foods.

No information on deaths, serious injury, or property damage could be found for superfund sites, manure spills, or product defect or contamination; therefore these types of environmental hazards were not profiled in this plan.

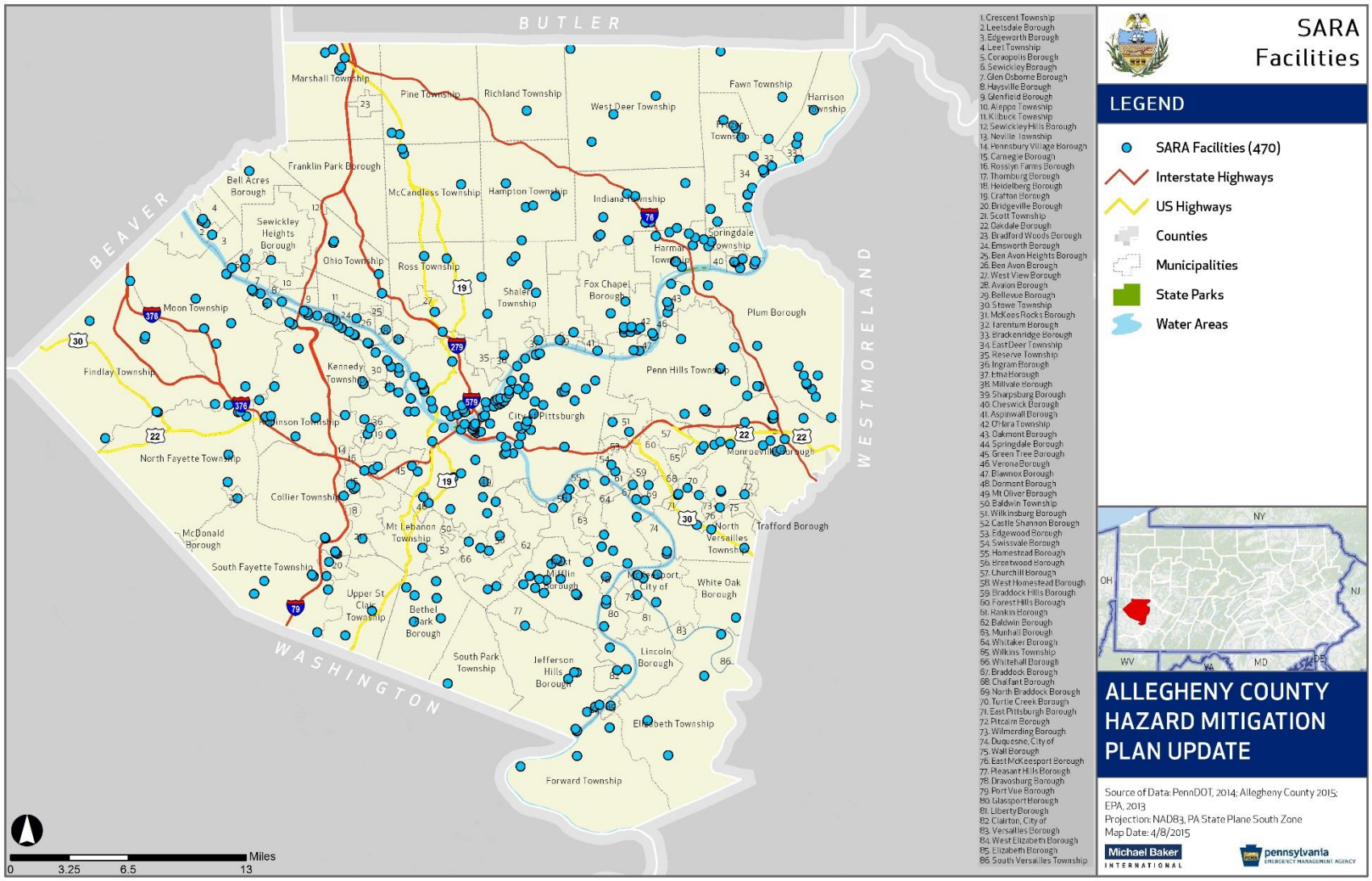
Hazardous Material Release

Hazardous material releases pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. Hazardous materials can include toxic chemicals, infectious substances, bio-hazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive (PL 1990-165, §207(e)). Hazardous material releases can occur wherever hazardous materials are manufactured, used, stored, or transported. Such releases can occur along transportation routes or at fixed-site facilities. Hazardous material releases can result in human and wildlife injury, property damage, and contamination of air, water, and soils.

Fixed-site facilities that use, manufacture, or store hazardous materials in Allegheny County pose risk and must comply with both Title III of the federal Superfund Amendments and Reauthorization Act (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Commonwealth's reporting requirements under the Hazardous Materials Emergency Planning and Response Act (1990-165), as amended. These legislations require that all owners or operators of facilities that manufacture, produce, use, import, export, store, supply, or distribute any extremely hazardous substance, as defined by the EPA, at or above the threshold planning quantity, as established by EPA, shall report to the county where the facility is located and to the Commonwealth that the facility is subject to the requirement to assist the Local Emergency Planning Committee (LEPC) in the development of an Off-site Emergency Response Plan. The community right-to-know reporting requirements keep communities abreast of the presence and release of chemicals at individual facilities. There are 474 SARA Title III facilities that report to Allegheny County Emergency Services. Of these, 468 are located within the County's boundaries, shown in Figure 4.3.14-1. Allegheny County does not maintain a separate list of non-SARA hazardous materials facilities; all hazardous material facilities are considered SARA facilities.

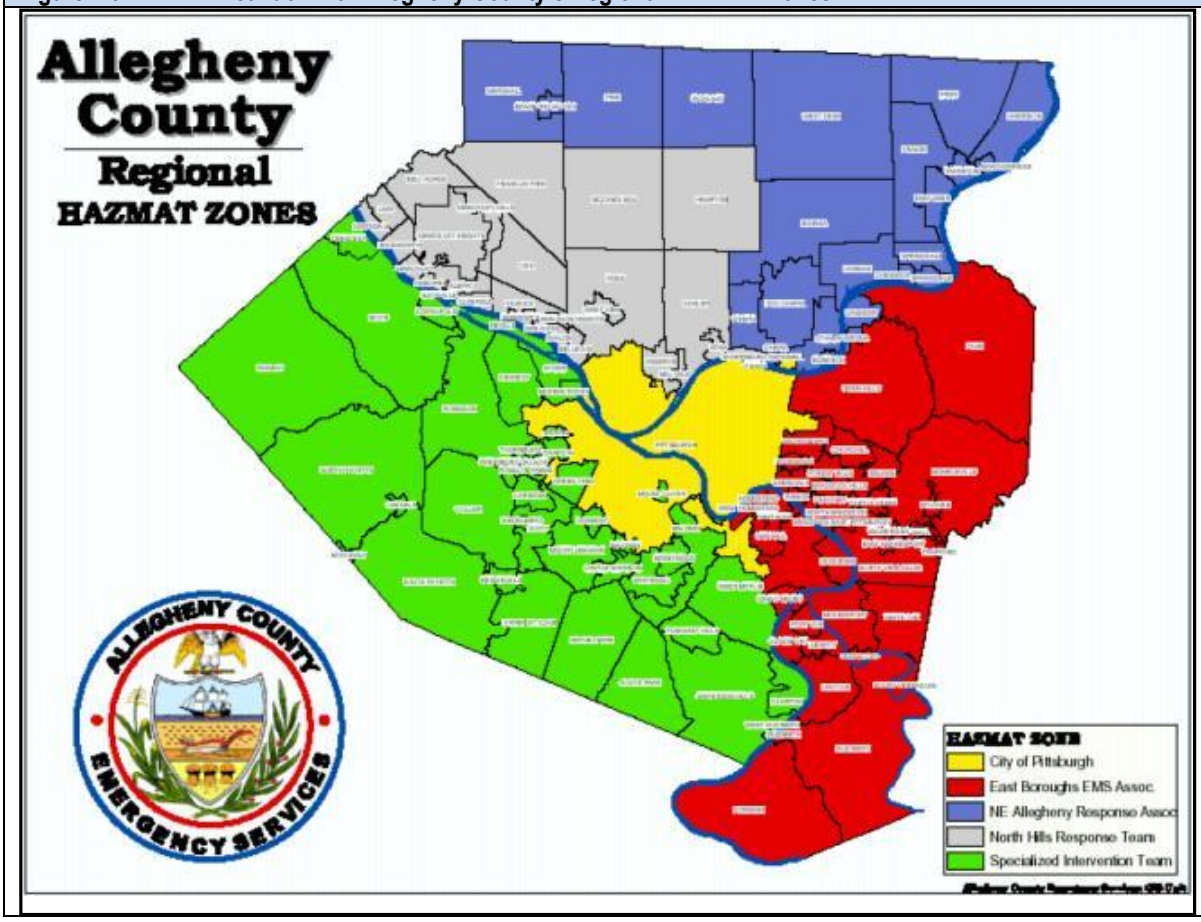
Additional hazardous materials are contained at the military installations within Pennsylvania. Nuclear facilities are another type of fixed-facility that poses risk of hazard material release. For more information about nuclear incidents, reference Section 4.3.16.

Figure 4.3.14-1 Locations of Allegheny County SARA Facilities.



Allegheny County considers its SARA facilities as critical facilities, so a complete listing of SARA Facilities and their vulnerability to other hazard events can be found in Appendix E. Allegheny County has a number of response teams positioned to respond to hazardous material incidents. Allegheny County regional HAZMAT zones are shown below in Figure 4.3.14-2.

Figure 4.3.14-2 Breakdown of Allegheny County's Regional HAZMAT Zones.

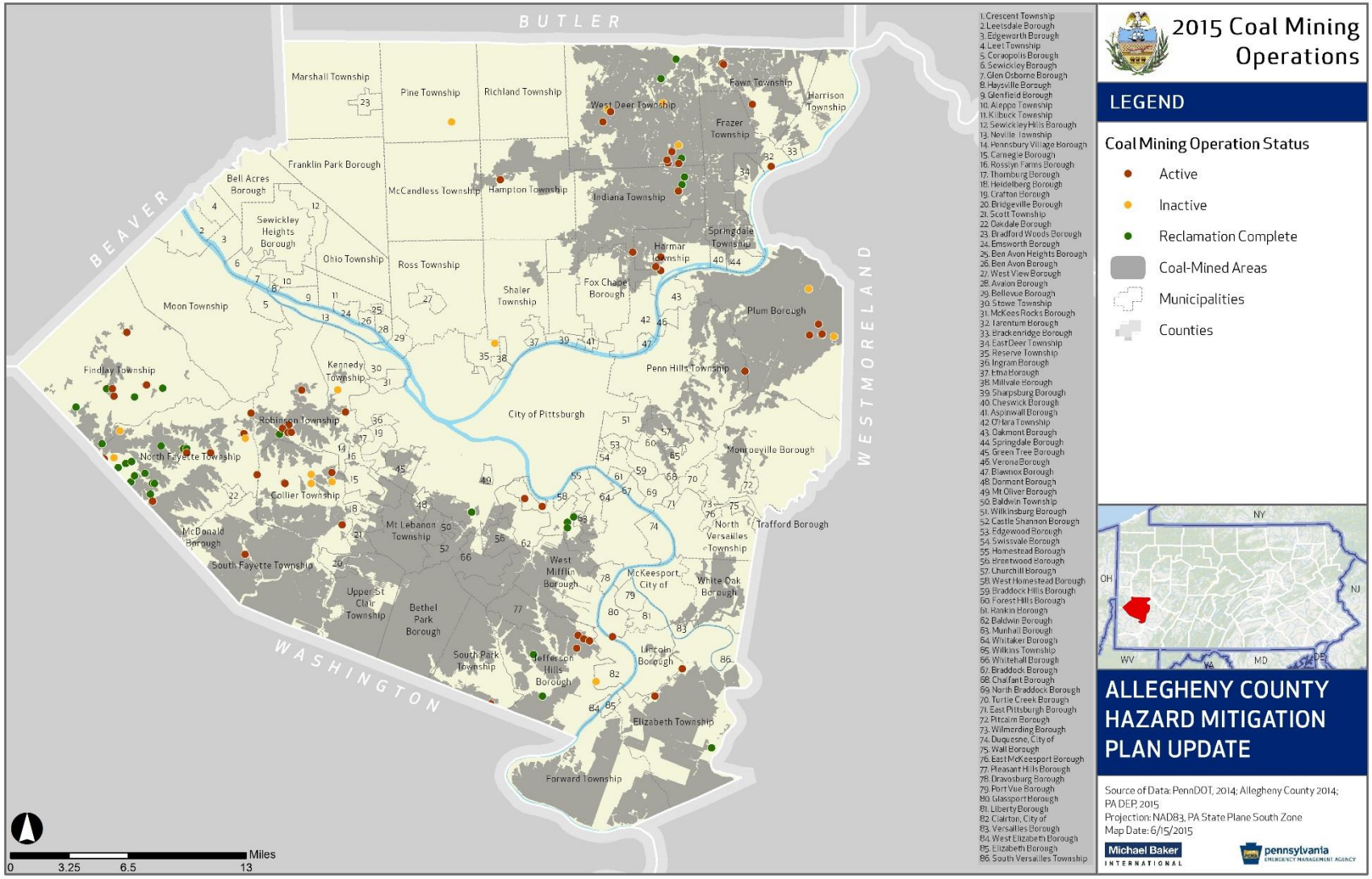


Coal Mining

Section 4.3.8 *Subsidence, Sinkhole* discussed mining as a major factor that can make an area more susceptible to subsidence. This section will focus on mining how it can potentially act as an environmental hazard.

Mining, including surface, underground, and open-pit operations, was conducted in Pennsylvania before the 1680s and was instrumental in the development of the Commonwealth. As such, Pennsylvania was one of the first states to initiate, promulgate, and enforce environmental regulations related to mining, including mine reclamation. Active mining continues in Allegheny County, which is located over Pennsylvania's main bituminous coal field. Figure 4.3.14-3 shows the location of mining operations in the county. Of the mapped operations, 108 are active, 26 are inactive, and 55 have been reclaimed.

Figure 4.3.14-3 Active, Inactive, and Reclaimed Coal Mines in Allegheny County.



There remains a legacy of abandoned mines, waste piles, and degraded groundwater and surface water in the Commonwealth. The EPA estimates that over 3,000 miles of streams in Pennsylvania have been contaminated by acid mine drainage which occurs when metal sulfides in rock oxidize and generate acidity in water that comes in contact with them. Table 4.3.14-1 shows coal slurry ponds in the County including impoundment name, Mine Safety and Health Administration (MSHA) ID number and the capacity. A slurry pond is an impoundment used to store waste created during coal preparation also known as washing. The waste contained in the impoundment consists of silt, dust, water, coal fines and washing/treatment chemicals. Coal slurry impoundments are considered dams and classified accordingly by the PA DEP.

The greatest hazard associated with coal slurry ponds is impoundment failure due to seepage, embankment weakness and undermining, all of which could result in flooding. Breakthroughs associated with deep mining have also led to flooding of underground mine operations. The slurry holding capacity of impoundments in the Commonwealth ranges from tens of millions to billions of gallons.

Table 4.3.14-1 Summary of Coal Slurry Impoundments in the Allegheny County (Coal Impoundment LIS 2015).

IMPOUNDMENT NAME	MSHA ID NO.	MAXIMUM CAPACITY
Harmar Refuse Bank Slurry Pond Tailings	1211-PA02-00375-01	14,193,552 gallons
Harmar Storage Pond #4 Slurry Impoundment	1211-PA02-00375-04	661,147 gallons
Slurry-Bald Knob Prep Plant	1211-PA02-00194-03	203,657,142 gallons
Treatment Pond 14-North Impoundment	1211-PA02-00049-05	8,146,286 gallons

Oil and Gas Well Incidents

More than 350,000 oil and gas wells have been drilled in Pennsylvania since the first commercial oil well was developed in 1859 (PADEP-BOGM 2010a). PA DEP differentiates between conventional and unconventional oil and gas wells. Conventional wells are traditional vertical wells, while unconventional wells are typically horizontally drilled wells commonly associated with the Marcellus Shale, a more recent advancement in drilling technology that has allowed for natural gas extraction from the Marcellus Shale, which exists at a depth of 5,000 to 8,000 feet. This type of extraction presents new and unique challenges and hazards in the Commonwealth.

In Allegheny County, most wells are conventional. There are 1,463 active, 627 inactive, and 74 abandoned conventional wells in the county. In contrast, there are only 74 active unconventional wells; there are no abandoned or inactive wells. In addition, there are 20 unconventional wells with a status of “Operator reported not drilled,” meaning the well permit has expired without being drilled or that the permit is not expired but the operator will not seek to drill, and “Proposed, but never materialized,” meaning that either a permit application was submitted but not approved, a well was entered erroneously into the database, or the permit was issued but the well was never drilled. There were no unconventional wells drilled in Allegheny County in 2011, so this represents an increase in risk. Figures 4.3.14.4 and 4.3.14.5 show the locations of these wells.

Private water supplies such as domestic drinking water wells in the vicinity of oil and gas wells are at risk of contamination from brine and other pollutants including methane, which can pose a fire hazard. For more information on public and private water supplies, see Section 4.3.1.5.

Figure 4.3.14-4 Conventional Oil and Gas Well Locations for Allegheny County.

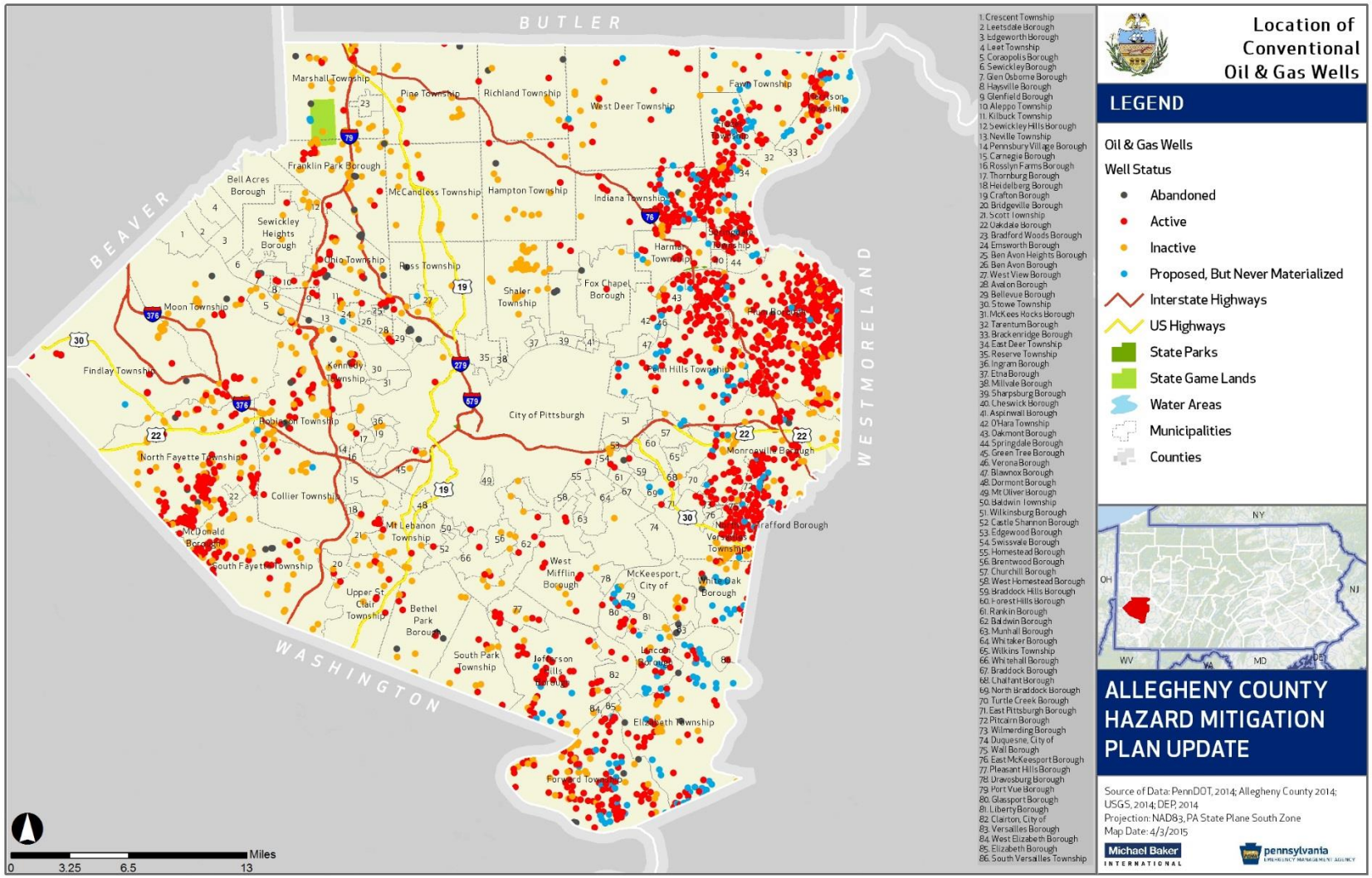
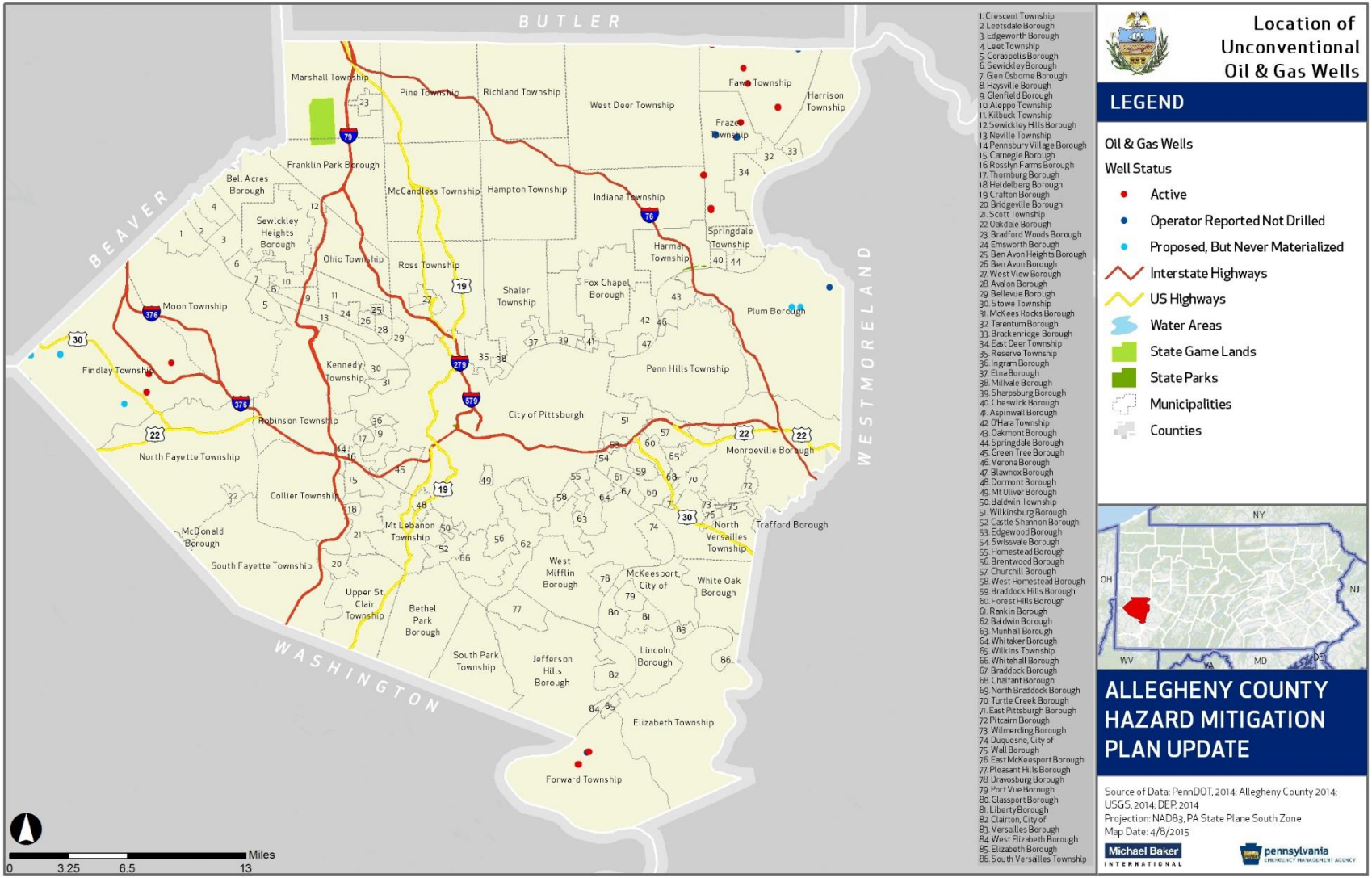


Figure 4.3.14-5 Unconventional Oil and Gas Well Locations.



4.3.14.2 Range of Magnitude

Hazardous Material Release

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

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

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

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

A worst case scenario event of a hazardous material release occurred in March 2009 when a tractor trailer overturned spilling 33,000 pounds of toxic hydrofluoric acid near Wind Gap, Pennsylvania, resulting in the evacuation of 5,000 people (USA Today, 2009). Residents were evacuated because contact with concentrated solutions of the acid can cause severe burns, and inhaling the gas can cause respiratory irritation, severe eye damage, and pulmonary edema.

The environmental impacts of hazardous material releases include:

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

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

Coal Mining

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

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

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

Also as potentially dangerous are slurry ponds or tailings dams. Mineral byproducts from coal mining are pumped to slurry or tailings dams for removal by sedimentation. If the dams or structures supporting the slurry ponds fail, they pose hazards similar to dam failure (see Appendix G – Dam Failure Profile).

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

Pennsylvania has a long history of mining, and there have been numerous mining accidents. The worst case scenario event in Pennsylvania mining history occurred in 1962 in Centralia, Pennsylvania, when an underground fire began in the coal mines underneath the town. The federal government offered buyouts of homes of residents so they could relocate from Centralia, resulting in a cost of over $40 million to carry this out and demolish homes. In 1992, Pennsylvania claimed eminent domain on all properties in the town and condemned all of the buildings. In 1981 the town had over 1,000 residents, but today only a few remain.

One of the worst mining accidents in the United States since 1950 occurred in nearby West Virginia. On April 5, 2010, twenty-nine miners were killed at the Upper Big Branch Mine by an explosion.

The environmental impacts of coal mining are many. Mining activities and acid mine drainage can contaminate surface and groundwater, create acid mine drainage, and cause changes in water temperature and damage to streams, lakes, ponds, estuaries, and wetland ecosystems. Mine explosions

or burning refuse piles can cause air quality problems. Although mine reclamation is required for much surface mining activity, there is still a loss of quality in landscape, damage to vegetation, and habitat.

Oil and Gas

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

Methane can leak into domestic drinking wells and pose fire and explosion hazards (see Figure 4.3.14-6). In addition, natural gas well fires can occur when natural gas is ignited at the well site. Often, these fires erupt during drilling when a spark from machinery or equipment ignites the gas. The initial explosion and resulting flames have the potential to seriously injure or kill individuals in the immediate area. These fires are often difficult to extinguish due to the intensity of the flame and the abundant fuel source. When methane gas from unplugged gas wells seeps into underground coal mines, miners are at risk of asphyxiation and are subject to impacts of explosion.

Figure 4.3.14-6 Natural Gas well explosion in Indiana Township, July 2010 (WPXI-TV).

Marcellus Shale play drilling has introduced a new set of hazards to the oil and gas industry in addition to the normal risks associated with the industry. The Marcellus Shale formation exists at a depth normally between 5,000 and 8,000 feet and holds trillions of cubic feet of natural gas. Extraction from this depth was previously not feasible but as drilling technology has improved over the years, recovering natural gas from Marcellus Shale is now possible (PADEP-BOGM, 2010).

This extraction process is different from traditional natural gas extraction in that it often requires horizontal drilling. Horizontal drilling is accomplished by hydraulic fracturing which involves pumping one to eight million gallons of water, mixed with sand and other additives including hydrochloric or muriatic acid, into the shale formation. The fluid or “frac fluid” that is recovered from this process must be properly treated as the water quality is very poor.

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

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

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

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

In 2010 the worst environmental disaster in United States history was realized and can be attributed to oil well drilling and extraction. British Petroleum's (BP) Deepwater Horizon oil rig, located in the Gulf of Mexico off the coast of Louisiana, began leaking millions of gallons of oil into the ocean after an explosion occurred at the site on April 20, 2010, killing 11 workers. The resulting environmental and economic impacts have been devastating to the region.

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

Additional potential environmental impacts of Marcellus Shale play drilling include surface water depletion and the accompanying damage to aquatic ecosystems; and contaminated surface, groundwater, and soil resulting from hydraulic fracturing, the recovery of contaminated hydraulic fracturing fluid and solid toxic waste produced from treatment.

4.3.14.3 Past Occurrence

Hazardous Material Release

Since the passage of SARA Title III, facilities which produce, use, or store hazardous chemicals must notify the public through their county's emergency dispatch center and PEMA, if an accidental release of a hazardous substance meets or exceeds a designated reportable quantity and affects or has the potential to affect persons and/or the environment outside the plant. SARA Title III and Pennsylvania Hazardous Material Emergency Planning and Response Act (Act 165) also require a written follow-up report to PEMA and to the county where the facility is located. These written follow-up reports include any known or anticipated health risks associated with the release and actions to be taken to mitigate potential future incidents. In addition, Section 204(a)(10) of Act 165 requires PEMA to staff and operate a 24-hour State Emergency Operations Center (EOC) to provide effective emergency response coordination. According to PEMA's Pennsylvania Hazardous Material Emergency Planning and Response Act Annual Reports, Allegheny County's annual number of incidents includes:

- 39 incidents in 2006
- 55 incidents in 2007
- 146 incidents in 2008
- 95 incidents in 2009
- 147 incidents in 2010
- 155 incidents in 2011.

For hazardous materials releases occurring in transit, please see Section 4.3.18.

Coal Mining

Although state and federal (U.S. Department of Labor, EPA, and the Office of Surface Mining and Reclamation) laws require occupational health, safety, and environmental protection in all mining activities, mining accidents still occur. The U.S. Department of Labor Mine Safety and Health Administration tracks mining accidents and injuries. From 2006 to 2011, there were 1,347 operator injuries (including 5 deaths) reported in Pennsylvania resulting from surface and underground coal mining activities (MSHA, 2013). In addition, the PA DEP Bureau of Mine Safety tracks fatalities for both the anthracite and bituminous regions of Pennsylvania. In the bituminous region, which includes Allegheny County, the most recent fatality was in February, 2015. It is unclear where in the region the fatality occurred, but it was in Southwestern Pennsylvania and illustrates that coal mining accidents still occur. There is no comprehensive database that tracks the data. Beyond operator accidents, there can be incidents that are a result of falls, drowning, electrocution, and ATV crashes.

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

action or assistance such as a state of emergency. Two of these were mine fires and two were inundations (PADEP, 2010).

Oil and Gas

Pennsylvania has a long history of oil and gas well drilling and, though relatively infrequent, many accidents and incidents have occurred related to the extraction of these natural resources. No comprehensive list of oil and gas related incidents exist for the Commonwealth. The hazards associated with each incident vary widely and encompass damages including serious injury, explosion, fire, and water contamination.

While there is no comprehensive list of past occurrences, PA DEP has made oil and gas well safety compliance information available to the public. Since 1990, there have been 150 environmental health and safety violations at oil and gas wells in Allegheny County. All of these violations occurred at conventional well sites. These violations range in severity, from failure to implement protective plans like erosion and sedimentation control plans and encroachment plans to more serious infractions like discharging pollutional materials into the waters of the Commonwealth. The most common infractions were:

1. Failure to minimize accelerated erosion, implement Erosion & Sedimentation (E&S) plan, maintain E&S controls, and failure to stabilize site until total site restoration (53 violations).
2. Unpermitted discharge of industrial waste (35 violations).
3. Discharge of pollutional material to waters of the Commonwealth (12 violations)

There are limited qualitative details on oil and gas incidents. One known incident in Allegheny County was in July 2010, when a shallow gas well exploded in Indiana Township and killed two workers.

4.3.14.4 Future Occurrence

Hazardous Material Release

While many hazardous material release incidents have occurred in Pennsylvania in the past, they are generally considered difficult to predict. An occurrence is largely dependent upon the accidental or intentional actions of a person or group. Intentional acts are addressed in Section 4.3.17: Terrorism. Risk associated with hazardous materials release is expected to remain moderate.

Coal Mining

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

Surface subsidence resulting from underground mining continues to be a major concern of those impacted by the mining industry (see Section 4.3.8). Despite the use of deep mine roof-support methods, some subsidence will eventually occur.

It is likely that Pennsylvania will continue to modify its laws to reflect additional environmental awareness. Stricter controls on reclamation, perhaps specifically addressing the disposal of mining residuals, are likely. State and federal laws and programs have historically placed an emphasis on environmental preservation and reclamation. As in the past, it seems likely that Pennsylvania will be at the forefront of these programs and future occurrence will decrease.

Oil and Gas

It is difficult to predict when and where environmental hazards will arise as they are often related to equipment failure and human error. Adequate monitoring through the DEP will reduce the likelihood of potential impacts to the community and to the environment. Risk associated with oil and gas drilling is expected to remain moderate though based on the short history of past occurrence, Pennsylvania should expect multiple incidences to occur annually or a 100 percent annual probability.

As the number of oil and gas wells increases each year, the probability of occurrence is likely to increase as well.

Overall, the probability of future environmental hazards events is *likely* as defined by the Risk Factor Methodology (See Section 4.4-1).

4.3.14.5 Vulnerability Assessment

The vulnerability of jurisdictions to environmental hazards differs based on the type of environmental hazard being examined. While explosions or other catastrophic incidents at hazardous material facilities, coal mining operations, or any kind of oil or gas well could cause property damage, the primary concern is the population living near those sites who would potentially need to be evacuated. For hazardous material releases at fixed facilities, vulnerability is defined as populations within 1.5 miles of SARA facilities. For coal mining incidents, vulnerability is defined as populations living within 1.5 miles of active coal mines. For oil and gas well incidents, vulnerability is defined as being located within 1,000 yards of an unconventional oil or gas well. This buffer is what DEP uses as its “zone of culpability” for oil and gas well incidents. Table 4.3.14-2 provides this vulnerability information by community. Looking across all kinds of environmental hazards, the highest population is at risk to fixed-facility hazardous material releases because of the high number of SARA facilities in densely populated areas. Vulnerability is lowest for unconventional oil and gas wells since there are so few in the county. The vulnerability of SARA facilities to each identified hazard in the HMP is included in Appendix E.

Table 4.3.14-2 Populations Vulnerable to Environmental Hazards.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 1.5 MI OF A SARA FACILITY	PERCENT POPULATION WITHIN 1.5 MI OF A SARA FACILITY	ESTIMATED POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	ESTIMATED POPULATION WITHIN 1000 YDS. OF AN UNCON-VENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YARDS OF AN UNCON-VENTIONAL WELL	ESTIMATED POPULATION WITHIN 1.5 MILES OF AN ACTIVE COAL MINE	PERCENT POPULATI ON WITHIN 1.5 MILES OF AN ACTIVE COAL MINE
Aleppo Township	1,916	1,900	99.2%	1,702	88.8%	0	0.0%	0	0.0%
Aspinwall Borough	2,801	2,801	100.0%	0	0.0%	0	0.0%	0	0.0%
Avalon Borough	4,705	4,705	100.0%	4,637	98.6%	0	0.0%	0	0.0%
Baldwin Borough	19,767	19,767	100.0%	17,129	86.7%	0	0.0%	8,220	41.6%
Baldwin Township	1,992	1,992	100.0%	122	6.1%	0	0.0%	0	0.0%
Bell Acres Borough	1,388	1,182	85.2%	20	1.4%	0	0.0%	0	0.0%
Bellevue Borough	8,370	8,370	100.0%	7,550	90.2%	0	0.0%	0	0.0%
Ben Avon Borough	1,781	1,781	100.0%	733	41.2%	0	0.0%	0	0.0%
Ben Avon Heights Borough	371	371	100.0%	371	100.0%	0	0.0%	0	0.0%
Bethel Park, Municipality of	32,313	29,679	91.8%	19,456	60.2%	0	0.0%	1,523	4.7%
Blawnox Borough	1,432	1,432	100.0%	182	12.7%	0	0.0%	0	0.0%
Brackenridge Borough	3,260	3,260	100.0%	1,515	46.5%	0	0.0%	3,029	92.9%
Braddock Borough	2,159	2,159	100.0%	652	30.2%	0	0.0%	0	0.0%
Braddock Hills Borough	1,880	1,880	100.0%	1,568	83.4%	0	0.0%	0	0.0%
Bradford Woods Borough	1,171	525	44.8%	333	28.4%	0	0.0%	0	0.0%
Brentwood Borough	9,643	9,643	100.0%	8,702	90.2%	0	0.0%	2,293	23.8%
Bridgeville Borough	5,148	5,054	98.2%	4,663	90.6%	0	0.0%	1,189	23.1%
Carnegie Borough	7,972	7,972	100.0%	179	2.2%	0	0.0%	6,326	79.4%
Castle Shannon Borough	8,316	8,293	99.7%	2,913	35.0%	0	0.0%	0	0.0%
Chalfant Borough	800	800	100.0%	800	100.0%	0	0.0%	0	0.0%
Cheswick Borough	1,746	1,746	100.0%	1,746	100.0%	0	0.0%	0	0.0%
Churchill Borough	3,011	2,883	95.7%	1,139	37.8%	0	0.0%	0	0.0%
Clairton City	6,796	6,796	100.0%	5,225	76.9%	0	0.0%	3,994	58.8%

Table 4.3.14-2 Populations Vulnerable to Environmental Hazards.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 1.5 MI OF A SARA FACILITY	PERCENT POPULATION WITHIN 1.5 MI OF A SARA FACILITY	ESTIMATED POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	ESTIMATED POPULATION WITHIN 1000 YDS. OF AN UNCON-VENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YARDS OF AN UNCON-VENTIONAL WELL	ESTIMATED POPULATION WITHIN 1.5 MILES OF AN ACTIVE COAL MINE	PERCENT POPULATI ON WITHIN 1.5 MILES OF AN ACTIVE COAL MINE
Collier Township	7,080	4,854	68.6%	2,290	32.3%	0	0.0%	6,737	95.2%
Coraopolis Borough	5,677	5,677	100.0%	5,297	93.3%	0	0.0%	0	0.0%
Crafton Borough	5,951	5,892	99.0%	2,921	49.1%	0	0.0%	331	5.6%
Crescent Township	2,640	2,095	79.4%	127	4.8%	0	0.0%	0	0.0%
Dormont Borough	8,593	8,522	99.2%	0	0.0%	0	0.0%	0	0.0%
Dravosburg Borough	1,792	1,792	100.0%	1,267	70.7%	0	0.0%	0	0.0%
Duquesne, City of	5,565	5,565	100.0%	0	0.0%	0	0.0%	0	0.0%
East Deer Township	1,500	1,500	100.0%	1,374	91.6%	0	0.0%	608	40.5%
East McKeesport Borough	2,126	2,126	100.0%	1,244	58.5%	0	0.0%	0	0.0%
East Pittsburgh Borough	1,822	1,822	100.0%	1,822	100.0%	0	0.0%	0	0.0%
Edgewood Borough	3,118	3,118	100.0%	2,873	92.1%	0	0.0%	0	0.0%
Edgeworth Borough	1,680	1,680	100.0%	0	0.0%	0	0.0%	0	0.0%
Elizabeth Borough	1,493	1,493	100.0%	1,493	100.0%	0	0.0%	0	0.0%
Elizabeth Township	13,271	11,613	87.5%	10,730	80.9%	297	2.2%	7,913	59.6%
Emsworth Borough	2,449	2,449	100.0%	2,449	100.0%	0	0.0%	0	0.0%
Etna Borough	3,451	3,449	99.9%	675	19.6%	0	0.0%	0	0.0%
Fawn Township	2,376	2,021	85.1%	2,320	97.6%	645	27.1%	1,482	62.4%
Findlay Township	5,060	4,595	90.8%	3,639	71.9%	1,109	21.9%	2,492	49.2%
Forest Hills Borough	6,518	6,447	98.9%	912	14.0%	0	0.0%	0	0.0%
Forward Township	3,376	1,985	58.8%	3,376	100.0%	672	19.9%	154	4.6%
Fox Chapel Borough	5,388	5,235	97.2%	1,905	35.4%	0	0.0%	2,009	37.3%
Franklin Park Borough	13,470	2,927	21.7%	11,488	85.3%	0	0.0%	0	0.0%
Frazer Township	1,157	1,157	100.0%	1,157	100.0%	621	53.7%	500	43.2%

Table 4.3.14-2 Populations Vulnerable to Environmental Hazards.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 1.5 MI OF A SARA FACILITY	PERCENT POPULATION WITHIN 1.5 MI OF A SARA FACILITY	ESTIMATED POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	ESTIMATED POPULATION WITHIN 1000 YDS. OF AN UNCON-VENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YARDS OF AN UNCON-VENTIONAL WELL	ESTIMATED POPULATION WITHIN 1.5 MILES OF AN ACTIVE COAL MINE	PERCENT POPULATI ON WITHIN 1.5 MILES OF AN ACTIVE COAL MINE
Glassport Borough	4,483	4,483	100.0%	3,948	88.1%	0	0.0%	3,934	87.8%
Glen Osborne Borough	547	547	100.0%	547	100.0%	0	0.0%	0	0.0%
Glenfield Borough	205	205	100.0%	151	73.7%	0	0.0%	0	0.0%
Green Tree Borough	4,432	4,427	99.9%	2,379	53.7%	0	0.0%	0	0.0%
Hampton Township	18,363	15,381	83.8%	10,557	57.5%	0	0.0%	6,227	33.9%
Harmar Township	2,921	2,921	100.0%	2,892	99.0%	0	0.0%	1,766	60.5%
Harrison Township	10,461	9,969	95.3%	10,461	100.0%	0	0.0%	344	3.3%
Haysville Borough	70	68	97.1%	68	97.1%	0	0.0%	0	0.0%
Heidelberg Borough	1,244	1,244	100.0%	1,089	87.5%	0	0.0%	1,244	100.0%
Homestead Borough	3,165	3,165	100.0%	0	0.0%	0	0.0%	0	0.0%
Indiana Township	7,253	6,989	96.4%	4,916	67.8%	107	1.5%	2,999	41.3%
Ingram Borough	3,330	3,330	100.0%	3,290	98.8%	0	0.0%	1,408	42.3%
Jefferson Hills Borough	10,619	8,126	76.5%	7,644	72.0%	0	0.0%	3,979	37.5%
Kennedy Township	7,672	7,668	99.9%	7,627	99.4%	0	0.0%	2,413	31.5%
Kilbuck Township	697	697	100.0%	697	100.0%	0	0.0%	0	0.0%
Leet Township	1,634	1,634	100.0%	0	0.0%	0	0.0%	0	0.0%
Leetsdale Borough	1,218	1,114	91.5%	0	0.0%	0	0.0%	0	0.0%
Liberty Borough	2,551	2,551	100.0%	1,331	52.2%	0	0.0%	575	22.5%
Lincoln Borough	1,072	708	66.0%	1,009	94.1%	0	0.0%	877	81.8%
Marshall Township	6,915	5,095	73.7%	6,099	88.2%	0	0.0%	0	0.0%
McCandless, Town of	28,457	18,536	65.1%	14,166	49.8%	0	0.0%	1,503	5.3%
McDonald Borough	383	0	0.0%	383	100.0%	0	0.0%	193	50.4%
McKees Rocks Borough	6,104	6,104	100.0%	0	0.0%	0	0.0%	0	0.0%

Table 4.3.14-2 Populations Vulnerable to Environmental Hazards.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 1.5 MI OF A SARA FACILITY	PERCENT POPULATION WITHIN 1.5 MI OF A SARA FACILITY	ESTIMATED POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	ESTIMATED POPULATION WITHIN 1000 YDS. OF AN UNCON-VENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YARDS OF AN UNCON-VENTIONAL WELL	ESTIMATED POPULATION WITHIN 1.5 MILES OF AN ACTIVE COAL MINE	PERCENT POPULATI ON WITHIN 1.5 MILES OF AN ACTIVE COAL MINE
McKeesport, City of	19,731	19,543	99.0%	7,331	37.2%	0	0.0%	0	0.0%
Millvale Borough	3,744	3,744	100.0%	0	0.0%	0	0.0%	0	0.0%
Monroeville, Municipality of	28,386	26,103	92.0%	26,621	93.8%	0	0.0%	802	2.8%
Moon Township	24,185	22,748	94.1%	11,352	46.9%	0	0.0%	135	0.6%
Mount Lebanon, Municipality of	33,137	32,839	99.1%	21,454	64.7%	0	0.0%	1,128	3.4%
Mount Oliver Borough	3,403	3,403	100.0%	0	0.0%	0	0.0%	0	0.0%
Munhall Borough	11,406	11,406	100.0%	742	6.5%	0	0.0%	285	2.5%
Neville Township	1,084	1,084	100.0%	1,007	92.9%	0	0.0%	0	0.0%
North Braddock Borough	4,857	4,857	100.0%	4,110	84.6%	0	0.0%	0	0.0%
North Fayette Township	13,934	11,089	79.6%	13,080	93.9%	0	0.0%	8,776	63.0%
North Versailles Township	10,229	10,229	100.0%	6,067	59.3%	0	0.0%	0	0.0%
Oakdale Borough	1,459	1,459	100.0%	975	66.8%	0	0.0%	1,331	91.2%
Oakmont Borough	6,303	6,303	100.0%	6,303	100.0%	0	0.0%	4,778	75.8%
O'Hara Township	8,407	8,160	97.1%	3,120	37.1%	0	0.0%	611	7.3%
Ohio Township	4,757	4,675	98.3%	4,653	97.8%	0	0.0%	0	0.0%
Penn Hills, Municipality of	42,329	39,374	93.0%	39,731	93.9%	0	0.0%	5,775	13.6%
Pennsbury Village Borough	661	661	100.0%	0	0.0%	0	0.0%	661	100.0%
Pine Township	11,497	3,969	34.5%	7,237	62.9%	0	0.0%	0	0.0%
Pitcairn Borough	3,294	3,294	100.0%	3,294	100.0%	0	0.0%	0	0.0%
Pittsburgh, City of	305,704	305,661	100.0%	22,265	7.3%	0	0.0%	11,135	3.6%
Pleasant Hills Borough	8,268	8,271	100.0%	6,534	79.0%	0	0.0%	5	0.1%
Plum Borough	27,126	23,805	87.8%	26,346	97.1%	1,749	6.4%	13,120	48.4%

Table 4.3.14-2 Populations Vulnerable to Environmental Hazards.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 1.5 MI OF A SARA FACILITY	PERCENT POPULATION WITHIN 1.5 MI OF A SARA FACILITY	ESTIMATED POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	ESTIMATED POPULATION WITHIN 1000 YDS. OF AN UNCON-VENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YARDS OF AN UNCON-VENTIONAL WELL	ESTIMATED POPULATION WITHIN 1.5 MILES OF AN ACTIVE COAL MINE	PERCENT POPULATI ON WITHIN 1.5 MILES OF AN ACTIVE COAL MINE
Port Vue Borough	3,798	3,798	100.0%	3,797	100.0%	0	0.0%	206	5.4%
Rankin Borough	2,122	2,122	100.0%	1,339	63.1%	0	0.0%	0	0.0%
Reserve Township	3,333	3,282	98.5%	0	0.0%	0	0.0%	0	0.0%
Richland Township	11,100	9,686	87.3%	5,958	53.7%	0	0.0%	0	0.0%
Robinson Township	13,354	13,110	98.2%	9,885	74.0%	0	0.0%	11,501	86.1%
Ross Township	31,105	31,105	100.0%	10,131	32.6%	0	0.0%	0	0.0%
Rosslyn Farms Borough	427	427	100.0%	0	0.0%	0	0.0%	427	100.0%
Scott Township	17,024	16,414	96.4%	11,252	66.1%	0	0.0%	8,582	50.4%
Sewickley Borough	3,827	3,827	100.0%	890	23.3%	0	0.0%	0	0.0%
Sewickley Heights	810	667	82.3%	241	29.8%	0	0.0%	0	0.0%
Sewickley Hills Borough	639	278	43.5%	452	70.7%	0	0.0%	0	0.0%
Shaler Township	28,757	28,698	99.8%	16,777	58.3%	0	0.0%	0	0.0%
Sharpsburg Borough	3,446	3,446	100.0%	0	0.0%	0	0.0%	0	0.0%
South Fayette Township	14,416	11,882	82.4%	11,246	78.0%	2	0.0%	2,776	19.3%
South Park Township	13,416	7,221	53.8%	8,271	61.7%	47	0.4%	7,220	53.8%
South Versailles Township	351	351	100.0%	270	76.9%	0	0.0%	67	19.1%
Springdale Borough	3,405	3,405	100.0%	3,104	91.2%	0	0.0%	0	0.0%
Springdale Township	1,636	1,636	100.0%	1,636	100.0%	0	0.0%	0	0.0%
Stowe Township	6,362	6,362	100.0%	1,322	20.8%	0	0.0%	0	0.0%
Swissvale Borough	8,983	8,925	99.4%	8,901	99.1%	0	0.0%	0	0.0%
Tarentum Borough	4,530	4,530	100.0%	2,789	61.6%	0	0.0%	4,530	100.0%
Thornburg Borough	455	455	100.0%	455	100.0%	0	0.0%	455	100.0%
Trafford Borough	61	61	100.0%	61	100.0%	0	0.0%	0	0.0%

Table 4.3.14-2 Populations Vulnerable to Environmental Hazards.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 1.5 MI OF A SARA FACILITY	PERCENT POPULATION WITHIN 1.5 MI OF A SARA FACILITY	ESTIMATED POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YDS. OF A CONVENTIONAL WELL	ESTIMATED POPULATION WITHIN 1000 YDS. OF AN UNCON-VENTIONAL WELL	PERCENT POPULATION WITHIN 1000 YARDS OF AN UNCON-VENTIONAL WELL	ESTIMATED POPULATION WITHIN 1.5 MILES OF AN ACTIVE COAL MINE	PERCENT POPULATI ON WITHIN 1.5 MILES OF AN ACTIVE COAL MINE
Turtle Creek Borough	5,349	5,349	100.0%	4,595	85.9%	0	0.0%	0	0.0%
Upper St. Clair Township	19,229	19,015	98.9%	11,316	58.8%	0	0.0%	2	0.0%
Verona Borough	2,474	2,474	100.0%	2,474	100.0%	0	0.0%	0	0.0%
Versailles Borough	1,515	776	51.2%	1,515	100.0%	0	0.0%	165	10.9%
Wall Borough	580	542	93.4%	542	93.4%	0	0.0%	0	0.0%
West Deer Township	11,771	9,520	80.9%	6,963	59.2%	0	0.0%	6,718	57.1%
West Elizabeth Borough	518	518	100.0%	518	100.0%	0	0.0%	0	0.0%
West Homestead Borough	1,929	1,837	95.2%	226	11.7%	0	0.0%	684	35.5%
West Mifflin Borough	20,313	20,313	100.0%	8,900	43.8%	0	0.0%	511	2.5%
West View Borough	6,771	6,771	100.0%	6,500	96.0%	0	0.0%	0	0.0%
Whitaker Borough	1,271	1,271	100.0%	0	0.0%	0	0.0%	0	0.0%
White Oak Borough	7,862	4,164	53.0%	6,673	84.9%	0	0.0%	0	0.0%
Whitehall Borough	13,944	13,751	98.6%	9,211	66.1%	0	0.0%	0	0.0%
Wilkins Township	6,357	6,230	98.0%	2,686	42.3%	0	0.0%	0	0.0%
Wilkinsburg Borough	15,930	15,759	98.9%	683	4.3%	0	0.0%	0	0.0%
Wilmerding Borough	2,190	2,046	93.4%	2,046	93.4%	0	0.0%	0	0.0%
GRAND TOTAL	**1,223,348**	**1,142,668**	**93.4%**	**595,797**	**48.7%**	**5,249**	**0.4%**	**168,648**	**13.8%**

4.3.15 Levee Failure

4.3.15.1 Location and Extent

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

In the event of a levee failure, flood waters will ultimately inundate the protected area landward of the levee. The extent of inundation is dependent on the flooding intensity. Failure of a levee during a 1% annual chance flood will inundate the approximate 100-year flood plain previously protected by the levee. Residential and commercial buildings located nearest the levee overtopping or breach location will suffer the most damage from the initial embankment failure flood wave. Landward buildings will be damaged by inundation.

Municipalities that have either a levee system or a floodwall within their jurisdiction are Etna Borough, City of Clairton, City of Duquesne and Shaler Township. Figures 4.3.15-1 through 4.3.15-3 show the locations of these levee and floodwall systems. More specific information about these levee systems can be found in Table 4.3.15-1.

Table 4.3.15-1 Levee and Floodwall Information for Allegheny County.

LEVEE SEGMENT NAME	PRIMARY MUNICIPALITY	OPERATOR	STATUS
Monongahela River Floodwall (Clairton)	City of Clairton	U.S. Steel Corporation	Does not provide 1%-annual-chance protection.
Monongahela River Floodwall System (Duquesne)	City of Duquesne	U.S. Steel Corporation	Does not provide 1%-annual-chance protection.
Little Pine Creek West Floodwall (Midstream)	Borough of Etna	Borough of Etna	Does not provide 1%-annual-chance protection.
Little Pine Creek West Floodwall (Downstream)	Borough of Etna	Borough of Etna	Does not provide 1%-annual-chance protection.
Pine Creek Levee (Left Bank)	Borough of Etna	Borough of Etna	Does not provide 1%-annual-chance protection.
Pine Creek Levee (Right Bank)	Borough of Etna	Borough of Etna	Does not provide 1%-annual-chance protection.
Pine Creek Levee (Downstream)	Township of Shaler	Township of Shaler	Does not provide 1%-annual-chance protection.
Pine Creek Levee System (Upstream)	Township of Shaler	Township of Shaler	Does not provide 1%-annual-chance protection.
Little Pine Creek West Floodwall (Upstream)	Borough of Etna	Borough of Etna	Small protected area shown on FIRM map.

Figure 4.3.15-1 The Etna-Little Pine Creek Levees and Floodwalls (FEMA, 2013).

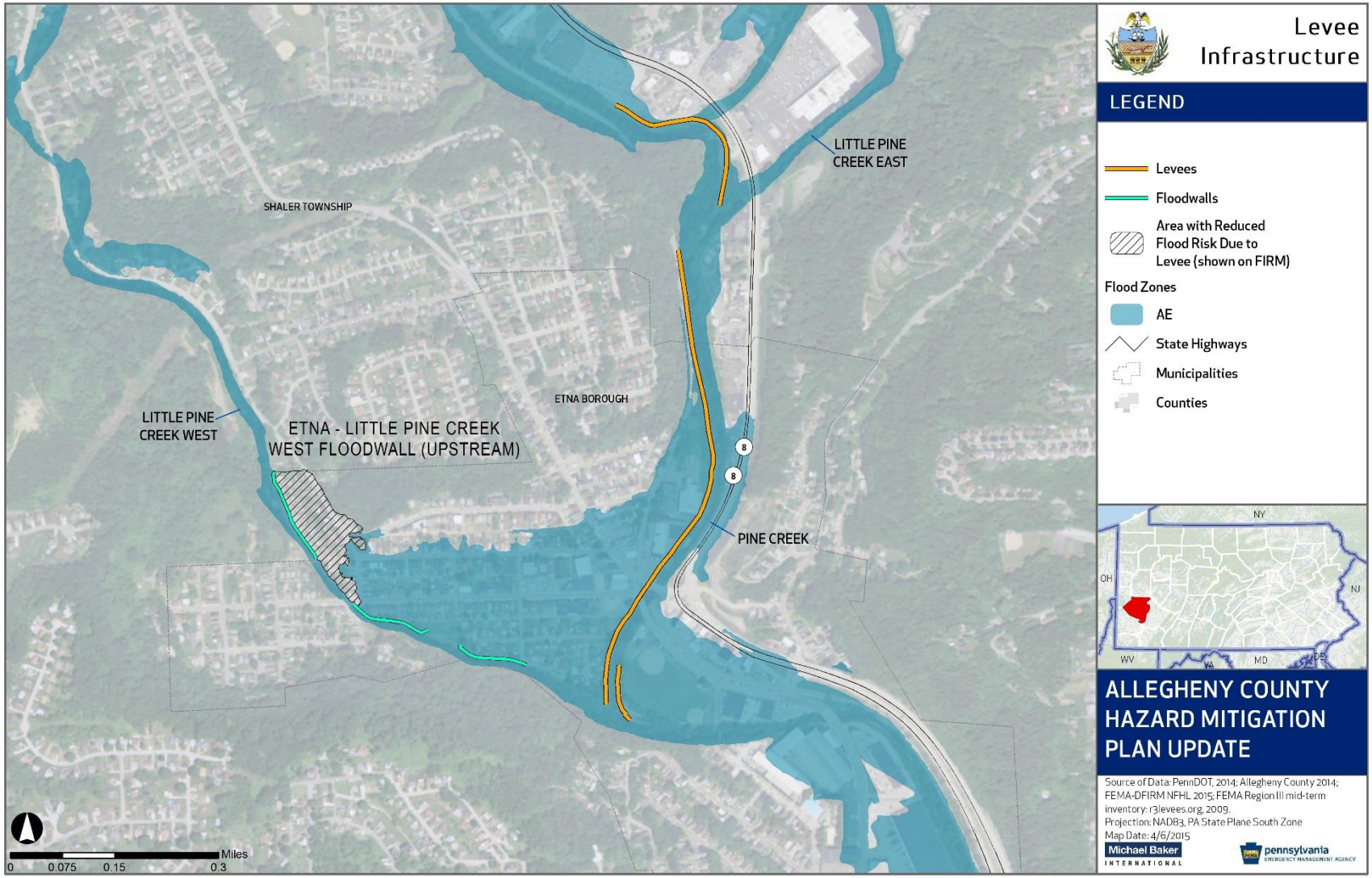


Figure 4.3.15-2 Monongahela River Floodwall System-Clairton.

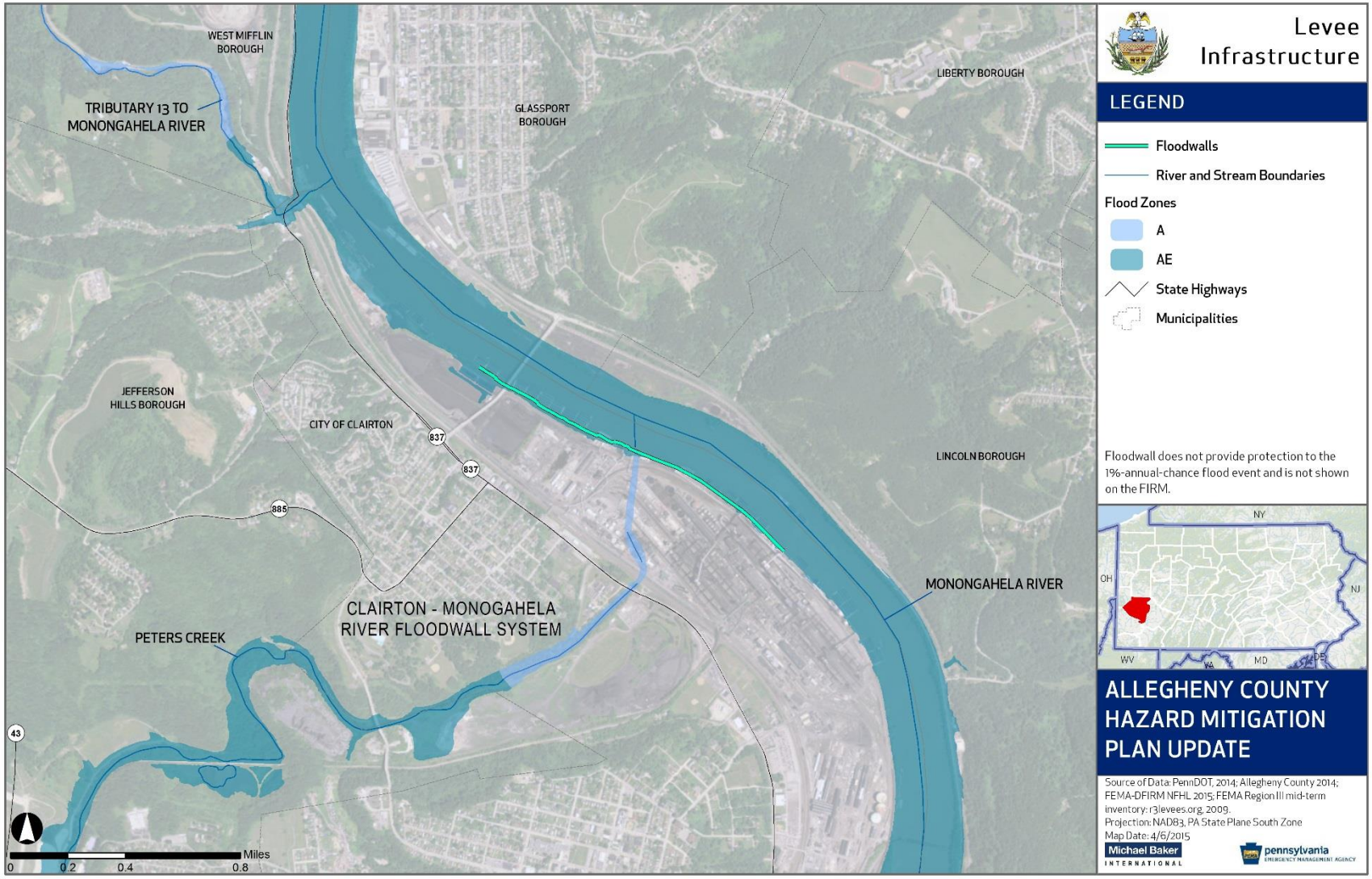
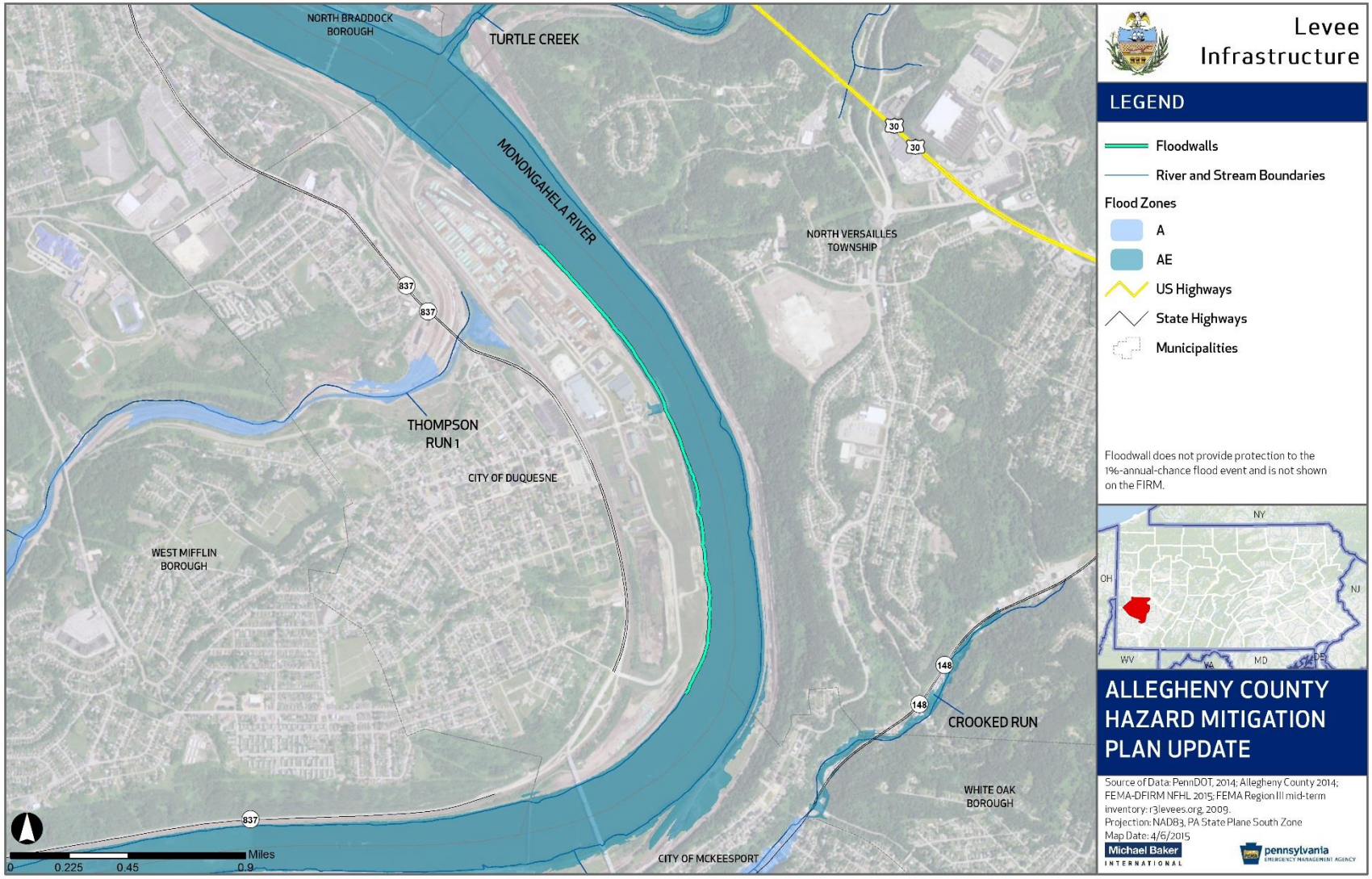


Figure 4.3.15-3 Monongahela River Floodwall System-Duquesne.



4.3.15.2 Range of Magnitude

A levee failure or breach causes flooding in landward areas adjacent to the structure. The failure of a levee or other flood protection structure could be devastating depending on the level of flooding for which the structure is designed and the amount of landward development present. In some instances, the magnitude of flooding could be more severe under a levee failure event compared to a normal flooding event. If an abrupt failure occurs, the rushing waters of a flood wave could result in catastrophic losses. Properties located in the area of reduced-risk landward of a levee system are not subject to the mandatory flood insurance purchase requirement of the National Flood Insurance Program. Thus, regardless of whether a levee is accredited, there is concern that property in these areas lack flood insurance. In the event of a failure, it is likely that inundated properties will not be insured.

The environmental impacts of a levee failure result in significant water quality and debris disposal issues. Flood waters will back up sanitary sewer systems and inundate waste water treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooding waterway. The contents of unsecured containers of oil, fertilizers, pesticides and other chemicals get added to flood waters. Water supplies and waste water treatment could be off-line for weeks. After the flood waters subside, contaminated and flood damaged building materials and contents must be properly disposed. Contaminated sediment must be removed from buildings, yards and properties.

The worst-case levee failure is one which occurs abruptly with little warning and results in deep, fast-moving flood waters through a highly-developed or highly-populated area. Based on currently available information, it is not known which levee in the Commonwealth best represents a potential worst-case failure scenario. However, given the worst case scenario, any levee may ultimately be overtopped and fail.

4.3.15.3 Past Occurrence

There are no known significant historic levee failures in Allegheny County.

4.3.15.4 Future Occurrence

Similarly to dam failures, given certain circumstances, a levee failure can occur at any time. However, the probability of future occurrence can be reduced through proper design, construction, and maintenance measures. The age of the levee can increase the potential for failures if not maintained. Most levees are designed to operate safely at specified levels of flooding. While FEMA focuses on mapping levees that will reduce the risk of a 1% annual chance flood, other levees may be designed to protect against smaller or larger floods. Design specifications provide information on the percent-annual-chance flood a structure is expected to withstand, provided that it has been adequately constructed and maintained. Overall, the probability of future levee failures can be considered unlikely according to the Risk Factor Methodology (see Table 4.4-1).

4.3.15.5 Vulnerability Assessment

With the exception of the Little Pine Creek West Floodwall, no levees in Allegheny County provide protection to the 1%-annual-chance event. At the same time, though, even a non-accredited levee may provide some measure of protection during a lesser storm. To account for this fact, the HMP identifies the structures and critical facilities that are either within the X Protected by Levee Zone (in Etna Borough)

or within 2,000 feet of the identified levee and floodwall system in Tables 4.3.15-2 and 4.3.15-3. This should be considered a broad estimate of structures potentially vulnerable to levee failures.

Table 4.3.15-2 Structure and Critical Facilities Vulnerable to Levee Failures.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES VULNERABLE TO LEVEE FAILURE	PERCENT STRUCTURES VULNERABLE TO LEVEE FAILURE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO LEVEE FAILURE	PERCENT CRITICAL FACILITIES VULNERABLE TO LEVEE FAILURE
Aleppo Township	622	0	0.0%	6	0	0.0%
Aspinwall Borough	1,205	0	0.0%	7	0	0.0%
Avalon Borough	1,611	0	0.0%	6	0	0.0%
Baldwin Borough	7,939	0	0.0%	24	0	0.0%
Baldwin Township	947	0	0.0%	2	0	0.0%
Bell Acres Borough	610	0	0.0%	6	0	0.0%
Bellevue Borough	2,785	0	0.0%	11	0	0.0%
Ben Avon Borough	744	0	0.0%	3	0	0.0%
Ben Avon Heights Borough	143	0	0.0%	1	0	0.0%
Bethel Park, Municipality of	12,562	0	0.0%	33	0	0.0%
Blawnox Borough	669	0	0.0%	7	0	0.0%
Brackenridge Borough	1,483	0	0.0%	10	0	0.0%
Braddock Borough	1,799	0	0.0%	13	0	0.0%
Braddock Hills Borough	864	0	0.0%	2	0	0.0%
Bradford Woods Borough	500	0	0.0%	3	0	0.0%
Brentwood Borough	4,239	0	0.0%	14	0	0.0%
Bridgeville Borough	2,160	0	0.0%	8	0	0.0%
Carnegie Borough	3,499	0	0.0%	17	0	0.0%
Castle Shannon Borough	3,153	0	0.0%	9	0	0.0%
Chalfant Borough	422	0	0.0%	2	0	0.0%
Cheswick Borough	880	0	0.0%	7	0	0.0%
Churchill Borough	1,499	0	0.0%	9	0	0.0%
Clairton City	4,331	360	8.3%	14	2	14.3%
Collier Township	4,149	0	0.0%	21	0	0.0%
Coraopolis Borough	2,601	0	0.0%	13	0	0.0%
Crafton Borough	2,338	0	0.0%	9	0	0.0%
Crescent Township	1,135	0	0.0%	4	0	0.0%
Dormont Borough	3,458	0	0.0%	8	0	0.0%
Dravosburg Borough	798	0	0.0%	4	0	0.0%
Duquesne, City of	3,308	432	13.1%	15	6	40.0%
East Deer Township	784	0	0.0%	12	0	0.0%
East McKeesport Borough	1,047	0	0.0%	5	0	0.0%
East Pittsburgh Borough	803	0	0.0%	5	0	0.0%

Table 4.3.15-2 Structure and Critical Facilities Vulnerable to Levee Failures.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES VULNERABLE TO LEVEE FAILURE	PERCENT STRUCTURES VULNERABLE TO LEVEE FAILURE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO LEVEE FAILURE	PERCENT CRITICAL FACILITIES VULNERABLE TO LEVEE FAILURE
Edgewood Borough	1,334	0	0.0%	6	0	0.0%
Edgeworth Borough	667	0	0.0%	5	0	0.0%
Elizabeth Borough	677	0	0.0%	8	0	0.0%
Elizabeth Township	5,864	0	0.0%	26	0	0.0%
Emsworth Borough	918	0	0.0%	3	0	0.0%
Etna Borough	1,611	1101	68.3%	7	5	71.4%
Fawn Township	1,096	0	0.0%	9	0	0.0%
Findlay Township	2,789	0	0.0%	20	0	0.0%
Forest Hills Borough	3,154	0	0.0%	13	0	0.0%
Forward Township	1,667	0	0.0%	17	0	0.0%
Fox Chapel Borough	1,951	0	0.0%	11	0	0.0%
Franklin Park Borough	5,267	0	0.0%	10	0	0.0%
Frazer Township	675	0	0.0%	12	0	0.0%
Glassport Borough	2,115	98	4.6%	11	0	0.0%
Glen Osborne Borough	231	0	0.0%	2	0	0.0%
Glenfield Borough	112	0	0.0%	0	0	0.0%
Green Tree Borough	2,109	0	0.0%	7	0	0.0%
Hampton Township	7,202	0	0.0%	35	0	0.0%
Harmar Township	1,818	0	0.0%	24	0	0.0%
Harrison Township	5,099	0	0.0%	22	0	0.0%
Haysville Borough	49	0	0.0%	1	0	0.0%
Heidelberg Borough	639	0	0.0%	4	0	0.0%
Homestead Borough	1,582	0	0.0%	7	0	0.0%
Indiana Township	3,348	0	0.0%	28	0	0.0%
Ingram Borough	1,301	0	0.0%	7	0	0.0%
Jefferson Hills Borough	5,121	0	0.0%	24	0	0.0%
Kennedy Township	3,585	0	0.0%	14	0	0.0%
Kilbuck Township	370	0	0.0%	3	0	0.0%
Leet Township	637	0	0.0%	4	0	0.0%
Leetsdale Borough	611	0	0.0%	12	0	0.0%
Liberty Borough	1,153	0	0.0%	8	0	0.0%
Lincoln Borough	573	4	0.7%	4	0	0.0%
Marshall Township	3,479	0	0.0%	13	0	0.0%
McCandless, Town of	10,876	0	0.0%	40	0	0.0%
McDonald Borough	184	0	0.0%	2	0	0.0%
McKees Rocks Borough	2,838	0	0.0%	9	0	0.0%

Table 4.3.15-2 Structure and Critical Facilities Vulnerable to Levee Failures.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES VULNERABLE TO LEVEE FAILURE	PERCENT STRUCTURES VULNERABLE TO LEVEE FAILURE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO LEVEE FAILURE	PERCENT CRITICAL FACILITIES VULNERABLE TO LEVEE FAILURE
McKeesport, City of	10,265	59	0.6%	43	0	0.0%
Millvale Borough	1,736	0	0.0%	5	0	0.0%
Monroeville, Municipality of	11,215	0	0.0%	66	0	0.0%
Moon Township	10,065	0	0.0%	31	0	0.0%
Mount Lebanon, Municipality of	11,586	0	0.0%	38	0	0.0%
Mount Oliver Borough	1,506	0	0.0%	4	0	0.0%
Munhall Borough	5,167	0	0.0%	17	0	0.0%
Neville Township	599	0	0.0%	22	0	0.0%
North Braddock Borough	2,920	0	0.0%	14	0	0.0%
North Fayette Township	6,948	0	0.0%	29	0	0.0%
North Versailles Township	4,687	143	3.1%	14	0	0.0%
Oakdale Borough	3,954	0	0.0%	25	0	0.0%
Oakmont Borough	673	0	0.0%	3	0	0.0%
O'Hara Township	2,848	0	0.0%	17	0	0.0%
Ohio Township	2,424	0	0.0%	15	0	0.0%
Penn Hills, Municipality of	19,504	0	0.0%	52	0	0.0%
Pennsbury Village Borough	503	0	0.0%	3	0	0.0%
Pine Township	4,688	0	0.0%	14	0	0.0%
Pitcairn Borough	1,389	0	0.0%	6	0	0.0%
Pittsburgh, City of	130,310	0	0.0%	505	0	0.0%
Pleasant Hills Borough	3,239	0	0.0%	10	0	0.0%
Plum Borough	10,864	0	0.0%	42	0	0.0%
Port Vue Borough	1,824	0	0.0%	5	0	0.0%
Rankin Borough	784	0	0.0%	3	0	0.0%
Reserve Township	1,554	0	0.0%	8	0	0.0%
Richland Township	4,553	0	0.0%	17	0	0.0%
Robinson Township	6,093	0	0.0%	29	0	0.0%
Ross Township	13,249	0	0.0%	35	0	0.0%
Rosslyn Farms Borough	212	0	0.0%	3	0	0.0%
Scott Township	6,160	0	0.0%	21	0	0.0%
Sewickley Borough	1,551	0	0.0%	12	0	0.0%
Sewickley Heights	425	0	0.0%	3	0	0.0%
Sewickley Hills Borough	265	0	0.0%	3	0	0.0%
Shaler Township	12,428	1091	8.8%	24	0	0.0%
Sharpsburg Borough	1,570	0	0.0%	7	0	0.0%

Table 4.3.15-2 Structure and Critical Facilities Vulnerable to Levee Failures.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES VULNERABLE TO LEVEE FAILURE	PERCENT STRUCTURES VULNERABLE TO LEVEE FAILURE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO LEVEE FAILURE	PERCENT CRITICAL FACILITIES VULNERABLE TO LEVEE FAILURE
South Fayette Township	6,421	0	0.0%	23	0	0.0%
South Park Township	5,127	0	0.0%	17	0	0.0%
South Versailles Township	163	0	0.0%	3	0	0.0%
Springdale Borough	1,573	0	0.0%	14	0	0.0%
Springdale Township	860	0	0.0%	4	0	0.0%
Stowe Township	3,161	0	0.0%	13	0	0.0%
Swissvale Borough	4,109	0	0.0%	12	0	0.0%
Tarentum Borough	2,109	0	0.0%	19	0	0.0%
Thornburg Borough	190	0	0.0%	3	0	0.0%
Trafford Borough	51	0	0.0%	2	0	0.0%
Turtle Creek Borough	2,165	0	0.0%	13	0	0.0%
Upper St. Clair Township	7,419	0	0.0%	19	0	0.0%
Verona Borough	1,264	0	0.0%	7	0	0.0%
Versailles Borough	669	0	0.0%	5	0	0.0%
Wall Borough	370	0	0.0%	2	0	0.0%
West Deer Township	5,424	0	0.0%	22	0	0.0%
West Elizabeth Borough	291	0	0.0%	5	0	0.0%
West Homestead Borough	1,112	0	0.0%	5	0	0.0%
West Mifflin Borough	8,856	0	0.0%	54	0	0.0%
West View Borough	2,669	0	0.0%	13	0	0.0%
Whitaker Borough	618	0	0.0%	1	0	0.0%
White Oak Borough	3,739	0	0.0%	11	0	0.0%
Whitehall Borough	5,426	0	0.0%	16	0	0.0%
Wilkins Township	2,761	0	0.0%	13	0	0.0%
Wilkinsburg Borough	7,156	0	0.0%	25	0	0.0%
Wilmerding Borough	848	0	0.0%	4	0	0.0%
GRAND TOTAL	**530,098**	**3,288**	**0.6%**	**2,208**	**13**	**0.6%**

Table 4.3.15-3 Structures Vulnerable to Levee Failure by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Aleppo Township	622	0	0	0	0	0	0	0	0	0
Aspinwall Borough	1,205	0	0	0	0	0	0	0	0	0
Avalon Borough	1,611	0	0	0	0	0	0	0	0	0
Baldwin Borough	7,939	0	0	0	0	0	0	0	0	0
Baldwin Township	947	0	0	0	0	0	0	0	0	0
Bell Acres Borough	610	0	0	0	0	0	0	0	0	0
Bellevue Borough	2,785	0	0	0	0	0	0	0	0	0
Ben Avon Borough	744	0	0	0	0	0	0	0	0	0
Ben Avon Heights Borough	143	0	0	0	0	0	0	0	0	0
Bethel Park, Municipality of	12,562	0	0	0	0	0	0	0	0	0
Blawnox Borough	669	0	0	0	0	0	0	0	0	0
Brackenridge Borough	1,483	0	0	0	0	0	0	0	0	0
Braddock Borough	1,799	0	0	0	0	0	0	0	0	0
Braddock Hills Borough	864	0	0	0	0	0	0	0	0	0
Bradford Woods Borough	500	0	0	0	0	0	0	0	0	0
Brentwood Borough	4,239	0	0	0	0	0	0	0	0	0
Bridgeville Borough	2,160	0	0	0	0	0	0	0	0	0
Carnegie Borough	3,499	0	0	0	0	0	0	0	0	0
Castle Shannon Borough	3,153	0	0	0	0	0	0	0	0	0
Chalfant Borough	422	0	0	0	0	0	0	0	0	0
Cheswick Borough	880	0	0	0	0	0	0	0	0	0
Churchill Borough	1,499	0	0	0	0	0	0	0	0	0
Clairton City	4,331	0	37	1	3	16	303	0	0	360
Collier Township	4,149	0	0	0	0	0	0	0	0	0
Coraopolis Borough	2,601	0	0	0	0	0	0	0	0	0
Crafton Borough	2,338	0	0	0	0	0	0	0	0	0
Crescent Township	1,135	0	0	0	0	0	0	0	0	0
Dormont Borough	3,458	0	0	0	0	0	0	0	0	0
Dravosburg Borough	798	0	0	0	0	0	0	0	0	0
Duquesne, City of	3,308	0	39	11	3	5	374	0	0	432
East Deer Township	784	0	0	0	0	0	0	0	0	0

Table 4.3.15-3 Structures Vulnerable to Levee Failure by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
East McKeesport Borough	1,047	0	0	0	0	0	0	0	0	0
East Pittsburgh Borough	803	0	0	0	0	0	0	0	0	0
Edgewood Borough	1,334	0	0	0	0	0	0	0	0	0
Edgeworth Borough	667	0	0	0	0	0	0	0	0	0
Elizabeth Borough	677	0	0	0	0	0	0	0	0	0
Elizabeth Township	5,864	0	0	0	0	0	0	0	0	0
Emsworth Borough	918	0	0	0	0	0	0	0	0	0
Etna Borough	1,611	0	46	6	8	16	1,019	6	0	1,101
Fawn Township	1,096	0	0	0	0	0	0	0	0	0
Findlay Township	2,789	0	0	0	0	0	0	0	0	0
Forest Hills Borough	3,154	0	0	0	0	0	0	0	0	0
Forward Township	1,667	0	0	0	0	0	0	0	0	0
Fox Chapel Borough	1,951	0	0	0	0	0	0	0	0	0
Franklin Park Borough	5,267	0	0	0	0	0	0	0	0	0
Frazer Township	675	0	0	0	0	0	0	0	0	0
Glassport Borough	2,115	0	0	0	0	0	98	0	0	98
Glen Osborne Borough	231	0	0	0	0	0	0	0	0	0
Glenfield Borough	112	0	0	0	0	0	0	0	0	0
Green Tree Borough	2,109	0	0	0	0	0	0	0	0	0
Hampton Township	7,202	0	0	0	0	0	0	0	0	0
Harmar Township	1,818	0	0	0	0	0	0	0	0	0
Harrison Township	5,099	0	0	0	0	0	0	0	0	0
Haysville Borough	49	0	0	0	0	0	0	0	0	0
Heidelberg Borough	639	0	0	0	0	0	0	0	0	0
Homestead Borough	1,582	0	0	0	0	0	0	0	0	0
Indiana Township	3,348	0	0	0	0	0	0	0	0	0
Ingram Borough	1,301	0	0	0	0	0	0	0	0	0
Jefferson Hills Borough	5,121	0	0	0	0	0	0	0	0	0
Kennedy Township	3,585	0	0	0	0	0	0	0	0	0
Kilbuck Township	370	0	0	0	0	0	0	0	0	0
Leet Township	637	0	0	0	0	0	0	0	0	0
Leetsdale Borough	611	0	0	0	0	0	0	0	0	0

Table 4.3.15-3 Structures Vulnerable to Levee Failure by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Liberty Borough	1,153	0	0	0	0	0	0	0	0	0
Lincoln Borough	573	0	0	0	0	1	3	0	0	4
Marshall Township	3,479	0	0	0	0	0	0	0	0	0
McCandless, Town of	10,876	0	0	0	0	0	0	0	0	0
McDonald Borough	184	0	0	0	0	0	0	0	0	0
McKees Rocks Borough	2,838	0	0	0	0	0	0	0	0	0
McKeesport, City of	10,265	0	1	0	1	1	56	0	0	59
Millvale Borough	1,736	0	0	0	0	0	0	0	0	0
Monroeville, Municipality of	11,215	0	0	0	0	0	0	0	0	0
Moon Township	10,065	0	0	0	0	0	0	0	0	0
Mount Lebanon, Municipality of	11,586	0	0	0	0	0	0	0	0	0
Mount Oliver Borough	1,506	0	0	0	0	0	0	0	0	0
Munhall Borough	5,167	0	0	0	0	0	0	0	0	0
Neville Township	599	0	0	0	0	0	0	0	0	0
North Braddock Borough	2,920	0	0	0	0	0	0	0	0	0
North Fayette Township	6,948	0	0	0	0	0	0	0	0	0
North Versailles Township	4,687	0	4	0	3	1	135	0	0	143
Oakdale Borough	3,954	0	0	0	0	0	0	0	0	0
Oakmont Borough	673	0	0	0	0	0	0	0	0	0
O'Hara Township	2,848	0	0	0	0	0	0	0	0	0
Ohio Township	2,424	0	0	0	0	0	0	0	0	0
Penn Hills, Municipality of	19,504	0	0	0	0	0	0	0	0	0
Pennsbury Village Borough	503	0	0	0	0	0	0	0	0	0
Pine Township	4,688	0	0	0	0	0	0	0	0	0
Pitcairn Borough	1,389	0	0	0	0	0	0	0	0	0
Pittsburgh, City of	130,310	0	0	0	0	0	0	0	0	0
Pleasant Hills Borough	3,239	0	0	0	0	0	0	0	0	0
Plum Borough	10,864	0	0	0	0	0	0	0	0	0
Port Vue Borough	1,824	0	0	0	0	0	0	0	0	0
Rankin Borough	784	0	0	0	0	0	0	0	0	0

Table 4.3.15-3 Structures Vulnerable to Levee Failure by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
Reserve Township	1,554	0	0	0	0	0	0	0	0	0
Richland Township	4,553	0	0	0	0	0	0	0	0	0
Robinson Township	6,093	0	0	0	0	0	0	0	0	0
Ross Township	13,249	0	0	0	0	0	0	0	0	0
Rosslyn Farms Borough	212	0	0	0	0	0	0	0	0	0
Scott Township	6,160	0	0	0	0	0	0	0	0	0
Sewickley Borough	1,551	0	0	0	0	0	0	0	0	0
Sewickley Heights	425	0	0	0	0	0	0	0	0	0
Sewickley Hills Borough	265	0	0	0	0	0	0	0	0	0
Shaler Township	12,428	2	35	2	3	0	1,049	0	0	1,091
Sharpsburg Borough	1,570	0	0	0	0	0	0	0	0	0
South Fayette Township	6,421	0	0	0	0	0	0	0	0	0
South Park Township	5,127	0	0	0	0	0	0	0	0	0
South Versailles Township	163	0	0	0	0	0	0	0	0	0
Springdale Borough	1,573	0	0	0	0	0	0	0	0	0
Springdale Township	860	0	0	0	0	0	0	0	0	0
Stowe Township	3,161	0	0	0	0	0	0	0	0	0
Swissvale Borough	4,109	0	0	0	0	0	0	0	0	0
Tarentum Borough	2,109	0	0	0	0	0	0	0	0	0
Thornburg Borough	190	0	0	0	0	0	0	0	0	0
Trafford Borough	51	0	0	0	0	0	0	0	0	0
Turtle Creek Borough	2,165	0	0	0	0	0	0	0	0	0
Upper St. Clair Township	7,419	0	0	0	0	0	0	0	0	0
Verona Borough	1,264	0	0	0	0	0	0	0	0	0
Versailles Borough	669	0	0	0	0	0	0	0	0	0
Wall Borough	370	0	0	0	0	0	0	0	0	0
West Deer Township	5,424	0	0	0	0	0	0	0	0	0
West Elizabeth Borough	291	0	0	0	0	0	0	0	0	0
West Homestead Borough	1,112	0	0	0	0	0	0	0	0	0
West Mifflin Borough	8,856	0	0	0	0	0	0	0	0	0
West View Borough	2,669	0	0	0	0	0	0	0	0	0
Whitaker Borough	618	0	0	0	0	0	0	0	0	0

Table 4.3.15-3 Structures Vulnerable to Levee Failure by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	AGRICULTURAL	COMMERCIAL	GOVERNMENT	INDUSTRIAL	MIXED-USE	RESIDENTIAL	UNKNOWN	UTILITIES	GRAND TOTAL
White Oak Borough	3,739	0	0	0	0	0	0	0	0	0
Whitehall Borough	5,426	0	0	0	0	0	0	0	0	0
Wilkins Township	2,761	0	0	0	0	0	0	0	0	0
Wilkinsburg Borough	7,156	0	0	0	0	0	0	0	0	0
Wilmerding Borough	848	0	0	0	0	0	0	0	0	0
GRAND TOTAL	**530,098**	**2**	**162**	**20**	**21**	**40**	**3,037**	**6**	**0**	**3,288**

4.3.16 Nuclear Incidents

4.3.16.1 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.

Only a very small portion of Allegheny County is within the 10-Mile Emergency Planning Zone for Beaver Valley, located in Beaver County. However, the entire county is within the 50-mile EPZ of the plant. Pennsylvania's four other nuclear power plants are more than 50 miles away from Allegheny County; this distance exceeds the Plume-Exposure and Ingestion Exposure Pathway EPZs for nuclear emergencies, so these other facilities are considered a minimal threat to the County. Figure 4.3.16-1 illustrates the location of the nuclear facilities in the Commonwealth and their associated EPZs.

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

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

Plume Exposure Pathway refers to whole-body external exposure to gamma radiation from the plume and from deposited materials and inhalation exposure from the passing radioactive plume. The duration of primary exposures could range in length from hours to days. The Ingestion Exposure Pathway refers to

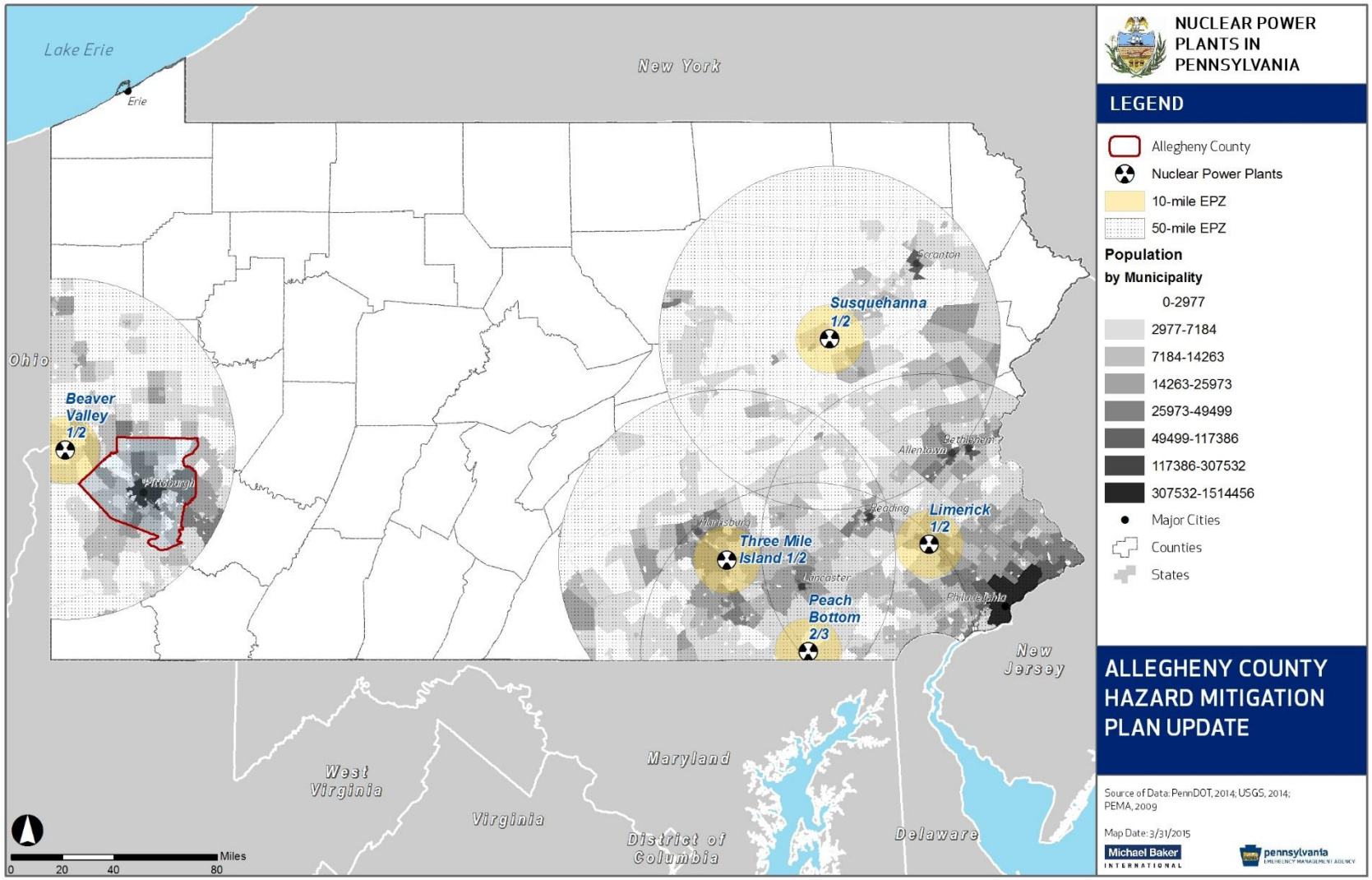
exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation.

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

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

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

Figure 4.3.16-1 Location of Allegheny County in Relation to Pennsylvania Nuclear Power Stations, their Emergency Planning Zones (EPZs), and the Population Density of Affected Municipalities (PEMA, 2009 and Census, 2014).



4.3.16.2 Range of Magnitude

Beaver Valley is the closest nuclear power plant, approximately 10 miles from Allegheny County; all other nuclear power plants in the state are over 150 miles away. The entire county lies within the 50-mile Ingestion Exposure Pathway EPZ designated for nuclear/radiological emergencies. The magnitude of a nuclear incident differs for those within the Plume Exposure Pathway EPZ and those within the Ingestion Exposure Pathway EPZ. The Plume Exposure Pathway refers to whole-body external exposure to gamma radiation from a radioactive plume and from deposited materials and inhalation exposure from the passing radioactive plume. The duration of primary exposures could range in length from hours to days. The Ingestion Exposure Pathway refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation.

Nuclear accidents themselves are classified into three categories:

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

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

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

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

The worst-case radiological release event would be a major release of radioactive material from the Beaver Valley Nuclear Generating Station. This event could generate a great deal of fear for residents of western Pennsylvania. In addition, as a neighboring county, Allegheny County would be impacted by large numbers of evacuees dramatically increasing the volume of traffic the county's transportation networks. Finally, there is the potential for radioactive contamination to reach Allegheny County, leading to the possibility of evacuations from portions of the county. Specific impacts depend on the extent of the spread of the contamination.

The nuclear industry has adopted pre-determined, site-specific Emergency Action Levels (EALs). The EALs provide the framework and guidance to observe, address, and classify the severity of site-specific events and conditions that are communicated to off-site emergency response organizations (Nuclear Regulatory Commission, 2008). There are additional EALs that specifically deal with issues of security, such as threats of airborne attack, hostile action within the facility, or facility attack. These EALs ensure that appropriate notifications for the security threat are made in a timely manner. Each facility is also equipped with a public alerting system, which includes a number of sirens to alert the public located in the Plume Ingestion Pathway EPZ. This alerting system is activated by the counties of each specific EPZ. Emergency notifications and instructions are communicated to the public via the Emergency Alert System as activated by the Commonwealth of Pennsylvania Emergency Operations Center. State officials also have the capability to send emergency messages as text messages to mobile devices.

4.3.16.3 Past Occurrence

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

Despite the severity of the damage, no injuries due to radiation exposure occurred. However, numerous studies were conducted to determine the measurable health effects related to radiation and/or stress. More than a dozen epidemiological and stress related studies conducted to date have found no discernible direct health effects to the population in the vicinity of the plant. However, one study conducted by the

PA Department of Health's Three Mile Island Health Research Program did find evidence of psychological stress (National Energy Institute, 2010).

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

There have been no significant nuclear incidents at Beaver Valley since the last plan update. In April 2015, there was an emergency shutdown because a pump malfunctioned in Unit 1, but there was no radioactivity released.

4.3.16.4 Future Occurrence

Pennsylvania is home to the only nuclear power plant *General Emergency* in the nation. Since the Three Mile Island incident, nuclear power has become significantly safer and is one of the most heavily regulated industries in the nation. Despite the knowledge gained since then, there is still the potential for a similar accident to occur again at one of the five nuclear generating facilities in the Commonwealth. The Nuclear Energy Agency of the Organization for Economic Co-Operation and Development notes that studies estimate the chance of protective barriers in a modern nuclear facility at less than one in 100,000 per year (Nuclear Energy Agency 2005). In addition, FirstEnergy, the owner of the facility, has begun rolling out additional safety-related recommendations stemming from the Fukushima nuclear incident, which should further reduce future nuclear incidents that are secondary to natural hazard events. Nuclear incident occurrences may also occur as a result of intentional actions; these acts are addressed under Section 4.3.16: Terrorism.

The probability of future nuclear incidents is *unlikely*, as defined by the Risk Factor probability criteria (see Table 4.4-1). However, if an event were to occur, Allegheny County would likely be adversely affected. It could see the arrival of displaced persons and all municipalities, including the City of Pittsburgh, could see immediate economic impacts as the entire county is within the 50-mile EPZ.

4.3.16.5 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. As previously stated, Allegheny County is located within the 50-mile ingestion zone for the Beaver Valley facility.

The County's primary vulnerability to nuclear incidents comes in the form of food, soil, and water contamination. Soil contamination would have an impact on the county's agriculture. Time of year also impacts the vulnerability and losses estimated for a nuclear incident; an incident that occurs during the prime growing and harvesting season will have a larger impact on the County, while off-season events would result in much lower losses. Water contamination is also a concern in nuclear incidents. The public water systems and many of the county's drinking water wells are all vulnerable to the effects of a nuclear incident. For a listing of these facilities, see Section 4.3.1.5.

4.3.17 Terrorism

4.3.17.1 Location and Extent

The term "terrorism" refers to intentional, criminal, malicious acts, but the functional definition of terrorism can be interpreted in many ways. Officially, terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 CFR §0.85).

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

Terrorism refers to the use of weapons of mass destruction (WMD), including, biological, chemical, radiological, and nuclear weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and agriterrorism; intentional hazardous materials releases; and cyber-terrorism.

Terrorism is a threat everywhere, but there are a number of important considerations in evaluating terrorism hazards, such as the existence of facilities, landmarks, or other buildings of international, national, or regional importance. High-risk targets for acts of terrorism include military and civilian government facilities, international airports, large cities, and high-profile landmarks. Terrorists might also target large public gatherings, water and food supplies, utilities, and corporate centers. Furthermore, terrorists are capable of spreading fear by sending explosives or chemical and biological agents through the mail (FEMA, April 2009). Additionally, terrorists use threats to create fear, to try to convince citizens of the powerlessness of their government, and/or to get publicity for their cause. Nonetheless, terrorism can take many forms and terrorists have a wide range of personal, political, or cultural agendas.

The probability of terrorism cannot be quantified with as great a level of accuracy as that of many natural hazards. Furthermore, these incidents generally occur at a specific location, such as a government building, rather than encompassing an area such as a floodplain. This type of attack could take place at any facility or public or private location in the County. Allegheny County has many high profile and public places that could be considered targets, including, but not limited to, business centers, especially in downtown Pittsburgh which has a high daytime workforce population; educational centers, including University of Pittsburgh; cultural centers, including Allegheny Center and the Cultural District in Pittsburgh; arenas and stadiums, including PNC Park, Heinz Field, and CONSOL Energy Center; and the hazardous material sites detailed in Section 4.3.14.

4.3.17.2 Range of Magnitude

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

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

Depending on the type of terrorist attack, there may be significant loss of life for humans and animals as well as economic losses. Additionally, the impact of the attack itself may be exacerbated by the fact that human services agencies like community support programs, health and medical services, public assistance programs, and social services can experience physical damage to facilities, supplies, and equipment and disruption of emergency communications. There may also be ancillary effects of terrorism such as urban fires or, in the case of a radiological device, radioactive fallout that can multiply the impact of a terrorist event.

A worst-case scenario of a terrorism event in Allegheny County would be if multiple “dirty bomb” devices – or explosive devices with radiological material – were set to explode in quick succession near the Allegheny and North Side transit stations and in the Allegheny Commons Park on a weekend afternoon in the fall when a pre-season Steelers game and a Pirates game are both being held and the tourist population at the museums are high. This type of event would cause casualties and fatalities across all demographics, and depending on the time of recovery, would cause severe economic losses. In addition to the physical injuries, there will be high emotional and behavioral impacts on the population who was near the attack, as well as the residents of Allegheny County who were not near the attack.

4.3.17.3 Past Occurrence

There has been a high consciousness of terrorist activity in the press with few catastrophic events. The most significant terrorist attack on US soil occurred on September 11, 2001; Flight 93, the fourth hijacked aircraft in the attack, crashed in Somerset County, Pennsylvania.

While there have not been any catastrophic terrorist attacks in Allegheny County, the most notable attack was an active shooter incident at a Monroeville Mall in February 2015. Additionally, there have been a number of reported bomb threats in different institutions in Allegheny County, especially at Pittsburgh University. Anecdotally, Allegheny County is also vigilant in checking all reported unattended packages and bags to ensure that they do not pose a threat to the nearby population.

4.3.17.4 Future Occurrence

An important consideration in estimating the likelihood of a terrorist incident is the existence of facilities, landmarks, or other buildings of national or regional importance. As previously noted, Allegheny County has many high profile and public places that could be considered terrorist targets, and the county hosts many special events annually, from sporting events, to concerts, to festivals. Additionally, the county has multiple hazardous material sites which could be targeted for attack that could impact the surrounding area. Based on historical events, Allegheny County can expect to experience multiple reports of suspicious activities and bomb threats each year, but these have not historically manifested in terrorism events.

Although previous events have not resulted in what are considered significant terrorist attacks, the severity of a future incident cannot be predicted with a sufficient level of certainty. Prediction of terrorist attacks is almost impossible because terrorism is a result of human factors. As long as fringe groups maintain radically different ideas than that of the government or general population, terrorism is a possibility. The likelihood of a terrorist attack is considered *unlikely,* as defined by the Risk Factor Methodology (see Table 4.4-1).

4.3.17.5 Vulnerability Assessment

Since the probability of terrorism occurring cannot be quantified in the same way as that of many natural hazards, it is not possible to assess vulnerability in terms of likelihood of occurrence. Instead, vulnerability is assessed in terms of specific assets. By identifying potentially at-risk terrorist targets in Allegheny County, planning efforts can be put in place to reduce the risk of attack. FEMA's Integrating Manmade Hazards into Mitigation Planning (2003) encourages site-specific assessments that should be based on the relative importance of a particular site to the surrounding community or population, threats that are known to exist, and vulnerabilities including:

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

- Tactical vulnerability:
  Site Perimeter
  - Site planning and Landscape Design – Is the facility designed with security in mind – both site-specific and with regard to adjacent land uses?

- Parking Security – Are vehicle access and parking managed in a way that separates vehicles and structures?

Building Envelope

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

Facility Interior

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

4.3.18 Transportation Accidents

4.3.18.1 Location and Extent

For the purposes of this plan, transportation accidents are defined as incidents involving highway, air, and rail travel. Figure 4.3.18-1 shows the major highways, rail lines, and airports located throughout Allegheny County.

Traffic accidents and rail accidents can occur anywhere along their respective corridors in Allegheny County. Aviation accidents typically occur within 5 miles of take-off or landing, but can occur countywide. Table 4.3.18-1 lists the different types of identified traffic and rail accidents.

Table 4.3.18-1 Identified Types of Traffic and Rail Accidents (PennDOT, 2012; Federal Railway Administration, 2010).

MODE	TYPE OF ACCIDENT	DESCRIPTION
Traffic	Non-collision	A harmful event that does not involve a collision, such as a fire, explosion, or overturn.
	Angle	A crash in which two vehicles on opposite roadways collide at an intersection, driveway, or ramp.
	Rear-end	A crash in which vehicles traveling in the same direction on the same road collide.
	Head-on	A crash in which vehicles traveling in opposite directions, on the same road collide.
	Sideswipe	A crash between two vehicles in which the sides of the vehicles engage.
	Hit fixed object	A collision in which a vehicle hits a stationary object on or adjacent to the roadway.

Table 4.3.18-1 Identified Types of Traffic and Rail Accidents (PennDOT, 2012; Federal Railway Administration, 2010).		
MODE	**TYPE OF ACCIDENT**	**DESCRIPTION**
	Hit pedestrian	A collision between a motor vehicle and any person not in or upon the vehicle.
Rail	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.
	Other	Accidents caused by other circumstances like obstructions on rails, fire, or explosion.

Figure 4.3.18-2 shows the traffic volume along major highways and roadways in Allegheny County. Major Interstate Routes are 79, 279, 579, 76, and 376. Other heavily traveled highways are U.S. Route 19, 22, and 30.

Figure 4.3.18-1 Allegheny County Traffic Transportation Systems.

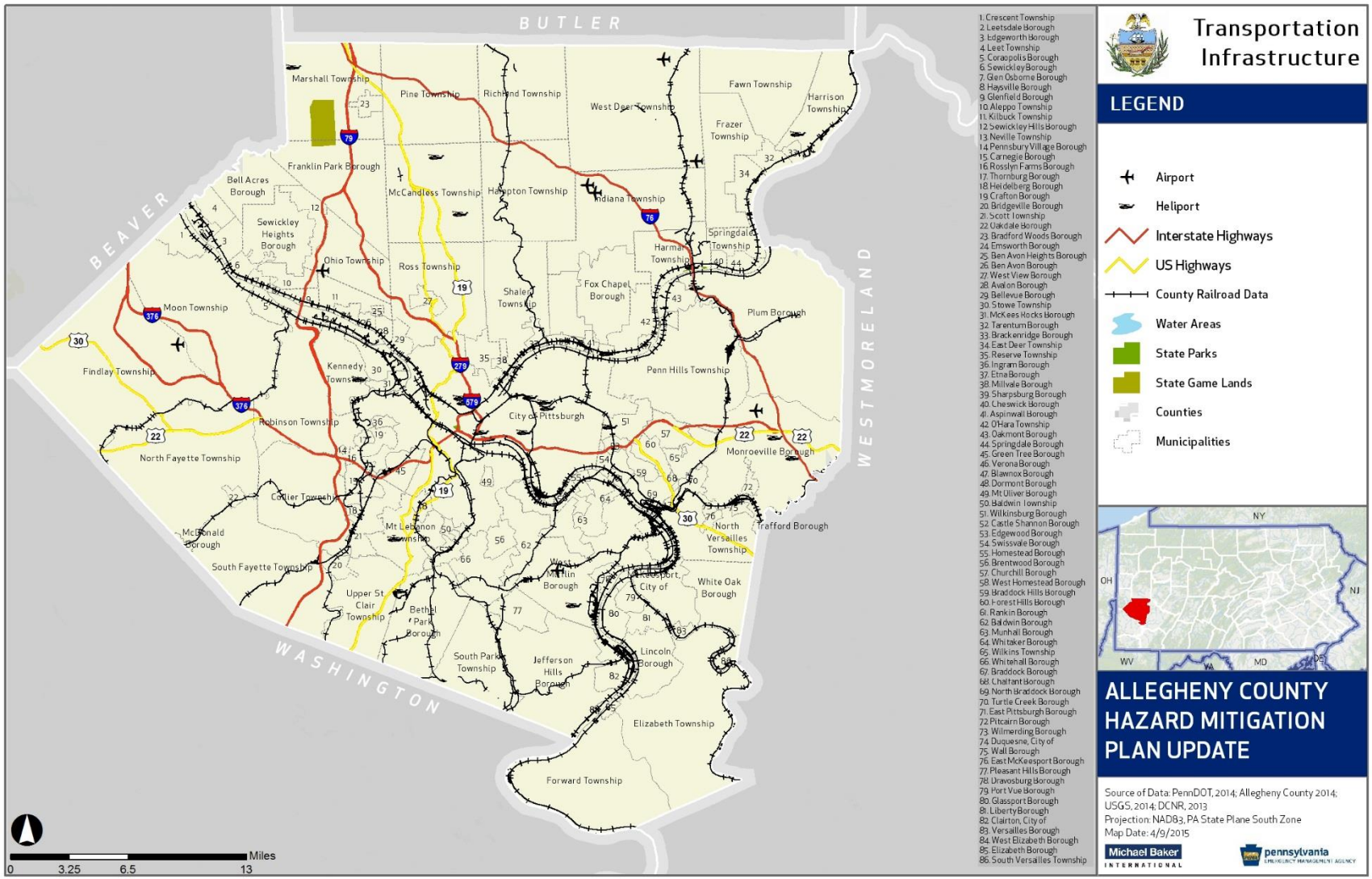
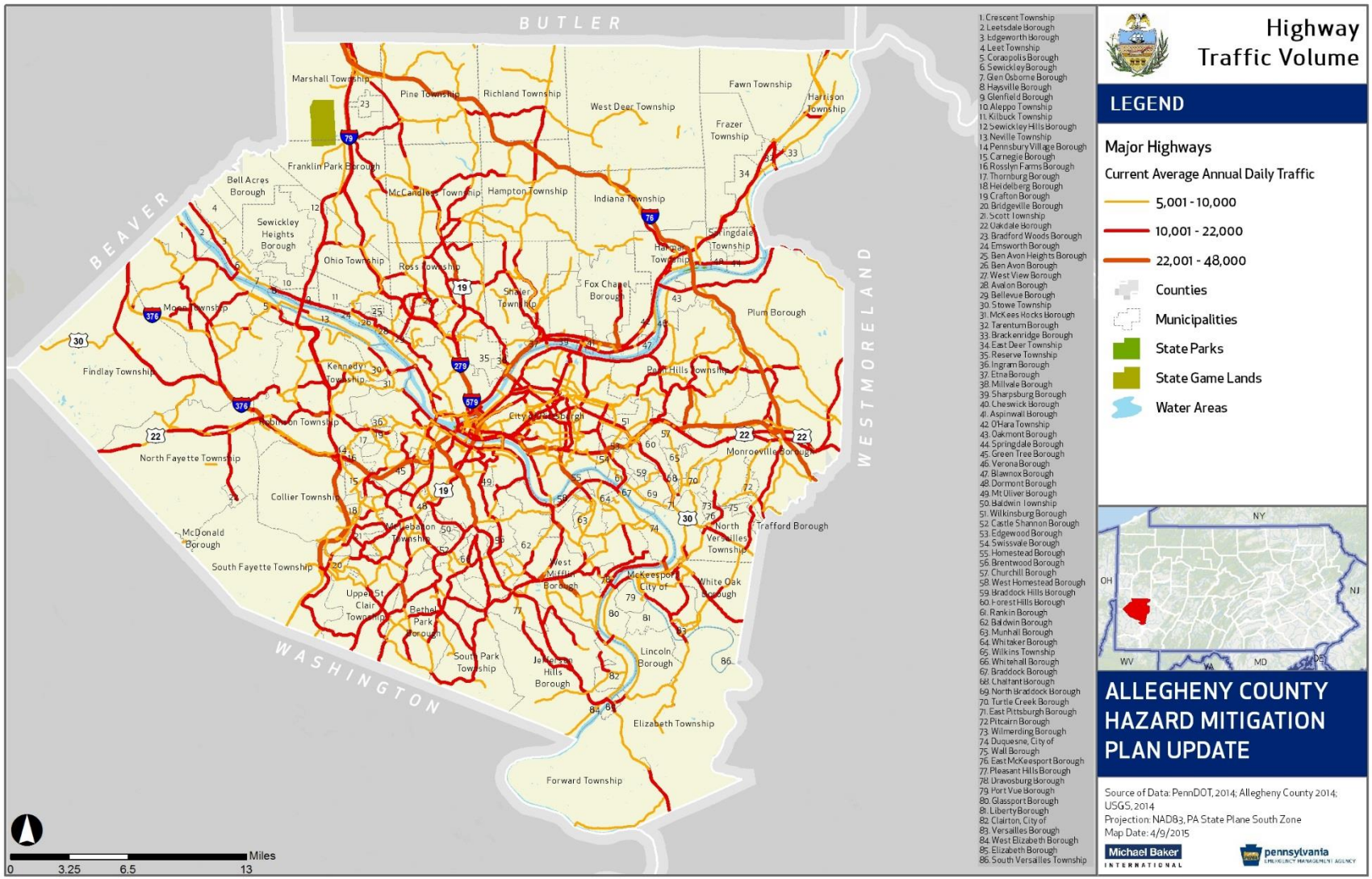


Figure 4.3.18-2 Allegheny County Traffic Volume on Key Roadways.



Transportation of hazardous materials on highways involves tanker trucks or trailers which are responsible for the greatest number of hazard material release incidents. There are over 120,000 miles of highway in the state and many of those are used to transport hazardous materials (Center for Rural Pennsylvania, 2008). These roads also cross rivers and streams at many points and have the potential to pollute watersheds that serve as domestic water supplies for parts of the state.

Potential also exists for hazardous material releases to occur along rail lines as collisions and derailments of train cars can result in large spills. A number of severe rail events have reportedly occurred in Pennsylvania. In addition, many of Allegheny County's rail lines lie in its valleys next to stream beds, compounding the impact of rail-related releases and increasing the possibility of water contamination during a release.

Pipelines can also transport hazardous liquids and flammable substances such as natural gas. Incidents can occur when pipes corrode, when they are damaged during excavation, incorrectly operated, or damaged by other forces. There are approximately 131 miles of liquid pipeline and 365 miles of gas pipeline in Allegheny County (PA HMP 2013). In addition, hazardous materials can be transported by aircraft or by watercraft. Crashes, spills of materials, and fires on these vessels can pose a hazard.

4.3.18.2 Range of Magnitude

Significant passenger vehicle, air, and rail transportation accidents can result in a wide range of outcomes from damage solely to property to serious injury or death. The most serious transportation accidents include a release of hazardous material. As described in Section 4.3.14, weather conditions, micro-meteorological effects of buildings and terrain, and non-compliance with applicable codes can exacerbate these releases. Response time and quantity and type of material release also impact the severity of an accident.

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 June, July, and August.

Railway and roadway accidents in particular have the potential to result in hazardous materials release. Transportation accidents can also result in broader infrastructure damage. Like the range of magnitude, the environmental impacts of transportation accidents can vary greatly. In the case of a simple motor vehicle crash, train derailment, or aviation accident, the environmental impact is minimal. However, if the accident involves any type of vehicle moving chemicals or other hazardous materials, the impact will be considerably larger and may include an explosion or the release of potentially hazardous material. For a complete discussion of the environmental impacts of hazardous materials releases, see Section 4.3.14.

A worst-case scenario for transportation accidents in Allegheny County would be if a Bakken crude oil train was to derail and explode near Pittsburgh in the middle of the workday, when an increased number of people would be downtown. The transportation of crude oil by rail has increased exponentially since the 2011 HMP, and this growing concern was echoed by municipal officials at every meeting. This kind of event, like the Lac-Megantic train derailment in Quebec in July 2012, would have no warning time. There

would be the potential for serious loss of life and loss of property in the event of an explosion. The rail infrastructure would be damaged, and mass evacuations would be needed to reduce exposure to chemicals. An accident of this nature would not only cause environmental harm and endanger human health, but it would also cause a disruption of the economy in Allegheny County during recovery.

4.3.18.3 Past Occurrence

The most common transportation accidents in Allegheny County involve highway incidents involving motor vehicles. Vehicular transportation accidents like this are a daily occurrence throughout Pennsylvania. Table 4.3.18-2 shows the number of vehicle accidents in Allegheny County between 2010 and 2014, as well as the break down by fatal crashes, crashes that cause injuries, and the crashes that result only in property damage. The table shows that the number of crashes, and the amount of crashes by type, has remained relatively constant throughout this five-year period.

Table 4.3.18-2 Total Number of Crashes and Crashes Causing Datalities, Injuries, and Property Damage in Bucks County (PennDOT, 2014).

YEAR	TOTAL CRASHES	TOTAL FATAL CRASHES	TOTAL INJURY CRASHES	TOTAL PROPERTY DAMAGE ONLY CRASHES
2010	11,234	64	5,345	5,825
2011	12,115	57	5,567	6,491
2012	12,109	64	5,573	6,472
2013	11,952	61	5,285	6,606
2014	12,154	57	5,460	6,637

Allegheny County has conducted a number of Commodity Flow Studies to look at the movement of hazardous chemicals through the county. The 2012 Study found that there had been 150 railroad accidents/incidents in Allegheny County from 2003-2012. In addition, the 2014 Addendum to the Commodity Flow Study found that over the planning period from 2011-2014, total truck traffic had increased, as had the number of hazmat placards on trucks. In 2014, 10.8% of all trucks bore some kind of placard, up from 8.4% in 2011-12.

In 2013, Allegheny County conducted a Pipeline Commodity Flow Study. The study found that the primary commodity transported via pipeline is natural gas, and petroleum products in general dominate pipeline shipping. This study provides a list of significant pipeline incidents in Allegheny County from 2002-2013. There have been 21 incidents in that time frame; these incidents have caused 3 deaths and 15 injuries. Because this report is For Official Use Only, those events are not listed here.

Fuel spillages due to an accident with a tanker truck or rupture of fuel tanks are the main causes of transportation-related hazardous materials incidents in Allegheny County. However, there have been two major train derailments in Allegheny County that resulted in extensive emergency response actions. On April 11, 1987, there was a derailment of 33 railcars in the City of Pittsburgh, which caused the release of phosphorus oxychloride, resulting in the evacuation of 16,000 residents. On August 22, 1987, there was a derailment of 16 railcars in McKeesport, which caused the release of butane, sodium hydrochloride, and

hydrochloric acid and forced the evacuation of 700 residents, including patients at the Kane Regional Center and the Riverside Nursing Center.

Transportation-related hazardous material release incidents are tracked by the federal government. The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) maintains information on hazardous material releases by highway, freight, air, and rail incidents. PHSMA reports that there have been 2,380 release incidents between 1971 and June 2015. Table 4.3.18-3 lists the number of release incidents which have occurred by year along with their method of release. The majority of the releases (all but 160 incidents) were highway releases. The highest number of releases occurred in the mid- to late 1970s, but there have been multiple highway releases every year since tracking began.

Table 4.3.18-3 Total Number of Hazardous Material Release Incidents and Method of Release in Allegheny County (PHMSA, 2015).

YEAR	TOTAL NUMBER OF RELEASES	METHOD OF RELEASE			
		AIR	FREIGHT FORWARDER	HIGHWAY	RAIL
1971	11	0	0	9	2
1972	29	0	0	28	1
1973	44	2	0	41	1
1974	79	1	0	78	0
1975	139	2	0	134	3
1976	157	3	0	148	6
1977	187	2	0	182	3
1978	150	2	0	144	4
1979	101	1	0	94	6
1980	67	1	0	65	1
1981	40	0	1	36	3
1982	31	2	0	28	1
1983	25	0	0	23	2
1984	19	3	0	14	2
1985	24	0	3	20	1
1986	18	0	0	13	5
1987	24	0	1	19	4
1988	23	0	0	17	6
1989	19	1	2	13	3
1990	14	0	0	14	0
1991	23	0	0	22	1
1992	22	0	0	22	0
1993	24	2	0	22	0
1994	38	2	0	35	1
1995	20	1	0	17	2
1996	36	4	0	31	1
1997	47	2	0	44	1
1998	61	2	0	55	4
1999	117	5	0	111	1
2000	88	4	0	83	1
2001	89	2	0	86	1
2002	74	2	0	72	0

Table 4.3.18-3 Total Number of Hazardous Material Release Incidents and Method of Release in Allegheny County (PHMSA, 2015).					
YEAR	TOTAL NUMBER OF RELEASES	METHOD OF RELEASE			
		AIR	FREIGHT FORWARDER	HIGHWAY	RAIL
2003	50	0	0	50	0
2004	60	0	0	60	0
2005	60	0	0	58	2
2006	57	1	0	55	1
2007	46	3	0	42	1
2008	41	0	0	40	1
2009	38	1	0	36	1
2010	42	3	0	37	2
2011	30	3	0	24	3
2012	36	6	0	26	4
2013	32	1	0	29	2
2014	43	2	0	38	3
2015*	5	0	0	5	0
Grand Total	**2,380**	**66**	**7**	**2,220**	**87**
*Reported incidents through June 17, 2015					

4.3.18.4 Future Occurrence

Transportation accidents have little to no warning time and are nearly impossible to predict. However, as Tables 4.3.18-2 and 4.3.18-3 show, the amount of traffic accidents and hazardous material releases have remained constant in recent years. Additionally, the trucking industry is expected to continue to grow increasing the number of long haul trucks operating in the County on a daily basis. The increase in Bakken crude oil transportation by rail represents an increase in risk to future transportation accidents by rail. Based on all of these factors, the probability of transportation accidents is characterized as *highly likely* according to the Risk Factor Methodology (See Table 4.4-1).

4.3.18.5 Vulnerability Assessment

A transportation related accident can occur on any stretch of road or railway in Allegheny County. However, severe accidents are more likely along highways such as U.S. Routes 30 and 22 as well as the Interstate Routes, which experience heavier traffic volumes including heavy freight vehicles. The combination of high traffic volume, severe winter weather in the County, and large numbers of hazardous materials haulers increase the chances of traffic accidents occurring.

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

Utilizing Census Block data and proximity to modes of transportation, Tables 4.3.18-4 and 4.3.18-5 identify the population and critical facilities respectively within a half-mile of a major highway and rail line. This

half-mile buffer represents the recommended evacuation zone around a highway or rail line in the event of a hazardous material release in transit.

Table 4.3.18-4 Population and Critical Facilities Vulnerable to Transportation Accidents and Hazardous Material Releases in Transit.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	ESTIMATED POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Aleppo Township	1,916	1,038	54.2%	721	37.6%
Aspinwall Borough	2,801	2,801	100.0%	2,736	97.7%
Avalon Borough	4,705	4,238	90.1%	4,099	87.1%
Baldwin Borough	19,767	3,578	18.1%	12,542	63.4%
Baldwin Township	1,992	447	22.4%	505	25.4%
Bell Acres Borough	1,388	0	0.0%	0	0.0%
Bellevue Borough	8,370	4,573	54.6%	4,216	50.4%
Ben Avon Borough	1,781	1,781	100.0%	1,745	98.0%
Ben Avon Heights Borough	371	0	0.0%	0	0.0%
Bethel Park, Municipality of	32,313	15,779	48.8%	22,557	69.8%
Blawnox Borough	1,432	1,432	100.0%	1,432	100.0%
Brackenridge Borough	3,260	307	9.4%	3,229	99.0%
Braddock Borough	2,159	466	21.6%	2,159	100.0%
Braddock Hills Borough	1,880	1,401	74.5%	454	24.1%
Bradford Woods Borough	1,171	558	47.7%	0	0.0%
Brentwood Borough	9,643	5,793	60.1%	0	0.0%
Bridgeville Borough	5,148	3,250	63.1%	4,441	86.3%
Carnegie Borough	7,972	7,209	90.4%	7,661	96.1%
Castle Shannon Borough	8,316	7,746	93.1%	8,262	99.4%
Chalfant Borough	800	800	100.0%	506	63.3%
Cheswick Borough	1,746	0	0.0%	1,573	90.1%
Churchill Borough	3,011	2,931	97.3%	0	0.0%
Clairton City	6,796	4,326	63.7%	5,633	82.9%
Collier Township	7,080	2,551	36.0%	3,245	45.8%
Coraopolis Borough	5,677	5,549	97.7%	5,148	90.7%

Table 4.3.18-4 Population and Critical Facilities Vulnerable to Transportation Accidents and Hazardous Material Releases in Transit.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	ESTIMATED POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Crafton Borough	5,951	5,191	87.2%	2,059	34.6%
Crescent Township	2,640	1,888	71.5%	1,008	38.2%
Dormont Borough	8,593	8,522	99.2%	8,251	96.0%
Dravosburg Borough	1,792	1,691	94.4%	1,792	100.0%
Duquesne, City of	5,565	4,652	83.6%	5,113	91.9%
East Deer Township	1,500	1,394	92.9%	1,330	88.7%
East McKeesport Borough	2,126	1,966	92.5%	545	25.6%
East Pittsburgh Borough	1,822	1,822	100.0%	1,822	100.0%
Edgewood Borough	3,118	3,118	100.0%	2,848	91.3%
Edgeworth Borough	1,680	1,362	81.1%	1,269	75.5%
Elizabeth Borough	1,493	1,467	98.3%	1,493	100.0%
Elizabeth Township	1,3271	5,445	41.0%	4,463	33.6%
Emsworth Borough	2,449	2,449	100.0%	2,198	89.8%
Etna Borough	3,451	3,398	98.5%	3,429	99.4%
Fawn Township	2,376	349	14.7%	0	0.0%
Findlay Township	5,060	2,194	43.4%	4	0.1%
Forest Hills Borough	6,518	5,945	91.2%	0	0.0%
Forward Township	3,376	1,476	43.7%	1,212	35.9%
Fox Chapel Borough	5,388	852	15.8%	541	10.0%
Franklin Park Borough	13,470	5,583	41.4%	0	0.0%
Frazer Township	1,157	134	11.6%	64	5.5%
Glassport Borough	4,483	2,818	62.9%	4,194	93.6%
Glen Osborne Borough	547	547	100.0%	547	100.0%
Glenfield Borough	205	205	100.0%	205	100.0%
Green Tree Borough	4,432	4,427	99.9%	2,766	62.4%

Table 4.3.18-4 Population and Critical Facilities Vulnerable to Transportation Accidents and Hazardous Material Releases in Transit.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	ESTIMATED POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Hampton Township	18,363	8,840	48.1%	5,598	30.5%
Harmar Township	2,921	1,759	60.2%	2,060	70.5%
Harrison Township	10,461	4,205	40.2%	4,778	45.7%
Haysville Borough	70	68	97.1%	68	97.1%
Heidelberg Borough	1,244	1,244	100.0%	1,244	100.0%
Homestead Borough	3,165	2,946	93.1%	2,525	79.8%
Indiana Township	7,253	2,150	29.6%	411	5.7%
Ingram Borough	3,330	2,551	76.6%	1,677	50.4%
Jefferson Hills Borough	10,619	5,392	50.8%	4,395	41.4%
Kennedy Township	7,672	4,626	60.3%	317	4.1%
Kilbuck Township	697	170	24.4%	10	1.4%
Leet Township	1,634	773	47.3%	773	47.3%
Leetsdale Borough	1,218	1,114	91.5%	1,114	91.5%
Liberty Borough	2,551	576	22.6%	1,929	75.6%
Lincoln Borough	1,072	239	22.3%	375	35.0%
Marshall Township	6,915	3,785	54.7%	0	0.0%
McCandless, Town of	28,457	11,473	40.3%	0	0.0%
McDonald Borough	383	0	0.0%	0	0.0%
McKees Rocks Borough	6,104	4,695	76.9%	6,104	100.0%
McKeesport, City of	19,731	14,556	73.8%	10,157	51.5%
Millvale Borough	3,744	1,905	50.9%	1,542	41.2%
Monroeville, Municipality of	28,386	18,799	66.2%	4,321	15.2%
Moon Township	24,185	3,936	16.3%	2,135	8.8%
Mount Lebanon, Municipality of	33,137	22,598	68.2%	14,171	42.8%
Mount Oliver Borough	3,403	0	0.0%	147	4.3%

Table 4.3.18-4 Population and Critical Facilities Vulnerable to Transportation Accidents and Hazardous Material Releases in Transit.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	ESTIMATED POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Munhall Borough	11,406	3,040	26.7%	3,017	26.5%
Neville Township	1,084	1,084	100.0%	1,084	100.0%
North Braddock Borough	4,857	2,320	47.8%	3,551	73.1%
North Fayette Township	13,934	6,411	46.0%	934	6.7%
North Versailles Township	10,229	8,077	79.0%	3,061	29.9%
Oakdale Borough	1,459	1,459	100.0%	0	0.0%
Oakmont Borough	6,303	1,557	24.7%	5,389	85.5%
O'Hara Township	8,407	4,911	58.4%	3,610	42.9%
Ohio Township	4,757	2,732	57.4%	0	0.0%
Penn Hills, Municipality of	42,329	26,908	63.6%	8,540	20.2%
Pennsbury Village Borough	661	661	100.0%	0	0.0%
Pine Township	11,497	7,700	67.0%	14	0.1%
Pitcairn Borough	3,294	2,935	89.1%	2,397	72.8%
Pittsburgh, City of	30,5704	222,149	72.7%	195,739	64.0%
Pleasant Hills Borough	8,268	5,403	65.3%	3,262	39.5%
Plum Borough	27,126	14,592	53.8%	2,565	9.5%
Port Vue Borough	3,798	946	24.9%	3,398	89.5%
Rankin Borough	2,122	66	3.1%	2,122	100.0%
Reserve Township	3,333	1,173	35.2%	848	25.4%
Richland Township	11,100	7,696	69.3%	2,413	21.7%
Robinson Township	13,354	7,657	57.3%	955	7.2%
Ross Township	31,105	20,991	67.5%	0	0.0%
Rosslyn Farms Borough	427	427	100.0%	427	100.0%
Scott Township	17,024	11,239	66.0%	8,358	49.1%
Sewickley Borough	3,827	3,478	90.9%	2,926	76.5%

Table 4.3.18-4 Population and Critical Facilities Vulnerable to Transportation Accidents and Hazardous Material Releases in Transit.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	ESTIMATED POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Sewickley Heights	810	0	0.0%	0	0.0%
Sewickley Hills Borough	639	284	44.4%	0	0.0%
Shaler Township	28,757	12,271	42.7%	12,182	42.4%
Sharpsburg Borough	3,446	3,446	100.0%	3,446	100.0%
South Fayette Township	14,416	7,414	51.4%	2,883	20.0%
South Park Township	13,416	2,041	15.2%	6,252	46.6%
South Versailles Township	351	0	0.0%	351	100.0%
Springdale Borough	3,405	0	0.0%	2,752	80.8%
Springdale Township	1,636	725	44.3%	1,009	61.7%
Stowe Township	6,362	4,119	64.7%	3,377	53.1%
Swissvale Borough	8,983	5,497	61.2%	7,916	88.1%
Tarentum Borough	4,530	4,196	92.6%	4,423	97.6%
Thornburg Borough	455	386	84.8%	455	100.0%
Trafford Borough	61	61	100.0%	61	100.0%
Turtle Creek Borough	5,349	3,873	72.4%	5,106	95.5%
Upper St. Clair Township	19,229	7,481	38.9%	2,256	11.7%
Verona Borough	2,474	0	0.0%	2,396	96.8%
Versailles Borough	1,515	1,515	100.0%	1,515	100.0%
Wall Borough	580	542	93.4%	542	93.4%
West Deer Township	11,771	3,339	28.4%	2,018	17.1%
West Elizabeth Borough	518	518	100.0%	518	100.0%
West Homestead Borough	1,929	579	30.0%	528	27.4%
West Mifflin Borough	20,313	8,664	42.7%	12,179	60.0%
West View Borough	6,771	6,554	96.8%	0	0.0%
Whitaker Borough	1,271	902	71.0%	769	60.5%

Table 4.3.18-4 Population and Critical Facilities Vulnerable to Transportation Accidents and Hazardous Material Releases in Transit.

MUNICIPALITY	2010 POPULATION	ESTIMATED POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT POPULATION WITHIN 0.5 MI OF A MAJOR HIGHWAY	ESTIMATED POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT POPULATION WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
White Oak Borough	7,862	2,658	33.8%	1,019	13.0%
Whitehall Borough	13,944	5,481	39.3%	3,669	26.3%
Wilkins Township	6,357	6,058	95.3%	2,691	42.3%
Wilkinsburg Borough	15,930	12,979	81.5%	7,555	47.4%
Wilmerding Borough	2,190	1,986	90.7%	2,046	93.4%
GRAND TOTAL	**1,223,348**	**735,030**	**60.1%**	**550,392**	**45.0%**

Table 4.3.18-5 Critical Facilities Vulnerable to Hazardous Material Releases in Transit.

MUNICIPALITY	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Aleppo Township	6	3	50.0%	2	33.3%
Aspinwall Borough	7	7	100.0%	7	100.0%
Avalon Borough	6	5	83.3%	5	83.3%
Baldwin Borough	24	5	20.8%	14	58.3%
Baldwin Township	2	0	0.0%	0	0.0%
Bell Acres Borough	6	0	0.0%	0	0.0%
Bellevue Borough	11	9	81.8%	4	36.4%
Ben Avon Borough	3	3	100.0%	3	100.0%
Ben Avon Heights Borough	1	0	0.0%	0	0.0%
Bethel Park, Municipality of	33	20	60.6%	26	78.8%
Blawnox Borough	7	7	100.0%	7	100.0%
Brackenridge Borough	10	0	0.0%	10	100.0%
Braddock Borough	13	2	15.4%	13	100.0%
Braddock Hills Borough	2	2	100.0%	0	0.0%
Bradford Woods Borough	3	0	0.0%	0	0.0%
Brentwood Borough	14	12	85.7%	0	0.0%
Bridgeville Borough	8	8	100.0%	8	100.0%
Carnegie Borough	17	16	94.1%	17	100.0%
Castle Shannon Borough	9	8	88.9%	9	100.0%
Chalfant Borough	2	2	100.0%	2	100.0%
Cheswick Borough	7	0	0.0%	7	100.0%
Churchill Borough	9	9	100.0%	0	0.0%
Clairton City	14	11	78.6%	14	100.0%
Collier Township	21	12	57.1%	14	66.7%
Coraopolis Borough	13	12	92.3%	12	92.3%

Table 4.3.18-5 Critical Facilities Vulnerable to Hazardous Material Releases in Transit.

MUNICIPALITY	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Crafton Borough	9	9	100.0%	2	22.2%
Crescent Township	4	4	100.0%	4	100.0%
Dormont Borough	8	8	100.0%	8	100.0%
Dravosburg Borough	4	4	100.0%	4	100.0%
Duquesne, City of	15	14	93.3%	15	100.0%
East Deer Township	12	11	91.7%	12	100.0%
East McKeesport Borough	5	4	80.0%	1	20.0%
East Pittsburgh Borough	5	5	100.0%	5	100.0%
Edgewood Borough	6	6	100.0%	6	100.0%
Edgeworth Borough	5	5	100.0%	5	100.0%
Elizabeth Borough	8	8	100.0%	8	100.0%
Elizabeth Township	26	10	38.5%	10	38.5%
Emsworth Borough	3	3	100.0%	3	100.0%
Etna Borough	7	7	100.0%	7	100.0%
Fawn Township	9	1	11.1%	0	0.0%
Findlay Township	20	6	30.0%	0	0.0%
Forest Hills Borough	13	13	100.0%	0	0.0%
Forward Township	17	8	47.1%	11	64.7%
Fox Chapel Borough	11	0	0.0%	0	0.0%
Franklin Park Borough	10	3	30.0%	0	0.0%
Frazer Township	12	2	16.7%	0	0.0%
Glassport Borough	11	10	90.9%	10	90.9%
Glen Osborne Borough	2	2	100.0%	2	100.0%
Glenfield Borough	0	0	0.0%	0	0.0%
Green Tree Borough	7	7	100.0%	7	100.0%

Table 4.3.18-5 Critical Facilities Vulnerable to Hazardous Material Releases in Transit.

MUNICIPALITY	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Hampton Township	35	15	42.9%	13	37.1%
Harmar Township	24	20	83.3%	21	87.5%
Harrison Township	22	6	27.3%	14	63.6%
Haysville Borough	1	1	100.0%	1	100.0%
Heidelberg Borough	4	4	100.0%	4	100.0%
Homestead Borough	7	5	71.4%	5	71.4%
Indiana Township	28	11	39.3%	3	10.7%
Ingram Borough	7	4	57.1%	0	0.0%
Jefferson Hills Borough	24	20	83.3%	11	45.8%
Kennedy Township	14	4	28.6%	2	14.3%
Kilbuck Township	3	1	33.3%	0	0.0%
Leet Township	4	0	0.0%	0	0.0%
Leetsdale Borough	12	12	100.0%	12	100.0%
Liberty Borough	8	1	12.5%	6	75.0%
Lincoln Borough	4	0	0.0%	1	25.0%
Marshall Township	13	8	61.5%	0	0.0%
McCandless, Town of	40	20	50.0%	0	0.0%
McDonald Borough	2	0	0.0%	0	0.0%
McKees Rocks Borough	9	8	88.9%	9	100.0%
McKeesport, City of	43	38	88.4%	32	74.4%
Millvale Borough	5	4	80.0%	3	60.0%
Monroeville, Municipality of	66	52	78.8%	5	7.6%
Moon Township	31	15	48.4%	8	25.8%
Mount Lebanon, Municipality of	38	25	65.8%	15	39.5%
Mount Oliver Borough	4	0	0.0%	3	75.0%

Table 4.3.18-5 Critical Facilities Vulnerable to Hazardous Material Releases in Transit.

MUNICIPALITY	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Munhall Borough	17	4	23.5%	4	23.5%
Neville Township	22	22	100.0%	22	100.0%
North Braddock Borough	14	2	14.3%	12	85.7%
North Fayette Township	29	19	65.5%	1	3.4%
North Versailles Township	14	13	92.9%	2	14.3%
Oakdale Borough	25	18	72.0%	10	40.0%
Oakmont Borough	3	3	100.0%	0	0.0%
O'Hara Township	17	8	47.1%	16	94.1%
Ohio Township	15	8	53.3%	0	0.0%
Penn Hills, Municipality of	52	35	67.3%	13	25.0%
Pennsbury Village Borough	3	3	100.0%	0	0.0%
Pine Township	14	10	71.4%	0	0.0%
Pitcairn Borough	6	6	100.0%	6	100.0%
Pittsburgh, City of	505	411	81.4%	395	78.2%
Pleasant Hills Borough	10	7	70.0%	3	30.0%
Plum Borough	42	22	52.4%	8	19.0%
Port Vue Borough	5	5	100.0%	5	100.0%
Rankin Borough	3	0	0.0%	3	100.0%
Reserve Township	8	5	62.5%	1	12.5%
Richland Township	17	10	58.8%	3	17.6%
Robinson Township	29	24	82.8%	5	17.2%
Ross Township	35	28	80.0%	0	0.0%
Rosslyn Farms Borough	3	3	100.0%	3	100.0%
Scott Township	21	16	76.2%	15	71.4%
Sewickley Borough	12	10	83.3%	10	83.3%

Table 4.3.18-5 Critical Facilities Vulnerable to Hazardous Material Releases in Transit.

MUNICIPALITY	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
Sewickley Heights	3	0	0.0%	0	0.0%
Sewickley Hills Borough	3	3	100.0%	0	0.0%
Shaler Township	24	12	50.0%	12	50.0%
Sharpsburg Borough	7	7	100.0%	7	100.0%
South Fayette Township	23	16	69.6%	8	34.8%
South Park Township	17	4	23.5%	10	58.8%
South Versailles Township	3	0	0.0%	3	100.0%
Springdale Borough	14	0	0.0%	12	85.7%
Springdale Township	4	4	100.0%	4	100.0%
Stowe Township	13	11	84.6%	12	92.3%
Swissvale Borough	12	5	41.7%	12	100.0%
Tarentum Borough	19	19	100.0%	18	94.7%
Thornburg Borough	3	2	66.7%	3	100.0%
Trafford Borough	2	2	100.0%	2	100.0%
Turtle Creek Borough	13	12	92.3%	13	100.0%
Upper St. Clair Township	19	14	73.7%	3	15.8%
Verona Borough	7	0	0.0%	7	100.0%
Versailles Borough	5	5	100.0%	5	100.0%
Wall Borough	2	2	100.0%	2	100.0%
West Deer Township	22	3	13.6%	6	27.3%
West Elizabeth Borough	5	5	100.0%	5	100.0%
West Homestead Borough	5	5	100.0%	5	100.0%
West Mifflin Borough	54	24	44.4%	33	61.1%
West View Borough	13	13	100.0%	0	0.0%
Whitaker Borough	1	1	100.0%	1	100.0%

Table 4.3.18-5 Critical Facilities Vulnerable to Hazardous Material Releases in Transit.

MUNICIPALITY	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF A MAJOR HIGHWAY	CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE	PERCENT CRITICAL FACILITIES WITHIN 0.5 MI OF AN ACTIVE RAIL LINE
White Oak Borough	11	3	27.3%	2	18.2%
Whitehall Borough	16	8	50.0%	10	62.5%
Wilkins Township	13	12	92.3%	10	76.9%
Wilkinsburg Borough	25	24	96.0%	17	68.0%
Wilmerding Borough	4	4	100.0%	4	100.0%
GRAND TOTAL	**2,208**	**1,489**	**67.4%**	**1,225**	**55.5%**

4.3.19 Urban Fire and Explosion

4.3.19.1 Location and Extent

Urban fire and explosion hazards incorporate vehicle and building/structure fires as well as overpressure rupture, overheat, or other explosions. Statewide, this hazard occurs in the denser, more urbanized areas and occurs most often in residential structures (US Fire Administration, 2009). Urban fires can more easily spread from building to building in these denser areas.

Urban fires and explosions often begin as a result of other hazards, particularly severe storms, drought, transportation accidents, hazardous material releases, criminal activity such as arson, and terrorism. Urban fires have the potential to cause extensive damage to residential, commercial, or public property. Damage ranges from minor smoke and/or water damage to the destruction of buildings. People are often displaced for several months to years depending on the magnitude of the event. Urban fires and explosions can also cause injuries and death; in Pennsylvania, the fire mortality rate is approximately 19.9 deaths per million residents, or about 240 fire-related deaths per year. This is the 10th highest fire mortality rate in the nation and is higher than the national average of 13.2 deaths per million residents (US Fire Administration, 2009). In Allegheny County, many communities have an abundance of wood-frame homes densely built, which is conducive to urban fires. In addition, nearly 40% of housing units in the County are attached, making it easier for fires to spread.

In the most serious urban fire events, the extreme heat of a fire event can damage the underlying infrastructure. For example, in 1996, an eight-alarm tire fire ignited in Philadelphia under Interstate 95. The extreme heat of the fire caused the bridge to buckle and forced two months of repairs to the bridge. The governor declared this event a disaster shortly after it occurred.

4.3.19.2 Range of Magnitude

The impacts of urban fire and explosion events vary based on the size of the incident and the population and structure density where it occurs. There may be environmental impacts related to hazardous materials when a fire event or explosion releases dangerous materials.

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

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

While urban fires are a regular occurrence in Allegheny County, one of the worst events was an 11- alarm fire on Ormsby Avenue in Mount Oliver in June 2014. During the event, which started with a cigarette, seven to eight houses were destroyed. Additional houses ignited when high winds blew embers as far as

two streets away. About 100 firefighters from four communities worked to manage the blaze, which left 50 people homeless.

4.3.19.3 Past Occurrence

Allegheny County experiences a number of urban fire and explosion events each year, most of which are small and affect a limited number of structures. PEIRS data indicates that from 2002-2009, there have been 276 urban fire events reported to PEMA. Please note that since PEIRS is a voluntary reporting system, this is not an inclusive list of fires in the County.

Table 4.3.19-1 Number of Urban Fire Events Reported to PEIRS, 2002-2009 (PEMA, 2010).

URBAN FIRE EVENT TYPE	2002	2003	2004	2005	2006	2007	2008	2009	TOTAL BY TYPE
CHURCH FIRE	1		1	1	1	3	1	1	9
RAD FACILITY FIRE				1					1
SCHOOL FIRES			2					1	3
STRUCTURE FIRE	23	23	23	24	38	57	51	37	276
Total per year	**24**	**23**	**26**	**26**	**39**	**60**	**52**	**39**	**289**

**Events totaled through June 2009*

As described in Section 2.5, PEIRS is no longer used as the Commonwealth's reporting system, so more recent events are not available from PEIRS. However, Allegheny County has had an active social media since 2013 and actively reports occurrences of structure fires and explosions. While not a comprehensive accounting of these events since fall 2012, these tweets provide additional past occurrences. Since October 2012, there have been 14 explosions reported via Twitter, eight of which occurred in 2013. Many of these were transformer explosions. For the same period, Allegheny County has tweeted about 181 structure fires. Due to the character limitations of this media, few details are available.

4.3.19.4 Future Occurrence

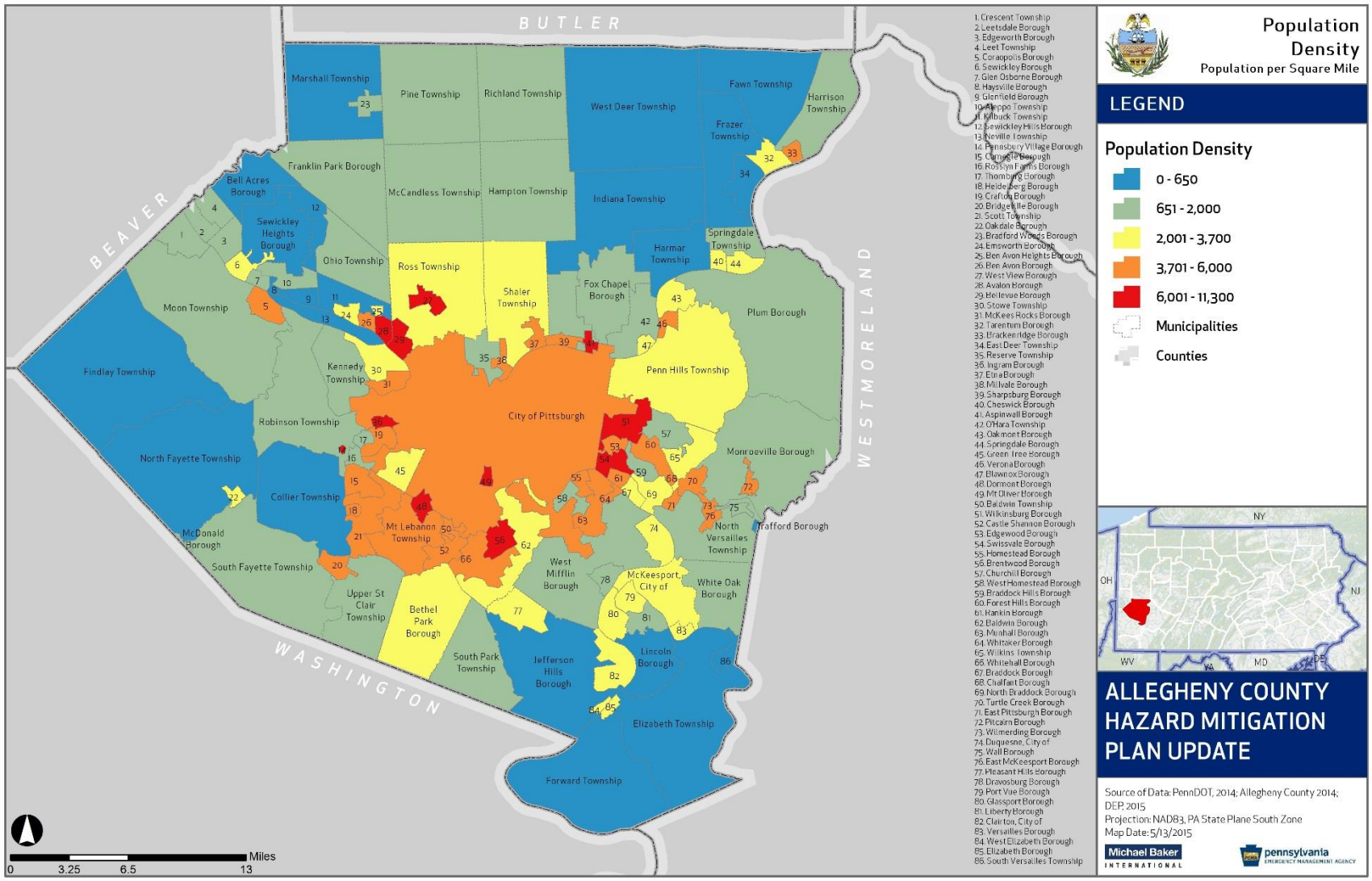
Urban fire and explosion events can be considered possible, with minor events happening more frequently than major fires or explosions in the future. The greatest urban fire and explosion threats in Allegheny County are industrial fires. While residential fires are more common, industrial fires have a potentially higher risk because of the possibility of there being flammable chemicals and a sustained fuel source at industrial sites. While small fires may be more frequent, overall the probability of future urban fire and explosion events that cause significant damage is considered *possible*, according to the Risk Factor Methodology (see Table 4.4-1).

There is also a growing threat of natural gas, particularly methane, migration into homes and sparking fires and explosions. These events could occur more frequently moving forward if natural gas extraction grows in the County.

4.3.19.5 Vulnerability Assessment

Areas where large buildings are located or development is closely spaced should be considered more vulnerable to urban fire and explosion events; population density is mapped in Figure 4.3.19-1.

Figure 4.3.19-1 Allegheny County Population Density by Community.



While population density is an indicator of urban fire and explosion, in order to adequately assess vulnerability to urban fires and explosions, detailed information on the design specifications on the design specifications, specifically fire codes, used for the construction of individual buildings as required. As of December 31, 2006, all communities in Pennsylvania are required to comply with the Uniform Construction Codes. This includes requirements to comply with both the International Fire Code and the International Wildland Urban Interface Code. The adoption and enforcement of these codes will hopefully decrease the overall vulnerability of structures in Allegheny County. However, these regulations will only affect new construction, as well as additions and renovations to existing structures. Older buildings that do not meet the criteria established in these modern fire codes will continue to remain vulnerable to urban fire and explosion events, as will vacant and unmaintained structures of nearly any age. Additionally, homes that are located in proximity to natural gas drilling operations may have an added vulnerability to fires and explosions.

4.3.20 Utility Interruption

4.3.20.1 Location and Extent

Utility interruptions include any impairment of the functioning of telecommunication, gas, electric, water, or waste networks. Interruptions or outages occur because of geomagnetic storms, fuel or resources shortage, electromagnetic pulses, information technology failures, transmission facility or linear utility accident, and major energy, power, or utility failure. The focus of utility interruptions as a hazard lies in fuel, energy, or utility failure. These kinds of interruptions rarely spontaneously occur on their own; this hazard is often secondary to other natural hazard event, particularly transportation accidents, lightning strikes, extreme heat or cold events, and coastal and winter storms.

Utility interruptions in Allegheny County occur regularly but are usually are small-scale, localized incidents. Utility interruptions are possible anywhere there is utility service. Table 4.3.20-1 lists the major Pittsburgh-area utility companies. Water authorities are listed and discussed in Section 4.3.1.

Table 4.3.20-1 Major Utility Companies in Allegheny County.

COMPANY NAME	TYPE OF UTILITY
FirstEnergy Corp.	Electric Power
Duquesne Light	
Armstrong Cable	Telecom
AT&T Broadband	
Comcast Cable	
Sprint	
Verizon	
Columbia Gas	Gas
Dominion People's	
Equitable Gas	

According to the 2013 5-year American Community Survey, in Allegheny County, 85% of housing units use utility gas as their heat source, followed by 11.6% of homes using electric heat. As a result, an interruption in either of those utilities could affect a significant number of residents. In addition, an increasing reliance on internet access and telecommunications could also a large number of residents at any given time.

4.3.20.2 Range of Magnitude

The most severe utility interruptions will be regional or widespread power and telecommunications outages. With the loss of power, electrical powered equipment and systems will not be 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. Additionally, an internet outage could be crippling to the economy, as many companies and government entities process payments and invoices electronically rather than with physical checks.

In a possible worst-case scenario, a winter storm event causes 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.

4.3.20.3 Past Occurrence

Utility interruptions are largely minor, routine events. Power outages have been caused by winter storms, wind, vehicle accidents, and other factors. There is no comprehensive listing of prior utility outages, but a search of the Allegheny County Twitter feed, which is used to inform residents of outages, indicates that there are outages in small areas of the county 1-4 times per month.

4.3.20.4 Future Occurrence

Utility interruptions will continue to occur annually with minimal impact. Widespread utility interruption events usually occur approximately once every five years, usually as a secondary effect of an extreme weather event. These interruptions should be anticipated and first responders should be prepared during severe weather events. Overall, the future probability of utility interruptions can be considered *likely* according to the Risk Factor Methodology (See Table 4.4-1).

Aging infrastructure also brings risk in the form of potential utility interruptions, particularly for places like Allegheny County with aging infrastructure. In many utility systems, significant portions of the equipment and facilities date from the growth periods of the 1950s and 1960s that followed World War II. As this equipment ages, it deteriorates from the constant wear and tear of service. As it ages, it reaches a point at which it will either fail on its own or as a result of outside forces (storms, loads it was designed to handle but no longer can, etc.). These failures cause service interruptions and can require expensive emergency repairs. In addition as repairs have taken place along transmission routes, there is often a mix of new and

old equipment along the line, as repair and not replacement is generally the choice made to resolve an issue. At the same time, though, the City of Pittsburgh is reinvesting in its power grid and other public facilities; the city is undertaking a grid security project to both cut water and energy consumption by 2030 and create redundant systems that would be more resilient in a disaster situation.

4.3.20.5 Vulnerability Assessment

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

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

4.4 Hazard Vulnerability Summary

4.4.1 Methodology

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

RF values were obtained by assigning varying degrees of risk to five categories for each of the hazards profiled in the HMP update. Those categories include probability, impact, spatial extent, warning time, and duration. Each degree of risk was assigned a value ranging from one to four. The weighting factor agreed upon by the planning team is shown in Table 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 following example equation:

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

Table 4.4-1 summarizes each of the five categories used for calculating a RF for each hazard. According to the weighting scheme applied, the highest possible RF value is 4.0.

Table 4.4-1 Summary of Risk Factor (RF) Approach.

RISK ASSESSMENT CATEGORY	DEGREE OF RISK			WEIGHT VALUE
	LEVEL	CRITERIA	INDEX	
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	**1**	**30%**
	POSSIBLE	BETWEEN 1% & 49.9% ANNUAL PROBABILITY	**2**	
	LIKELY	BETWEEN 50% & 90% ANNUAL PROBABILITY	**3**	
	HIGHLY LIKELY	GREATER THAN 90% ANNUAL PROBABILITY	**4**	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	**1**	**30%**
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	**2**	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	**3**	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	**4**	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	**1**	**20%**
	SMALL	BETWEEN 1 & 10.9% OF AREA AFFECTED	**2**	
	MODERATE	BETWEEN 11 & 25% OF AREA AFFECTED	**3**	
	LARGE	GREATER THAN 25% OF AREA AFFECTED	**4**	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**MORE THAN 24 HRS**	SELF-DEFINED	**1**	**10%**
	12 TO 24 HRS	SELF-DEFINED *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	**2**	
	6 TO 12 HRS	SELF-DEFINED	**3**	
	LESS THAN 6 HRS	SELF-DEFINED	**4**	
DURATION *How long does the hazard event usually last?*	**LESS THAN 6 HRS**	SELF-DEFINED	**1**	**10%**
	LESS THAN 24 HRS	SELF-DEFINED *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	**2**	
	LESS THAN 1 WEEK	SELF-DEFINED	**3**	
	MORE THAN 1 WEEK	SELF-DEFINED	**4**	

4.4.2 Ranking Results

Using the methodology described in Section 4.4.1, Table 4.4-2 lists the Countywide Risk Factor calculated for each of the 19 potential hazards identified in the 2015 Hazard Mitigation Plan Update. 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. Allegheny County has five high risk hazards, seven moderate risk hazards, and eight low risk hazards for a total of 20 hazards.

Table 4.4-2 Countywide Ranking of Hazard Types Based on Risk Factor (RF) Methodology.

HAZARD RISK	HAZARD NATURAL (N) OR MAN-MADE (M)	RISK ASSESSMENT CATEGORY					RISK FACTOR
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Flood, Flash Flood, Ice Jam	4	3	3	3	3	**3.3**
	Winter storm	4	2	4	1	3	**3**
	Environmental Hazards	3	2	3	4	2	**2.7**
	Tornado, Windstorm	3	3	2	4	1	**2.7**
	Transportation Accidents	4	2	1	4	1	**2.5**
MODERATE	Utility Interruption	3	1	4	3	1	**2.4**
	Dam and Lock Failure	1	3	3	4	1	**2.3**
	Terrorism	1	3	2	4	2	**2.2**
	Civil Disturbance	3	2	1	4	1	**2.2**
	Drought	2	1	3	1	4	**2.0**
	Landslide	3	1	1	4	2	**2.0**
	Levee failure	1	3	1	4	2	**2.0**
LOW	Subsidence, Sinkhole	2	2	1	3	2	**1.9**
	Urban Fire and explosion	2	2	1	4	1	**1.9**
	Nuclear Incidents	1	2	2	4	2	**1.9**
	Wildfire	1	2	2	2	2	**1.7**
	Pandemic	2	1	1	1	4	**1.6**
	Hurricane, Tropical Storm, Nor'easter	2	1	2	1	2	**1.6**
	Radon Exposure	2	1	1	1	2	**1.4**
	Earthquake	1	1	1	4	1	**1.3**

Table 4.4-3 shows the different municipalities in Allegheny County and whether their risk is greater than (>), less than (<), or equal to (=) the risk factor assigned to the County as a whole.

Table 4.4-3 Jurisdictional Risk Evaluation.

MUNICIPALITY	Flood, Flash Flood, Ice Jam	Winter storm	Environmental Hazards	Tornado, Windstorm	Transportation Accidents	Utility Interruption	Dam and Lock Failure	Terrorism	Civil Disturbance	Drought	Landslide	Levee failure	Subsidence, Sinkhole	Urban Fire and explosion	Nuclear Incidents	Wildfire	Pandemic	Hurricane, Tropical Storm, Nor'easter	Radon Exposure	Earthquake
Aleppo Township	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Aspinwall Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
Avalon Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
Baldwin Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Baldwin Township	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	<	=
Bell Acres Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Bellevue Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
Ben Avon Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
Ben Avon Heights Borough	<	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Bethel Park, Municipality of	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Blawnox Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Brackenridge Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	>	=	=	>	=	=	=
Braddock Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Braddock Hills Borough	<	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Bradford Woods Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Brentwood Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	<	=
Bridgeville Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	=	=
Carnegie Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	=	=
Castle Shannon Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	<	=
Chalfant Borough	<	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
Cheswick Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Churchill Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Clairton City	=	=	=	=	=	=	=	=	=	=	=	=	<	=	=	<	=	=	=	=
Collier Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Coraopolis Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Crafton Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
Crescent Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Dormont Borough	<	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	<	=
Dravosburg Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Duquesne, City of	=	=	=	=	=	=	=	=	=	=	=	=	<	=	=	<	=	=	=	=
East Deer Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	>	=	=	=	=

Table 4.4-3 Jurisdictional Risk Evaluation.

MUNICIPALITY	Flood, Flash Flood, Ice Jam	Winter storm	Environmental Hazards	Tornado, Windstorm	Transportation Accidents	Utility Interruption	Dam and Lock Failure	Terrorism	Civil Disturbance	Drought	Landslide	Levee failure	Subsidence, Sinkhole	Urban Fire and explosion	Nuclear Incidents	Wildfire	Pandemic	Hurricane, Tropical Storm, Nor'easter	Radon Exposure	Earthquake
East McKeesport Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
East Pittsburgh Borough	<	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
Edgewood Borough	<	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
Edgeworth Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Elizabeth Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Elizabeth Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Emsworth Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Etna Borough	=	=	=	=	=	=	=	=	=	=	=	=	<	>	=	=	>	=	=	=
Fawn Township	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Findlay Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	>	=	=	=	=	=
Forest Hills Borough	<	=	=	=	=	=	=	=	=	=	=	<	=	>	=	=	>	=	=	=
Forward Township	=	=	=	>	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Fox Chapel Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Franklin Park Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Frazer Township	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Glassport Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Glen Osborne Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Glenfield Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Green Tree Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Hampton Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Harmar Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Harrison Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Haysville Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Heidelberg Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	=	=
Homestead Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
Indiana Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Ingram Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
Jefferson Hills Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Kennedy Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Kilbuck Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Leet Township	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Leetsdale Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=

Table 4.4-3 Jurisdictional Risk Evaluation.

MUNICIPALITY	Flood, Flash Flood, Ice Jam	Winter storm	Environmental Hazards	Tornado, Windstorm	Transportation Accidents	Utility Interruption	Dam and Lock Failure	Terrorism	Civil Disturbance	Drought	Landslide	Levee failure	Subsidence, Sinkhole	Urban Fire and explosion	Nuclear Incidents	Wildfire	Pandemic	Hurricane, Tropical Storm, Nor'easter	Radon Exposure	Earthquake
Liberty Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Lincoln Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Marshall Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
McCandless, Town of	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
McDonald Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
McKees Rocks Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
McKeesport, City of	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	<	=	=	=	=
Millvale Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
Monroeville, Municipality of	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Moon Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Mount Lebanon, Municipality of	=	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	=	=
Mount Oliver Borough	<	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	=	=
Munhall Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	>	=	=	>	=	=	=
Neville Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	<	=
North Braddock Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
North Fayette Township	=	=	=	>	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
North Versailles Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Oakdale Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Oakmont Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
O'Hara Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	<	=	=	=	=
Ohio Township	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Penn Hills, Municipality of	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Pennsbury Village Borough	<	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
Pine Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Pitcairn Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
Pittsburgh, City of	=	=	=	=	=	=	=	>	>	=	=	<	=	>	=	<	>	=	=	=
Pleasant Hills Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Plum Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Port Vue Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=

Table 4.4-3 Jurisdictional Risk Evaluation.

MUNICIPALITY	Flood, Flash Flood, Ice Jam	Winter storm	Environmental Hazards	Tornado, Windstorm	Transportation Accidents	Utility Interruption	Dam and Lock Failure	Terrorism	Civil Disturbance	Drought	Landslide	Levee failure	Subsidence, Sinkhole	Urban Fire and explosion	Nuclear Incidents	Wildfire	Pandemic	Hurricane, Tropical Storm, Nor'easter	Radon Exposure	Earthquake
Rankin Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
Reserve Township	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Richland Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Robinson Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Ross Township	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Rosslyn Farms Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Scott Township	=	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	=	=
Sewickley Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Sewickley Heights	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Sewickley Hills Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Shaler Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Sharpsburg Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
South Fayette Township	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
South Park Township	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
South Versailles Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Springdale Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Springdale Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Stowe Township	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
Swissvale Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
Tarentum Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Thornburg Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Trafford Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
Turtle Creek Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
Upper St. Clair Township	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Verona Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	>	=	=	>	=	=	=
Versailles Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Wall Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	=	=	=	=	=	=	=
West Deer Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
West Elizabeth Borough	=	=	=	>	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
West Homestead Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=

Table 4.4-3 Jurisdictional Risk Evaluation.

MUNICIPALITY	Flood, Flash Flood, Ice Jam	Winter storm	Environmental Hazards	Tornado, Windstorm	Transportation Accidents	Utility Interruption	Dam and Lock Failure	Terrorism	Civil Disturbance	Drought	Landslide	Levee failure	Subsidence, Sinkhole	Urban Fire and explosion	Nuclear Incidents	Wildfire	Pandemic	Hurricane, Tropical Storm, Nor'easter	Radon Exposure	Earthquake
West Mifflin Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
West View Borough	<	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=
Whitaker Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	=	=	=	=	=	=	=
White Oak Borough	=	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=
Whitehall Borough	=	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	<	=
Wilkins Township	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=	=
Wilkinsburg Borough	<	=	=	=	=	=	<	=	=	=	=	<	=	>	=	=	>	=	=	=
Wilmerding Borough	=	=	=	=	=	=	<	=	=	=	=	<	<	>	=	=	>	=	=	=

4.4.3 Potential Loss Estimates

Estimates provided in this section are based geospatial analysis via Hazus and previous events as reported to NCDC or SHELDUS in order to provide a comprehensive range of potential losses. NCDC and SHELDUS losses provide actual, on-the-ground losses associated with individual flood events with a range of return periods, and are useful to indicate the range of possible losses with different flood events. Hazus shows predictive, 1% annual chance losses. These are losses associated with a base flood assuming current development and hydrologic patterns. 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.

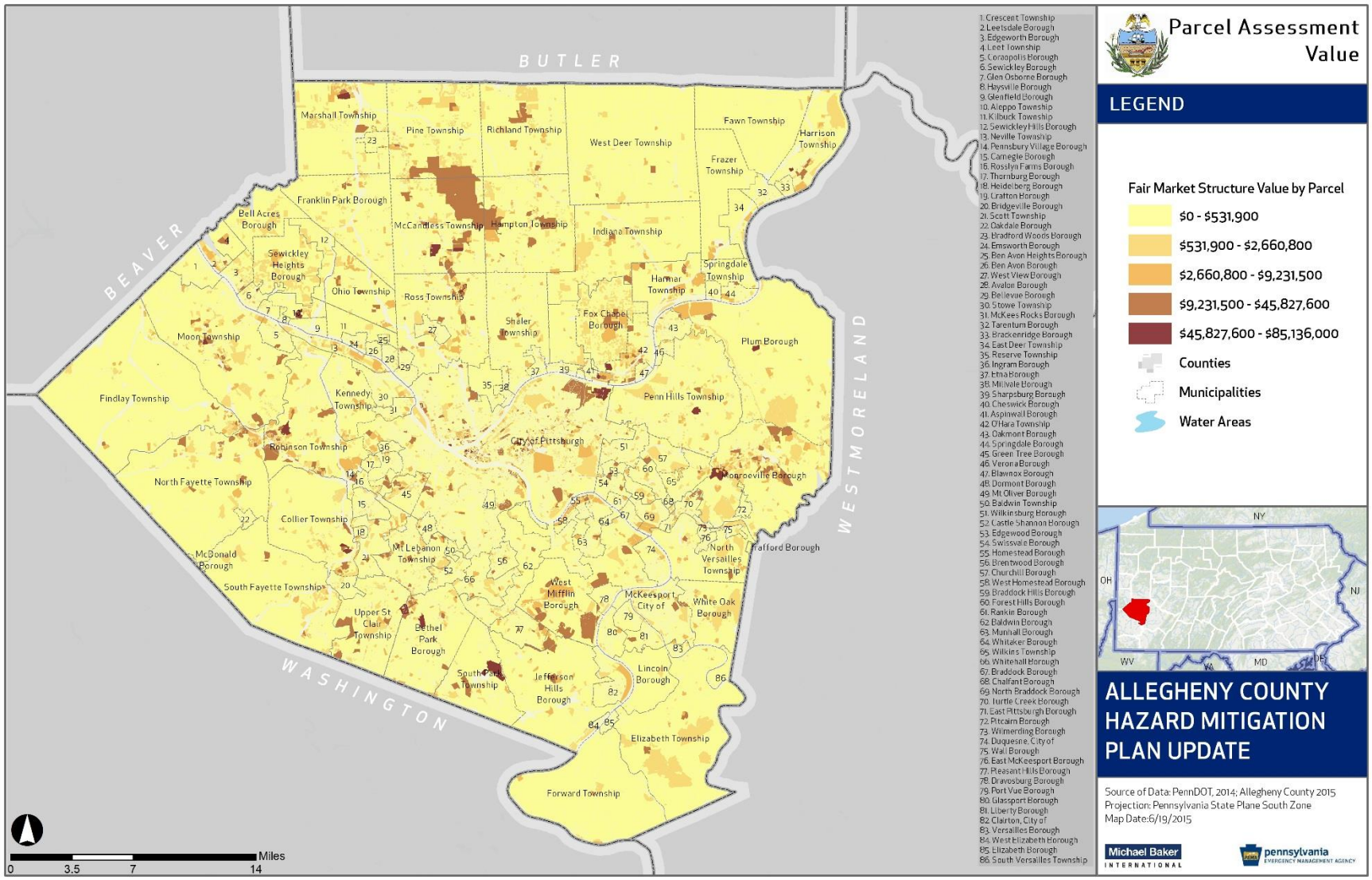
Potential loss estimates have four basic components, including:

- 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.

The parcel data used in this plan includes fair market price building values provided in the county tax assessment database. These values are representative of replacement value alone; content loss, functional loss, and displacement cost are not included. At the same time, though, they provide an indication of the total exposed value of buildings countywide. Figure 4.4-1 illustrates the range of

structure values by parcel in Allegheny County. The 580,510 parcels in Allegheny County have a cumulative assessed building value of over $79 billion. The largest municipalities in the County, such as the City of Pittsburgh, Pine Township, and Bethel Park Borough, have the potential to incur the greatest loss. Municipalities with smaller populations and a smaller number of parcels are anticipated to experience the lower losses, but even small losses in these communities can be devastating.

Figure 4.4-1 Allegheny County Parcel Assessed Values.



While Figure 4.4-1 looks at the total structure value countywide, FEMA has also calculated the Total Exposure in Floodplain 1.0 (TEIF) as a potential flood risk estimation. TEIF 1.0 data provides an approximate value of economic losses and a relative comparison of potential flood loss. This data highlights which communities have the highest exposure in the floodplain and provides a statewide comparison. In Allegheny County, the City of Pittsburgh and Sharpsburg Borough both rank in the top 20 communities in Pennsylvania for highest potential losses (ranked fourth and 13th, respectively). Table 4.4-4 provides the TEIF 1.0 data for all communities in Allegheny County.

Table 4.4-4 Total Exposure in Floodplain (FEMA, 2014).

MUNICIPALITY	TOTAL EXPOSURE IN FLOODPLAIN	COUNTY RANKING	STATE RANKING
Aleppo Township	$525,210	116	2,382
Aspinwall Borough	$4,114,074	100	1,951
Avalon Borough	$7,552,900	88	1,599
Baldwin Borough	$31,803,638	45	604
Baldwin Township	$6,755,499	90	1,679
Bell Acres Borough	$6,685,065	91	1,684
Bellevue Borough	$10,653,490	82	1,375
Ben Avon Borough	$5,682,015	95	1,788
Ben Avon Heights Borough	$0	N/A	N/A
Bethel Park, Municipality of	$24,909,267	51	741
Blawnox Borough	$14,818,089	72	1,110
Brackenridge Borough	$24,986,617	50	737
Braddock Borough	$49,808,967	28	404
Braddock Hills Borough	$0	N/A	N/A
Bradford Woods Borough	$241,391	118	2,412
Brentwood Borough	$395,130	117	2,398
Bridgeville Borough	$54,986,021	23	361
Carnegie Borough	$41,012,673	32	476
Castle Shannon Borough	$24,176,106	52	769
Chalfant Borough	$0	N/A	N/A
Cheswick Borough	$5,905,065	94	1,764
Churchill Borough	$4,887,334	98	1,862
Clairton City	$17,521,696	63	976
Collier Township	$52,836,614	25	374
Coraopolis Borough	$100,734,542	13	156
Crafton Borough	$3,869,261	102	1,988
Crescent Township	$9,860,048	85	1,433
Dormont Borough	$0	N/A	N/A
Dravosburg Borough	$15,630,156	68	1,062
Duquesne, City of	$21,257,129	54	838
East Deer Township	$21,360,404	53	834

Table 4.4-4 Total Exposure in Floodplain (FEMA, 2014).			
MUNICIPALITY	TOTAL EXPOSURE IN FLOODPLAIN	COUNTY RANKING	STATE RANKING
East McKeesport Borough	$0	N/A	N/A
East Pittsburgh Borough	$12,425,641	78	1,243
Edgewood Borough	$15,344,470	70	1,078
Edgeworth Borough	$0	N/A	N/A
Elizabeth Borough	$12,991,611	75	1,209
Elizabeth Township	$108,607,247	11	141
Emsworth Borough	$19,771,209	59	879
Etna Borough	$153,174,896	3	89
Fawn Township	$31,728,595	46	605
Findlay Township	$38,848,268	35	501
Forest Hills Borough	$0	N/A	N/A
Forward Township	$15,569,735	69	1,066
Fox Chapel Borough	$11,335,680	81	1,321
Franklin Park Borough	$32,675,507	43	587
Frazer Township	$1,348,134	113	2,291
Glassport Borough	$14,114,993	73	1,150
Glen Osborne Borough	$3,424,482	104	2,036
Glenfield Borough	$36,714,171	37	529
Green Tree Borough	$2,598,197	108	2,139
Hampton Township	$69,141,022	19	268
Harmar Township	$35,780,824	38	538
Harrison Township	$17,138,896	64	991
Haysville Borough	$2,322,700	110	2,174
Heidelberg Borough	$9,313,796	86	1,469
Homestead Borough	$1,869,438	112	2,233
Indiana Township	$32,764,293	42	585
Ingram Borough	$0	N/A	N/A
Jefferson Hills Borough	$54,608,064	24	365
Kennedy Township	$3,393,161	105	2,045
Kilbuck Township	$4,886,377	99	1,863
Leet Township	$32,024,817	44	600
Leetsdale Borough	$74,075,433	17	242
Liberty Borough	$7,646,538	87	1,589
Lincoln Borough	$3,969,566	101	1,973
Marshall Township	$29,422,083	47	656
McCandless, Town of	$103,602,450	12	150
McDonald Borough	$16,967,595	65	1,002
McKees Rocks Borough	$143,791,941	4	95
McKeesport, City of	$132,658,524	6	105

Table 4.4-4 Total Exposure in Floodplain (FEMA, 2014).

MUNICIPALITY	TOTAL EXPOSURE IN FLOODPLAIN	COUNTY RANKING	STATE RANKING
Millvale Borough	$126,759,974	7	111
Monroeville, Municipality of	$110,985,402	10	138
Moon Township	$89,937,981	15	184
Mount Lebanon, Municipality of	$15,030,027	71	1,097
Mount Oliver Borough	$0	N/A	N/A
Munhall Borough	$19,680,240	60	882
Neville Township	$112,257,823	9	136
North Braddock Borough	$16,028,887	67	1,047
North Fayette Township	$45,702,128	31	429
North Versailles Township	$19,415,500	61	889
Oakdale Borough	$20,116,219	57	870
Oakmont Borough	$34,752,569	40	552
O'Hara Township	$91,104,278	14	181
Ohio Township	$6,644,197	92	1,687
Penn Hills, Municipality of	$36,850,717	36	527
Pennsbury Village Borough	$0	N/A	N/A
Pine Township	$18,481,556	62	930
Pitcairn Borough	$73,367,874	18	245
Pittsburgh, City of	$1,631,622,779	1	4
Pleasant Hills Borough	$604,469	115	2,368
Plum Borough	$64,199,038	20	293
Port Vue Borough	$10,323,397	83	1,393
Rankin Borough	$39,196,062	34	495
Reserve Township	$3,326,175	106	2,054
Richland Township	$29,394,828	48	658
Robinson Township	$58,209,236	21	330
Ross Township	$56,768,489	22	347
Rosslyn Farms Borough	$6,423,995	93	1,708
Scott Township	$49,353,113	29	407
Sewickley Borough	$10,260,165	84	1,399
Sewickley Heights	$2,479,269	109	2,152
Sewickley Hills Borough	$1,116,563	114	2,315
Shaler Township	$125,873,910	8	112
Sharpsburg Borough	$520,085,254	2	13
South Fayette Township	$139,212,315	5	100
South Park Township	$51,058,698	26	392
South Versailles Township	$3,857,786	103	1,989
Springdale Borough	$12,081,465	79	1,264
Springdale Township	$7,533,802	89	1,603

Table 4.4-4 Total Exposure in Floodplain (FEMA, 2014).			
MUNICIPALITY	TOTAL EXPOSURE IN FLOODPLAIN	COUNTY RANKING	STATE RANKING
Stowe Township	$16,632,667	66	1,019
Swissvale Borough	$33,091,549	41	579
Tarentum Borough	$25,467,247	49	726
Thornburg Borough	$12,763,161	76	1,220
Trafford Borough	$46,534,902	30	426
Turtle Creek Borough	$51,045,130	27	394
Upper St. Clair Township	$83,311,127	16	206
Verona Borough	$34,834,987	39	549
Versailles Borough	$13,454,145	74	1,182
Wall Borough	$2,758,922	107	2,115
West Deer Township	$39,246,889	33	494
West Elizabeth Borough	$5,531,772	97	1,806
West Homestead Borough	$20,008,920	58	871
West Mifflin Borough	$20,456,405	56	863
West View Borough	$0	N/A	N/A
Whitaker Borough	$1,910,319	111	2,229
White Oak Borough	$11,636,513	80	1,292
Whitehall Borough	$5,608,451	96	1,794
Wilkins Township	$20,856,928	55	850
Wilkinsburg Borough	$0	N/A	N/A
Wilmerding Borough	$12,619,047	77	1,233
GRAND TOTAL	**$5,966,884,018**	**N/A**	**N/A**

Historical losses resulting from hazards in Allegheny County are determined through reports from NCDC and SHELDUS for flooding, tornado and windstorms, and winter storms. As reported in the Flood, Flash Flood, Ice Jam profile, past events have accumulated over $205 million in damages, an average of over $850,000 in property damage per event. Since 1996, flood events have caused 7 deaths in Allegheny County and 93 injuries. Nearly all of those injuries occurred during a single event, the remnants of Ivan; this indicates how high losses can be for a single, catastrophic event. Tornadoes resulted in 2 fatalities, 145 injuries and $296,180,000 in property damages. Wind storms, which tend to be more frequent, resulted in one fatality, 65 injuries, and a cumulative $53.1 million in property damage. Looking just at events with wind speeds of over 50 knots, the average property damage per event was $196,941. Winter storms caused $165,740,000 in property damages. Averaged over the 81 events on record, losses average out to over $200,000 per storm event.

The PHMSA incidence reports for hazardous material releases in transit indicate that losses per event are generally small, around $1,150 per incident. However, damages ranged from $0 to $1.3 million for a single event.

Agricultural production in Allegheny County is highly vulnerable to natural hazard events, particularly drought. Data on agricultural losses are available from the USDA Risk Management Agency. 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 Allegheny County. All historic insured crop losses in Allegheny County have been due to drought, for a total loss of $78,351.00. Looking holistically at agricultural production, any portion of Allegheny County's $10.4 million in agricultural products could be lost in a disaster event.

Prior flood losses can indicate future losses. Table 4.4-5 shows the total amount of claims paid in each municipality according to CIS. The City of Pittsburgh has the highest total paid claims and premium and coverage. Thirteen municipalities have never had a claim paid despite having policies in force in the community, while Pennsbury Village does not participate in the NFIP.

Table 4.4-5 NFIP Premium and Coverage and Claims Information (CIS, 2015).

MUNICIPALITY	TOTAL PREMIUM AND COVERAGE	TOTAL AMOUNT OF PAID CLAIMS
Aleppo Township	$1,130,555.00	$1,656.00
Aspinwall Borough	$1,937,569.00	$53,857.00
Avalon Borough	$7,765,599.00	$210,382.00
Baldwin Borough	$1,243,887.00	$4,984.00
Baldwin Township	$1,342,064.00	$129,627.00
Bell Acres Borough	$350,000.00	$8,191.00
Bellevue Borough	$105,000.00	$0.00
Ben Avon Borough	$1,023,706.00	$57,263.00
Ben Avon Heights Borough	$11,545,934.00	$381,237.00
Bethel Park, Municipality of	$2,443,721.00	$11,750.00
Blawnox Borough	$2,852,873.00	$14,369.00
Brackenridge Borough	$794,953.00	$41,963.00
Braddock Borough	$3,885,621.00	$28,025.00
Braddock Hills Borough	$280,000.00	$0.00
Bradford Woods Borough	$2,488,200.00	$16,673.00
Brentwood Borough	$10,462,228.00	$1,616,711.00
Bridgeville Borough	$30,096,609.00	$3,042,532.00
Carnegie Borough	$5,295,524.00	$180,707.00
Castle Shannon Borough	$280,000.00	$3,618.00
Chalfant Borough	$1,521,717.00	$51,646.00
Cheswick Borough	$3,649,357.00	$104,768.00
Churchill Borough	$95,109.00	$70,348.00
Clairton City	$10,800,525.00	$168,259.00
Collier Township	$11,525,986.00	$74,970.00
Coraopolis Borough	$958,173.00	$77,716.00
Crafton Borough	$1,389,143.00	$487.00

Table 4.4-5 NFIP Premium and Coverage and Claims Information (CIS, 2015).		
MUNICIPALITY	TOTAL PREMIUM AND COVERAGE	TOTAL AMOUNT OF PAID CLAIMS
Crescent Township	$168,000.00	$2,902.00
Dormont Borough	$1,217,958.00	$68,543.00
Dravosburg Borough	$280,000.00	$0.00
Duquesne, City of	$7,654,304.00	$58,325.00
East Deer Township	$70,000.00	$0.00
East McKeesport Borough	$1,756,166.00	$143,139.00
East Pittsburgh Borough	$400,352.00	$0.00
Edgewood Borough	$2,032,729.00	$1,319.00
Edgeworth Borough	$3,021,292.00	$277,643.00
Elizabeth Borough	$15,921,785.00	$2,275,651.00
Elizabeth Township	$2,688,945.00	$262,817.00
Emsworth Borough	$26,074,117.00	$5,799,296.00
Etna Borough	$5,487,508.00	$641,762.00
Fawn Township	$4,323,849.00	$68,707.00
Findlay Township	$4,571,079.00	$63,616.00
Forest Hills Borough	$3,121,285.00	$159,664.00
Forward Township	$17,113,138.00	$25,084.00
Fox Chapel Borough	$5,424,869.00	$65,788.00
Franklin Park Borough	$191,000.00	$5,345.00
Frazer Township	$1,833,172.00	$26,077.00
Glassport Borough	$1,533,492.00	$127,530.00
Glen Osborne Borough	$4,947,191.00	$245,979.00
Glenfield Borough	$1,584,369.00	$43,364.00
Green Tree Borough	$12,038,394.00	$1,599,332.00
Hampton Township	$6,458,668.00	$1,193,256.00
Harmar Township	$2,390,140.00	$120,156.00
Harrison Township	$1,752,103.00	$3,749.00
Haysville Borough	$7,367,748.00	$701,823.00
Heidelberg Borough	$1,003,593.00	$0.00
Homestead Borough	$4,870,782.00	$130,552.00
Indiana Township	$339,900.00	$10,832.00
Ingram Borough	$9,749,411.00	$522,921.00
Jefferson Hills Borough	$2,036,139.00	$0.00
Kennedy Township	$2,395,800.00	$416,976.00
Kilbuck Township	$3,568,130.00	$112,522.00
Leet Township	$18,443,059.00	$29,949.00
Leetsdale Borough	$55,000.00	$0.00
Liberty Borough	$757,284.00	$0.00

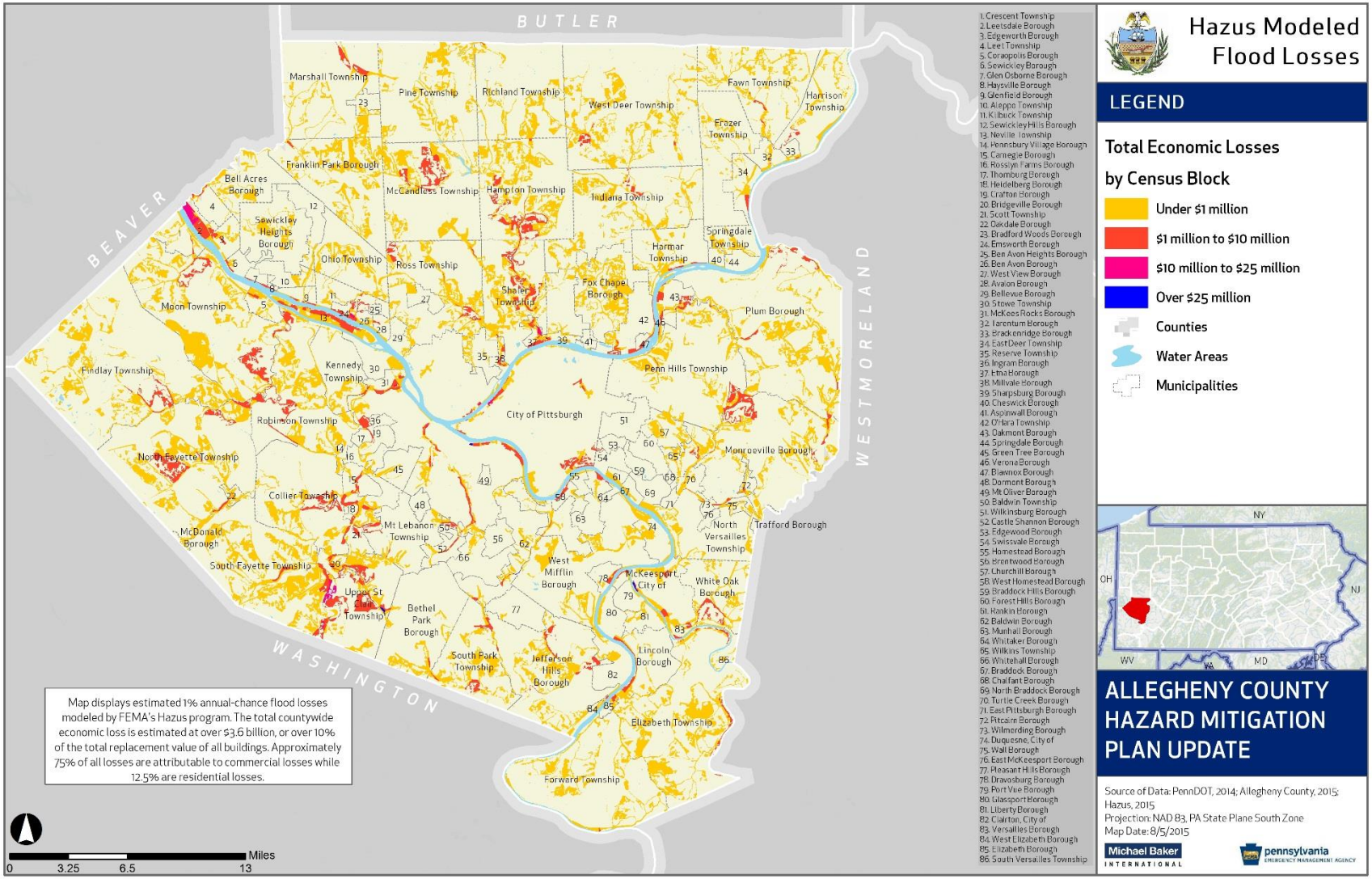
Table 4.4-5 NFIP Premium and Coverage and Claims Information (CIS, 2015).		
MUNICIPALITY	TOTAL PREMIUM AND COVERAGE	TOTAL AMOUNT OF PAID CLAIMS
Lincoln Borough	$7,860,429.00	$28,089.00
Marshall Township	$20,104,791.00	$668,055.00
McCandless, Town of	$3,176,442.00	$309,461.00
McDonald Borough	$25,338,453.00	$1,884,168.00
McKees Rocks Borough	$7,163,310.00	$458,475.00
McKeesport, City of	$15,451,884.00	$3,896,040.00
Millvale Borough	$18,260,582.00	$307,011.00
Monroeville, Municipality of	$6,202,357.00	$65,862.00
Moon Township	$0.00	$0.00
Mount Lebanon, Municipality of	$15,584,559.00	$41,014.00
Mount Oliver Borough	$0.00	$0.00
Munhall Borough	$1,193,253.00	$3,073.00
Neville Township	$24,758,875.00	$46,602.00
North Braddock Borough	$0.00	$0.00
North Fayette Township	$12,181,637.00	$1,221,606.00
North Versailles Township	$1,391,546.00	$64,900.00
Oakdale Borough	$7,996,032.00	$2,477,073.00
Oakmont Borough	$16,621,655.00	$61,004.00
O'Hara Township	$21,090,938.00	$156,843.00
Ohio Township	$2,478,285.00	$51,503.00
Penn Hills, Municipality of	$11,442,801.00	$223,911.00
Pennsbury Village Borough	$0.00	$0.00
Pine Township	$1,962,881.00	$19,894.00
Pitcairn Borough	$6,862,349.00	$567,908.00
Pittsburgh, City of	$190,228,943.00	$8,533,723.00
Pleasant Hills Borough	$1,295,423.00	$40,684.00
Plum Borough	$9,790,771.00	$789,077.00
Port Vue Borough	$2,315,354.00	$100,868.00
Rankin Borough	$28,000.00	$ 694.00
Reserve Township	$1,162,745.00	$28,133.00
Richland Township	$3,396,716.00	$52,801.00
Robinson Township	$13,208,225.00	$1,141,285.00
Ross Township	$30,561,419.00	$1,090,576.00
Rosslyn Farms Borough	$3,110,697.00	$2,894.00
Scott Township	$15,829,056.00	$276,783.00
Sewickley Borough	$6,758,711.00	$97,850.00
Sewickley Heights	$1,178,831.00	$25,599.00
Sewickley Hills Borough	$1,162,851.00	$0.00

Table 4.4-5 NFIP Premium and Coverage and Claims Information (CIS, 2015).		
MUNICIPALITY	TOTAL PREMIUM AND COVERAGE	TOTAL AMOUNT OF PAID CLAIMS
Shaler Township	$32,827,583.00	$3,627,992.00
Sharpsburg Borough	$17,899,284.00	$1,507,064.00
South Fayette Township	$19,082,242.00	$2,903,103.00
South Park Township	$6,110,363.00	$982,524.00
South Versailles Township	$300,418.00	$14,710.00
Springdale Borough	$1,002,880.00	$4,726.00
Springdale Township	$105,000.00	$12,382.00
Stowe Township	$3,630,238.00	$20,745.00
Swissvale Borough	$1,155,753.00	$0.00
Tarentum Borough	$4,186,072.00	$251,151.00
Thornburg Borough	$2,907,207.00	$7,271.00
Trafford Borough	$3,339,308.00	$175,343.00
Turtle Creek Borough	$5,679,083.00	$1,043,418.00
Upper St. Clair Township	$23,917,217.00	$377,299.00
Verona Borough	$7,965,687.00	$406,242.00
Versailles Borough	$399,346.00	$0.00
Wall Borough	$1,207,874.00	$0.00
West Deer Township	$5,916,340.00	$94,594.00
West Elizabeth Borough	$1,712,412.00	$874,727.00
West Homestead Borough	$455,000.00	$ 382
West Mifflin Borough	$2,039,410.00	$207,439.00
West View Borough	$1,513,421.00	$5,720.00
Whitaker Borough	$0.00	$0.00
White Oak Borough	$3,021,453.00	$47,424.00
Whitehall Borough	$2,388,485.00	$80,330.00
Wilkins Township	$5,048,440.00	$854,158.00
Wilkinsburg Borough	$576,302.00	$4,042.00
Wilmerding Borough	$3,863,150.00	$4,294.00
GRAND TOTAL	**$965,307,573.00**	**$59,795,334.00**

In addition to these losses, this plan employed an enhanced Hazus analysis for floods. As opposed to basic analysis using only default data, enhanced analysis incorporates some kind of more recent, up-to-date, or specific data for inclusion in the hazard models. The enhanced data incorporated into this HMP update include updated essential facilities from Allegheny County and Flood Depth Grid generated during Allegheny County's Risk MAP process. The model also used Hazus's dasymetric general building stock data. For more details on the methodology used to update the Hazus data and view the Global Summary Report, see Appendix F.

Using these datasets in HAZUS-MH Version 2.2, total economic losses from a 1%-annual-chance flood in Allegheny County are estimated to top $3.6 billion. Residential occupancies make up only 12.5% of the total estimated building-related losses. Unlike many counties in Pennsylvania, the vast majority of building-related losses are related to commercial occupancies instead of residential occupancies. Figure 4.4-2 shows a distribution of building-related losses by census block across Allegheny County. Losses are spread around the county, but the highest losses are anticipated in Sharpsburg Borough, the City of Pittsburgh, and Shaler Township; these three communities alone account for $2.3 billion of the estimated losses. In this scenario, an expected 1,250 buildings would be moderately damaged and an estimated 32 of the essential facilities (fire stations, hospitals, police stations, and schools) would be at least moderately damaged.

Figure 4.4-2 Hazus Modeled Flood Losses



4.5 Future Development and Vulnerability

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

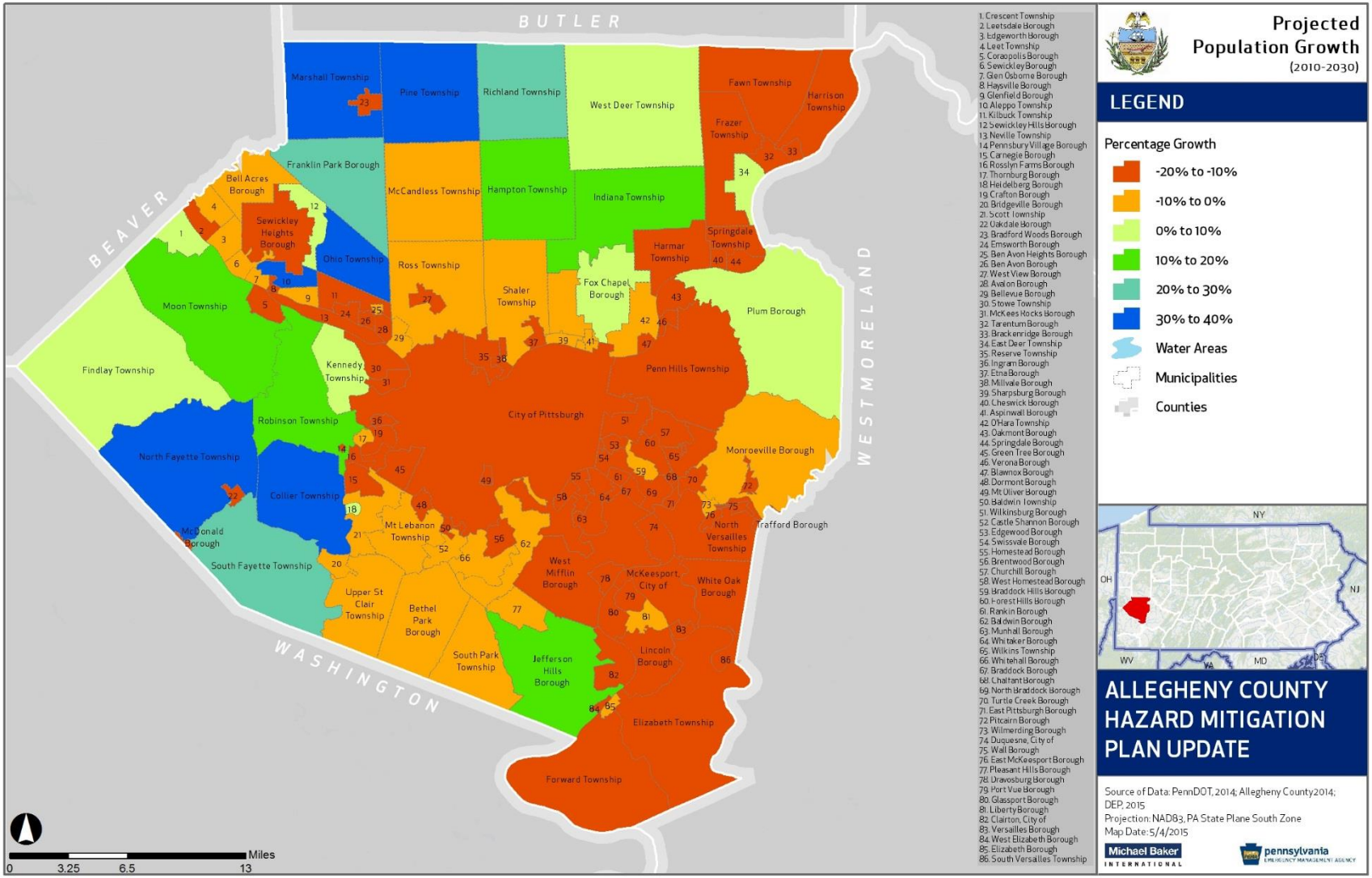
Population change is perhaps the most significant indicator of changes in vulnerability in the future. As discussed in Section 2.3, the total population in Allegheny County decreased between the 2000 and 2010 Census. However, population projections issued by PA DEP show a declining trend in population loss for the County as a whole, as seen in Table 4.5-1. It is important to note that these population figures are projections only and are derived from birth rates, death rates, and migration information; if there are shifts in these patterns, the projections may change.

Table 4.5-1 Population Projections for Allegheny County (PADEP, 2015)

2000 CENSUS	2010 CENSUS	10-YEAR PERCENT CHANGE	2020 PROJECTED	10-YEAR PERCENT CHANGE	2030 PROJECTED	10-YEAR PERCENT CHANGE	2040 PROJECTED	10-YEAR PERCENT CHANGE
1,281,710	1,223,348	-5	1,179,072	-4	1,155,460	-2	1,136,415	-1.6

Figure 4.5-1 displays the percent of growth or decline in municipal population between years 2010 and 2030 in Allegheny County, as estimated by the PADEP. Although a majority of the most populated municipalities are projected to experience a decrease in population, these areas still maintain the highest density of population in the County. As seen in Figure 2.3-1, the vast majority of the County's population is concentrated around the City of Pittsburgh. As such, hazard vulnerability and loss estimates are higher in this area.

Figure 4.5-1 Projected Population Growth from 2010-2030 in Allegheny County



The Allegheny Future Land Use Plan, within the County Comprehensive Plan Allegheny Places, was developed to serve as a guide for development in the County into the year 2025. The Allegheny Future Land Use Plan describes 8 different types of unique "places" and describes the appropriate type and level of development that would support each place. Most of the identified places include a mix of land uses and build on existing infrastructure. For example, places may include a variety of land use elements such as:

- **Infill Areas:** Provide opportunities for new development and redevelopment on vacant, abandoned or under-utilized properties.
- **Conservation Areas:** Sensitive environmental features, scenic landscapes and cultural resources that are only meant for very limited or no development.
- **Greenway Networks:** interconnected network of natural resource and recreational amenities.
- **River Networks**: major water features in the County.
- **Transportation Networks**: major transportation corridors.

There are not a set of defined growth areas; instead, many of the place-types could support future growth. The intent of developing places for targeted development is to provide an efficient and economical way to allow for both new growth and revitalization, meet a diversity of needs, support transit, reduce consumption of open space, and protect environmentally sensitive resources. There are streams and floodplains, environmentally sensitive areas, steep slopes, and coal mined areas throughout these places, but through enforcement of codes and ordinances at both the local and county level, new growth is funneled away from potential hazard areas.

The 8 places identified in the Allegheny Future Land Use Plan are:

1. **Airport-Industry:** Located in close proximity to Pittsburgh International Airport, and mainly include sites that have been targeted by the County and developers for office and light industrial development.
2. **The Core:** Located in downtown Pittsburgh and Oakland. Much new development in Core Places will be infill development, rehabilitation and reuse of existing buildings, and adaptive reuse of former industrial or warehouse sites and structures.
3. **Corridors:** Have good access to major transportation corridors and highway interchanges. They are relatively intense, mixed-use hubs of office, industrial, commercial and residential uses. Corridor Places can accommodate high-intensity land uses that require large amounts of land such as regional shopping centers, industrial parks, and business parks.
    - Interstate 79
    - Route 28
    - Interstate 279
    - Route 48
    - Future I-376 (Parkway West)
    - Route 50
    - Route 8
    - Route 51

- Route 19
- Route 65
- Route 22
- Mon/Fayette Expressway

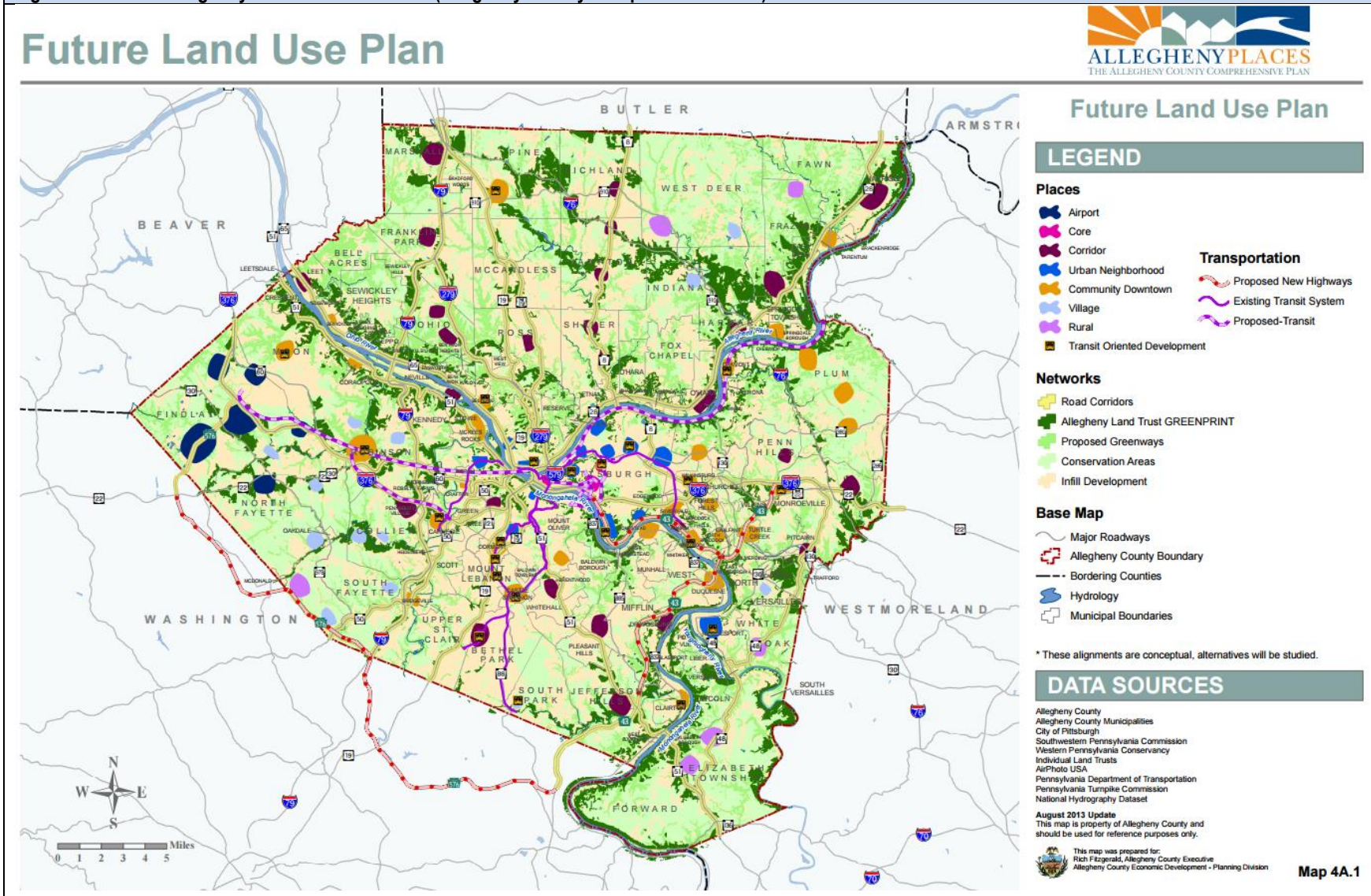
4. **Urban Neighborhoods:** Located within urban areas like the cities of Pittsburgh and McKeesport. They build on existing business districts and mixed-used areas in older, densely developed neighborhoods, and include more regionally-oriented services with a mix of housing types in a walkable setting.
5. **Community Downtowns:** Similar in character to Urban Neighborhoods, but are less densely developed. Most, but not all, Community Downtowns build on the existing business districts and downtowns in older communities.
6. **Villages:** Located in suburban communities throughout the County. Village Places are characterized by a mix of residences and small-scale, low-intensity businesses and services that primarily serve neighborhood needs. Non-residential development should neither generate, nor depend on, large volumes of vehicular traffic.
7. **Rural Places:** Located along the "edges" of the County in municipalities that are less developed. Rural Places are the least densely developed of all the types of Places. They will be primarily residential in nature, with a focus on single-family detached housing. Non-residential development will be limited mainly to recreation and essential supporting services.
8. **Transit-Oriented Developments (TODs):** A mix of relatively dense residential, office and retail uses at transit stations or transit stops, to maximize pedestrian access to transit. TOD is an overlay on selected Places that are located along the existing 'T' line and busways, and on proposed new transit lines. TOD Places will incorporate both infill development, and substantial new development on large parcels when available

Some of the Key Challenges identified in Allegheny County's future land use plan are:

- Sprawl in the northern and western portions of the County
- Declining population, especially in core areas
- Disinvestment in older communities
- Brownfields that have high clean-up costs and hinder river access
- A large number of local governments
- Poor condition of housing stock in older communities and the need for demolition

Figure 4.5-3 shows the map of future land use created for Allegheny County's Comprehensive Plan.

Figure 4.5-2 Allegheny Future Land Use Plan (Allegheny County Comprehensive Plan).



As previously discussed, brownfields redevelopment is a key issue for Allegheny County because of its strong industrial legacy. According to the EPA, a brownfield is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Remediating brownfields is a key economic growth strategy for the Commonwealth, as remediating brownfields both improves environmental quality and returns the property to productive use. However, care must be taken to address remediation in particular for brownfields located in hazard areas, as the hazard could exacerbate the environmental challenges faced by brownfields. Table 4.5-2 lists the communities in Allegheny County that have brownfields redevelopment opportunities as reported to the EPA Brownfields Program along with their vulnerability to each hazard as defined in each Section 4.3.X.5. Please note that there is no single, comprehensive inventory of brownfields available. Brownfields are often identified when a phase I environmental site assessment indicates that there was potential contamination. The data from the EPA represents the 130 brownfields reported to the EPA through the Assessment, Cleanup, and Redevelopment Exchange System. A detailed listing of the name, address, and vulnerability of each site can be found in Appendix H.

Table 4.5-2 Municipal brownfield vulnerability.

MUNICIPALITY	TOTAL BROWNFIELDS	BROWNFIELDS IN SFHA	BROWNFIELDS IN STEEP SLOPE AREAS	BROWNFIELDS IN COAL MINED AREAS	BROWNFIELDS IN WOODED AREAS	BROWNFIELDS IN DAM INUNDATION AREAS	BROWNFIELDS WITHIN 1.5 MILES OF A SARA FACILITY	BROWNFIELDS WITHIN 1,000 YARDS OF UNCONVENTIONAL OIL/GAS WELL	BROWNFIELDS WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	BROWNFIELDS WITHIN 1.5 MILES OF A COAL MINE	BROWNFIELDS IN LEVEE FAILURE AREAS	BROWNFIELDS WITHIN 0.5 MILES OF RAIL	BROWNFIELDS WITHIN 0.5 MILES OF MAJOR ROADS
Blawnox Borough	3	0	0	0	0	0	3	0	0	0	0	3	3
Clairton City	3	0	0	0	0	0	3	0	3	0	2	3	3
Coraopolis Borough	2	0	0	0	0	0	2	0	2	0	0	2	2
City of Duquesne	6	0	1	0	0	0	6	0	0	0	3	6	6
East Deer Township	3	0	0	1	0	0	3	0	3	1	0	2	2
Etna Borough	7	2	0	0	0	6	7	0	0	0	6	7	7
Harrison Township	3	0	0	0	0	0	1	0	3	0	0	0	0
Homestead Borough	2	0	0	0	0	0	2	0	0	0	0	2	2
McKees Rocks Borough	16	1	0	0	0	0	16	0	0	0	0	16	15
City of McKeesport	4	0	0	0	0	0	4	0	1	0	1	3	3
Millvale Borough	16	14	1	0	0	0	16	0	0	0	0	13	13
Neville Township	4	1	0	0	0	0	4	0	4	0	0	4	4
City of Pittsburgh	22	1	1	0	0	0	22	0	0	0	0	21	21
Ross Township	1	0	1	0	0	0	1	0	1	0	0	1	1
Shaler Township	12	1	0	0	0	7	12	0	5	0	2	12	12
Sharpsburg Borough	19	2	0	0	0	0	19	0	0	0	0	19	19
Springdale Borough	1	0	0	0	0	0	1	0	1	0	0	1	0
Stowe Township	1	0	0	0	0	0	1	0	0	0	0	0	1

Table 4.5-2 Municipal brownfield vulnerability.

MUNICIPALITY	TOTAL BROWNFIELDS	BROWNFIELDS IN SFHA	BROWNFIELDS IN STEEP SLOPE AREAS	BROWNFIELDS IN COAL MINED AREAS	BROWNFIELDS IN WOODED AREAS	BROWNFIELDS IN DAM INUNDATION AREAS	BROWNFIELDS WITHIN 1.5 MILES OF A SARA FACILITY	BROWNFIELDS WITHIN 1,000 YARDS OF UNCONVENTIONAL OIL/GAS WELL	BROWNFIELDS WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	BROWNFIELDS WITHIN 1.5 MILES OF A COAL MINE	BROWNFIELDS IN LEVEE FAILURE AREAS	BROWNFIELDS WITHIN 0.5 MILES OF RAIL	BROWNFIELDS WITHIN 0.5 MILES OF MAJOR ROADS
Thornburg Borough	2	0	0	2	0	0	2	0	2	0	0	2	2
Versailles Borough	1	0	0	0	0	0	0	0	1	0	0	1	1
West Elizabeth Borough	1	0	0	0	0	0	1	0	1	0	0	1	1
Wilmerding Borough	1	0	0	0	0	0	1	0	1	0	0	1	1
Grand Total	**130**	**22**	**4**	**3**	**0**	**13**	**127**	**0**	**28**	**1**	**14**	**120**	**119**

In addition to population growth and brownfields redevelopment, historical building permit activity provides insight into ongoing development in the County. The Department of Housing and Urban Development (HUD) maintains data on the number of building permits issued for residential construction by jurisdictions across the U.S., data which is culled from the U.S. Census Bureau's Building Permits Survey. The number of building permits by municipality for Allegheny County was obtained from HUD's State of the Cities Data Systems (SOCDS) database for years 2010 through 2014.

Table 4.5-3 displays the number of residential building permits issued by municipality for Allegheny County over the last five years. Although this is the most complete dataset for building permits available, it is an incomplete list as Allegheny County is not completely covered by permitting systems. Also, municipalities that issued no permits were excluded from the table.

Table 4.5-3 Building Permits Issued in Allegheny County between 2010-2014 (HUD, 2015)

COMMUNITY	2010	2011	2012	2013	2014	TOTAL UNITS
Aspinwall Borough	0	1	0	0	0	1
Brentwood Borough	0	0	1	0	0	1
Churchill Borough	0	0	0	0	1	1
Emsworth Borough	0	0	1	0	0	1
Liberty Borough	1	0	0	0	0	1
Neville Township	0	0	0	0	1	1
Glen Osborne Borough	0	0	1	0	0	1
Stowe Township	1	0	0	0	0	1
Tarentum Borough	0	1	0	0	0	1
Bellevue Borough	0	0	1	1	0	2
Ben Avon Heights Borough	0	0	0	0	2	2
Castle Shannon Borough	0	0	1	0	1	2
Cheswick Borough	0	0	0	0	2	2
Crescent Township	0	2	0	0	0	2
Ingram Borough	0	0	0	2	0	2
Kilbuck Township	1	1	0	0	0	2
North Braddock Borough	2	0	0	0	0	2
Springdale Township	0	0	0	1	1	2
West View Borough	0	0	0	0	2	2
Whitaker Borough	1	1	0	0	0	2
Aleppo Township	0	0	0	2	1	3
Bridgeville Borough	1	0	1	0	1	3
Crafton Borough	2	1	0	0	0	3
Forest Hills Borough	2	0	1	0	0	3
Heidelberg Borough	2	0	1	0	0	3
Munhall Borough	0	0	0	0	3	3
White Oak Borough	1	1	1	0	0	3

Table 4.5-3 Building Permits Issued in Allegheny County between 2010-2014 (HUD, 2015)						
COMMUNITY	2010	2011	2012	2013	2014	TOTAL UNITS
Wilkinsburg Borough	0	3	0	0	0	3
Dormont Borough	4	0	0	0	0	4
Fawn Township	2	1	1	0	0	4
Frazer Township	0	1	1	0	2	4
Glenfield Borough	0	4	0	0	0	4
Wilkins Township	1	2	0	0	1	4
Bradford Woods Borough	1	1	1	1	1	5
West Mifflin Borough	1	1	0	1	2	5
Edgeworth Borough	0	2	1	1	2	6
Springdale Borough	0	1	2	3	0	6
West Homestead Borough	6	0	0	0	0	6
Bell Acres Borough	3	3	0	1	0	7
Sewickley Heights	1	0	3	1	2	7
Penn Hills, Municipality of	3	1	2	0	2	8
Ben Avon Borough	0	0	3	6	0	9
Forward Township	2	1	1	5	1	10
Scott Township	0	1	0	1	8	10
Elizabeth Borough	0	0	0	8	5	13
Whitehall Borough	0	3	4	6	1	14
Oakdale Borough	0	0	7	7	1	15
Mount Lebanon, Municipality of	2	6	2	1	5	16
Fox Chapel Borough	5	2	4	4	3	18
Shaler Township	5	8	0	5	6	24
Duquesne, City of	0	0	0	0	26	26
Pleasant Hills Borough	4	7	9	5	3	28
Monroeville, Municipality of	6	8	5	3	7	29
Bethel Park, Municipality of	10	8	6	4	2	30
Sewickley Borough	1	1	29	1	0	32
Carnegie Borough	1	0	0	1	34	36
Ross Township	11	3	4	10	10	38
North Versailles Township	0	0	0	0	40	40
Indiana Township	9	12	11	7	2	41
Sewickley Hills Borough	12	10	19	2	0	43
Elizabeth Township	6	7	13	12	7	45
South Park Township	18	10	19	6	8	61
Harrison Township	9	3	16	18	18	64
O'Hara Township	8	4	54	13	17	96
Harmar Township	0	40	53	14	1	108

Table 4.5-3 Building Permits Issued in Allegheny County between 2010-2014 (HUD, 2015)						
COMMUNITY	2010	2011	2012	2013	2014	TOTAL UNITS
Hampton Township	19	8	18	28	36	109
Oakmont Borough	0	45	15	29	26	115
Baldwin Borough	9	13	8	8	84	122
West Deer Township	24	12	9	42	40	127
McCandless, Town of	41	27	24	50	28	170
Richland Township	58	40	48	28	29	203
Upper St. Clair Township	8	9	24	23	152	216
Robinson Township	46	23	44	61	51	225
Findlay Township	10	30	34	93	64	231
Kennedy Township	26	32	75	46	57	236
Plum Borough	54	40	53	60	41	248
Green Tree Borough	1	1	2	272	0	276
Jefferson Hills Borough	86	57	58	70	78	349
Franklin Park Borough	44	85	46	109	75	359
North Fayette Township	35	10	100	86	132	363
Moon Township	91	66	104	83	64	408
Collier Township	76	83	100	111	72	442
Pine Township	44	77	139	113	96	469
South Fayette Township	96	102	96	107	113	514
Ohio Township	293	56	56	59	115	579
Marshall Township	71	38	31	72	420	632
Pittsburgh, City of	147	284	137	100	338	1,006
GRAND TOTAL	**1,424**	**1,300**	**1,500**	**1,803**	**2,343**	**8,370**

As seen from Table 4.5-3, the greatest share of growth in the County over the last five years has occurred in the City of Pittsburgh – accounting for roughly 12 percent of development in the County. The following nine municipalities in the County each accounted for an average of approximately 2-7% of the County's growth and are as follows: Marshall, Ohio, South Fayette, Pine, Collier, Moon, and North Fayette Townships and Franklin Park and Jefferson Hills Boroughs.

Making use of the analysis of Allegheny County's current and future population and development 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 throughout the County, so as areas continue to grow and densify, these communities might become more vulnerable to hazards. For example, population growth and its associated development is likely to create increases in loss potential, as more people may be living in areas prone to hazards.

Although the redevelopment of land is preferable to the conversion of new land parcels for development, an increase in the population density of core urban areas in Allegheny County can increase the County's

risk to certain hazards. This development can often place additional critical facilities, businesses, transportation networks, and populations in 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. Key hazards that are specific to Allegheny County's growth and development trends include transportation accidents, environmental hazards, and urban fire and explosion.

As discussed previously, Allegheny County's comprehensive plan incorporates growth management strategies to protect environmentally sensitive areas and preserve open space, which may help to funnel growth away from hazard-prone areas. In addition, while there may be growth areas that include SFHA or other hazard areas, to comply with state requirements, municipalities have floodplain regulations that limit construction within flood-prone areas and other hazard or environmentally sensitive areas like steep slopes. These provisions are included within each municipality's and the county's subdivision and land development ordinance. The county subdivision and land development ordinance includes design standards to protect moderately steep and steep slopes, watercourses and wetlands, trees and woodlands, natural areas, air and water quality, and avoidance of hazardous development. Further, through multi-municipal and municipal comprehensive plans, environmentally sensitive areas such as biodiverse areas, floodplains, steep slopes, forested areas, landslide- prone areas, riparian corridors, and wildlife are addressed and appropriate recommendations pertaining to environmentally sensitive areas are provided.

This updated hazard mitigation plan can be used in tandem with the County's land use plan to guide future development because it identifies areas that may be more prone to hazards. Utilizing both the maps associated with the hazard mitigation plan and the future land use plan can assist Allegheny County in accomplishing their goals of development and redevelopment and make them less prone to the negative impacts of hazards.

5 CAPABILITY ASSESSMENT

5.1 Update Process Summary

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

The 2011 HMP update included Allegheny County's first capability assessment. This assessment was conducted using responses to the Capability Assessment Survey distributed to all municipalities and input from the County staff and other stakeholders. The 2011 HMP Update provided an inventory of the most critical local planning tools available within each municipality and a summary of the fiscal and technical capabilities available through programs and organizations outside of the County. It also identified emergency management capabilities and the processes used for implementation of the National Flood Insurance Program, gaps in capabilities, and discussed the wide variety of capabilities in Allegheny County's municipalities. The 2011 assessment did not delve into a municipal-specific accounting of capabilities. The 2015 HMP does include a municipal accounting of capabilities based on the capability assessment survey.

For the 2015 HMP update, a revised capability assessment survey was developed based on the most recent FEMA and PEMA guidance, and was shortened to collect the most essential capability information. The survey asked about the most common plans, tools, and programs found in Pennsylvania communities; about staff and personnel resources; and ended with a self-assessment of capabilities. Communities were asked to complete the information to the best of their ability. Allegheny County Economic Development also provided their central file of the availability of land use, plans, and ordinances available in each community.

If they had completed it, communities were given their 2011 Capability Assessment Survey to assist in updated the information for the 2015 HMP and reduce the amount of time needed to complete the survey. If a municipality did not complete a survey from the 2010 HMP Update, they were provided with a blank survey. The Capability Assessment survey was provided in both hard copy (at meetings) and electronic format (via e-mail and the project website) to each municipality. In addition, Allegheny County Emergency Services and Allegheny County Economic Development identified county-level capabilities.

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

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

5.2 Capability Assessment Findings

Within Pennsylvania, no county-level capability assessment would be complete without considering the constituent municipalities. Local municipalities have their own governing body, enforce their own rules and regulations, purchase their own equipment, maintain their own infrastructure, and manage their own resources. In many ways, the County is only as good as the capabilities of its constituent municipalities. As such, this capability assessment does not consider Allegheny County as a lone entity, but evaluates it in light of the various characteristics and differences of and between its municipalities.

Allegheny County's 130 municipalities carry out their daily operations and provide various community services according to their local needs and limitations. Some of these municipalities have formed cooperative agreements and work jointly with their neighboring municipalities to provide such services as police protection, fire and emergency response, wastewater treatment, water supply management, and planning, while others choose to operate on their own. They vary in staff size, resource availability, fiscal status, service provision, municipal population, overall size, and vulnerability to the profiled hazards. More information on planning and emergency services cooperative agreements can be found in Section 5.2.1, and the list of shared water suppliers can be found in Section 4.3.1.

Generally speaking, the municipalities in Allegheny County that tend to have fewer residents usually have less staff, and, by default, a more limited supply of available resources than those municipalities in the more urbanized parts of the County. This is not to say, however, that hazard mitigation is not an important factor in less populated areas of the County. It simply may require a more unified or coordinated approach and/or more efficient utilization of a limited supply of available resources (e.g., financial, technical, and human). For example, Trafford Borough or Haysville Borough, each with a resident population of under 100 persons, would not be expected, nor would it be appropriate, to engage in hazard mitigation activities on a scale similar to that of the City of Pittsburgh with its resident population of 305,841 persons. Rather, Trafford Borough or Haysville Borough would be expected to engage in hazard mitigation activities according to its local needs and available resources, which may prove to be as valuable to its residents as that of another municipality's hazard mitigation activities.

5.2.1 Planning and Regulatory Capability

Pennsylvania municipalities have the authority to govern more restrictively than the state and federal minimum requirements, as long as they are in compliance with all criteria established in the Pennsylvania Municipalities Planning Code (MPC). Municipalities can develop their own policies and programs and implement their own rules and regulations to protect and serve their local residents. Allegheny County and municipalities have used, and could continue to use, planning and regulatory tools to support the goals of this hazard mitigation plan and to provide opportunities for further mitigating the potentially negative effects of hazards.

Municipalities implement land use controls via the adoption and enforcement of zoning, subdivision and land development ordinances, building codes, building permit ordinances, floodplain, and stormwater management ordinances. When effectively prepared and administered, these regulations can lead to hazard mitigation. For example, the adoption of the NFIP and the Pennsylvania Floodplain Management Act (Act 166 of 1978) established minimum floodplain management criteria. A municipality must adopt and enforce these minimum criteria to be eligible for participation in the NFIP. Municipalities have the option of adopting a single-purpose ordinance or incorporating these provisions into their zoning and/or subdivision and land development ordinances, or building codes, thereby mitigating the potential impacts of local flooding.

5.2.1.1 Plans and Regulations

The subsections below provide details on the types of major plans and ordinances that Allegheny County and the municipalities use to support the goals of this hazard mitigation plan and provide opportunities for further mitigating the potentially negative effects of natural hazards through regulation.

Table 5.2-1 includes the regulatory capabilities that were identified by the municipalities during the planning process, as well as through Allegheny County records. Plans or ordinances that were under development at the time of this HMP and there was no prior existing plan or ordinance, were not marked as existing.

Table 5.2-1 Planning and Regulatory Capabilities

MUNICIPALITY	COMPREHENSIVE PLAN	ZONING REGULATIONS	SUBDIVISION REGULATIONS	FLOODPLAIN MANAGEMENT ORDINANCE	STORMWATER MANAGEMENT PLAN OR ORDINANCE	BUILDING CODES
Allegheny County	X	X	X	X	X	X
Aleppo Township	X	X	X	X		X
Aspinwall Borough		X	X	X		X
Avalon Borough	X	X				X
Baldwin Borough	X	X	X			X
Baldwin Township		X	X			X
Bell Acres Borough	X	X	X	X	X	X
Bellevue Borough	X	X	X	X	X	X
Ben Avon Borough	X	X				X
Ben Avon Heights Borough	X	X				X
Bethel Park, Municipality of	X	X	X	X	X	X
Blawnox Borough		X			X	X
Brackenridge Borough		X		X		X
Braddock Borough	X	X		X	X	X
Braddock Hills Borough		X	X			X
Bradford Woods Borough	X	X	X	X	X	X

Table 5.2-1 Planning and Regulatory Capabilities

MUNICIPALITY	COMPREHENSIVE PLAN	ZONING REGULATIONS	SUBDIVISION REGULATIONS	FLOODPLAIN MANAGEMENT ORDINANCE	STORMWATER MANAGEMENT PLAN OR ORDINANCE	BUILDING CODES
Brentwood Borough	X	X	X			X
Bridgeville Borough	X	X	X	X	X	X
Carnegie Borough	X	X	X	X		X
Castle Shannon Borough	X	X	X			X
Chalfant Borough		X				X
Cheswick Borough	X	X	X	X	X	X
Churchill Borough	X	X	X	X	X	X
Clairton City	X	X	X	X		X
Collier Township	X	X	X	X	X	X
Coraopolis Borough		X		X		X
Crafton Borough	X	X	X	X	X	X
Crescent Township	X	X	X		X	X
Dormont Borough	X	X	X			X
Dravosburg Borough		X			X	X
Duquesne, City of	X	X	X	X		X
East Deer Township		X	X			X
East McKeesport Borough		X	X	X	X	X
East Pittsburgh Borough	X	X				X
Edgewood Borough	X	X	X	X	X	X
Edgeworth Borough	X	X	X	X	X	X
Elizabeth Borough	X	X	X			X
Elizabeth Township	X	X	X	X	X	X
Emsworth Borough	X	X	X			X
Etna Borough	X	X	X	X	X	X
Fawn Township	X	X	X	X		X
Findlay Township	X	X	X	X	X	X
Forest Hills Borough	X	X	X	X	X	X
Forward Township	X	X	X			X
Fox Chapel Borough	X	X	X	X	X	X
Franklin Park Borough	X	X	X	X	X	X
Frazer Township	X	X	X	X	X	X
Glassport Borough	X	X	X			X
Glen Osborne Borough	X	X	X			X
Glenfield Borough		X	X	X		X
Green Tree Borough	X	X	X			X

Table 5.2-1 Planning and Regulatory Capabilities

MUNICIPALITY	COMPREHENSIVE PLAN	ZONING REGULATIONS	SUBDIVISION REGULATIONS	FLOODPLAIN MANAGEMENT ORDINANCE	STORMWATER MANAGEMENT PLAN OR ORDINANCE	BUILDING CODES
Hampton Township	X	X	X	X	X	X
Harmar Township	X	X	X	X	X	X
Harrison Township	X	X	X	X	X	X
Haysville Borough						X
Heidelberg Borough	X	X			X	X
Homestead Borough	X	X	X			X
Indiana Township	X	X	X	X	X	X
Ingram Borough		X	X			X
Jefferson Hills Borough	X	X	X	X	X	X
Kennedy Township		X	X		X	X
Kilbuck Township	X	X	X			X
Leet Township		X	X			X
Leetsdale Borough	X	X	X	X		X
Liberty Borough	X	X	X			X
Lincoln Borough	X	X	X			X
Marshall Township	X	X	X	X	X	X
McCandless, Town of	X	X	X	X	X	X
McDonald Borough		X	X			X
McKees Rocks Borough	X	X	X			X
McKeesport, City of	X	X	X			X
Millvale Borough	X	X	X	X	X	X
Monroeville, Municipality of	X	X	X			X
Moon Township	X	X	X	X	X	X
Mount Lebanon, Municipality of	X	X	X	X		X
Mount Oliver Borough	X	X	X		X	X
Munhall Borough		X	X			X
Neville Township	X	X	X	X	X	X
North Braddock Borough	X	X				X
North Fayette Township	X	X	X	X	X	X
North Versailles Township		X	X	X	X	X
Oakdale Borough	X	X	X	X	X	X
Oakmont Borough	X	X	X	X	X	X
O'Hara Township	X	X	X	X		X
Ohio Township	X	X	X			X

Table 5.2-1 Planning and Regulatory Capabilities

MUNICIPALITY	COMPREHENSIVE PLAN	ZONING REGULATIONS	SUBDIVISION REGULATIONS	FLOODPLAIN MANAGEMENT ORDINANCE	STORMWATER MANAGEMENT PLAN OR ORDINANCE	BUILDING CODES
Penn Hills, Municipality of	X	X	X	X	X	X
Pennsbury Village Borough						X
Pine Township	X	X	X	X	X	X
Pitcairn Borough	X	X	X	X	X	X
Pittsburgh, City of		X				X
Pleasant Hills Borough	X	X	X	X	X	X
Plum Borough	X	X	X		X	X
Port Vue Borough	X	X	X	X	X	X
Rankin Borough	X	X	X	X		X
Reserve Township	X	X	X	X	X	X
Richland Township	X	X	X	X	X	X
Robinson Township	X	X	X	X		X
Ross Township	X	X	X	X	X	X
Rosslyn Farms Borough	X	X	X			X
Scott Township	X	X	X			X
Sewickley Borough	X	X	X	X		X
Sewickley Heights Borough	X	X	X	X	X	X
Sewickley Hills Borough	X	X	X		X	X
Shaler Township		X	X	X	X	X
Sharpsburg Borough	X	X	X	X	X	X
South Fayette Township	X	X	X			X
South Park Township	X	X	X	X	X	X
South Versailles Township	X	X	X	X	X	X
Springdale Borough	X	X	X	X	X	X
Springdale Township	X	X	X			X
Stowe Township	X	X	X	X	X	X
Swissvale Borough	X	X	X	X	X	X
Tarentum Borough	X	X	X	X	X	X
Thornburg Borough	X	X	X			X
Trafford Borough		X	X			X
Turtle Creek Borough		X	X		X	X
Upper St. Clair Township	X	X	X			X
Verona Borough		X	X			X
Versailles Borough	X	X				X
Wall Borough	X	X	X			X

Table 5.2-1 Planning and Regulatory Capabilities						
MUNICIPALITY	COMPREHENSIVE PLAN	ZONING REGULATIONS	SUBDIVISION REGULATIONS	FLOODPLAIN MANAGEMENT ORDINANCE	STORMWATER MANAGEMENT PLAN OR ORDINANCE	BUILDING CODES
West Deer Township	X	X	X	X	X	X
West Elizabeth Borough				X	X	X
West Homestead Borough		X	X	X		X
West Mifflin Borough	X	X	X	X		X
West View Borough	X	X	X			X
Whitaker Borough		X	X			X
White Oak Borough	X	X	X	X		X
Whitehall Borough		X	X	X	X	X
Wilkins Township	X	X	X	X	X	X
Wilkinsburg Borough	X	X	X	X		X
Wilmerding Borough		X	X	X	X	X

Comprehensive Plans

A comprehensive plan is a policy document that states objectives and guides the future growth and physical development of a municipality. The comprehensive plan is a blueprint for housing, transportation, community facilities, utilities, and land use. It examines how the past led to the present and charts the community's future path. Pennsylvania's MPC (Act 247 of 1968), as reauthorized and amended, requires counties to prepare and maintain a county comprehensive plan and to update it every 10 years.

With regard to hazard mitigation planning, Section 301(a)2 of the MPC requires comprehensive plans to include a plan for land use, which, among other provisions, suggests that the Plan give consideration to floodplains and other areas of special hazards and other similar uses. The MPC also requires comprehensive plans to include a plan for community facilities and services, and recommends giving consideration to storm drainage and floodplain management.

Allegheny County adopted the comprehensive plan, Allegheny Places, in November 2008. The plan is an award-winning comprehensive land use plan focused on building a sustainable future for Allegheny County. A key push in the Allegheny Places plan was to improve coordinated planning between the county and local levels. To accomplish this, the county instituted checklists to evaluate local plans, ordinances, grant applications, and development plans to ensure consistency with the comprehensive plan. In addition, the planning process generated model ordinances for community use.

Many municipalities participated in regional comprehensive planning efforts for Allegheny Places, designed to address specific issues and characteristics in a region of Allegheny County that affect multiple municipalities. However, because land use authority in Pennsylvania is delegated to the local municipality,

communities are empowered to complete local or multi-municipal comprehensive plans. One hundred and two of the municipalities reported having, or Allegheny County has record of them having, a comprehensive plan or joint comprehensive plan. While it is not yet complete, it is notable that the City of Pittsburgh is in the process of completing its first-ever comprehensive plan.

Zoning Ordinances

Zoning ordinances allow for local communities to regulate the use of land in order to protect the interested and safety of the general public. Zoning ordinances can be designed to address unique conditions or concerns within a given community but must be based in maintaining public health and safety in a community. They may be used to create buffers between structures and high-risk areas, limit the type or density of development, and/or require land development to consider specific hazard vulnerabilities. All but three municipalities – Haysville Borough, Pennsbury Village Borough, and West Elizabeth Borough – have zoning ordinances.

Cooperative Comprehensive Plans and Ordinances

A number of Allegheny County communities conduct multi-municipal comprehensive to ensure consistency in land use and development strategies. These joint planning efforts coordinate development and redevelopment decisions and planning initiatives that directly impact all the communities included, and leverage resources in typically small communities. In addition, there are three joint land use ordinances (two zoning, one SALDO) to direct development. Table 5.2-2 details current joint plans and zoning ordinances in effect in Allegheny County.

Table 5.2-2 Joint Comprehensive Plans and Ordinances in Allegheny County

COORDINATING COMMUNITIES	GROUP PLAN AND/OR ORDINANCE NAME
Aleppo Township, Glen Osborne Borough, Sewickley Borough	ASO Joint Comprehensive Plan
Avalon Borough, Bellvue Borough, Ben Avon Borough	Tri-Borough Comprehensive Plan Tri-Borough Joint Zoning Ordinance
Carnegie Borough, Heidelberg Borough, Scott Township	Heidelberg, Carnegie, and Scott Township Comprehensive Plan
Springdale Township, Harmar Township, Cheswick Borough, Springdale Borough	Allegheny Valley Regional Planning Commission Long Range Development Plan
Crafton Borough, Rosslyn Farms Borough, Thornburg Borough	CTR Joint Comprehensive Plan
East McKeesport Borough, North Versailles Township, Wall Borough	East Allegheny Joint Comprehensive Plan East Allegheny Joint Zoning District Multi-municipal SALDO
East Pittsburgh Borough, North Braddock Borough	East Pittsburgh Borough and North Braddock Borough Joint Comprehensive Plan
Edgewood Borough, Swissvale Borough, Rankin Borough	Edgewood-Swissvale-Rankin Joint Comprehensive Plan

Table 5.2-2 Joint Comprehensive Plans and Ordinances in Allegheny County	
COORDINATING COMMUNITIES	**GROUP PLAN AND/OR ORDINANCE NAME**
Elizabeth Borough, Elizabeth Township, Forward Township, Glassport Borough, Liberty Borough, Lincoln Borough, City of McKeesport, Port Vue Borough, South Versailles Township, Versailles Borough, West Mifflin Borough, White Oak Borough (plus two municipalities in Westmoreland County)	Twin Rivers Council of Governments Comprehensive Plan
Etna Borough, Millvale Borough, Sharpsburg Borough	River Bend: A Comprehensive Plan for Etna, Millvale, and Sharpsburg
Indiana Township, West Deer Township	Indiana-West Deer Township Joint Comprehensive Plan
McKees Rocks Borough, Neville Township, Stowe Township	Char-West Comprehensive Plan
Richland Township and Middlesex Township, Butler County	Middlesex-Richland Comprehensive Plan
Leetsdale Borough and South Heights Borough, Economy Borough, Harmony Township, and Ambridge Borough, Beaver County	SHALE Comprehensive Plan

Subdivision Regulations

Subdivision and land development ordinances (SALDOs) are intended to regulate the development of housing, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Within these ordinances, guidelines on how land will be divided, the placement and size of roads and the location of infrastructure can reduce exposure of development to hazard events. One hundred and fourteen municipalities report having, or Allegheny County has record of them having, subdivision regulations. In addition, Allegheny County has a subdivision and land development ordinance (adopted April 2012) that governs the review and approval of subdivisions and land development plans in communities without its own subdivision ordinance.

Floodplain Management Ordinances

Municipalities can help regulate the building in floodplains through floodplain ordinances and plans. Floodplain management plans describe how the community will reduce the impact of flood events through preventive and corrective actions. Through administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to existing structures located in the floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. The NFIP establishes minimum ordinance requirements which must be met in order for that community to participate in the program. However, when the municipalities in Allegheny County updated their floodplain ordinances in 2014, nearly all report using the Pennsylvania Model Ordinance. All communities participating in the NFIP have floodplain management ordinances. Most have standalone ordinances that are a part of the municipal code, but a few, like the City of Pittsburgh and Fox Chapel Borough, include floodplain management regulations as a part of the zoning ordinance.

Stormwater Management Plan or Ordinance

The proper management of stormwater runoff can improve conditions and decrease the chance of flooding. The Pennsylvania legislature enacted the Stormwater Management Act (Act 167 if 1978), commonly called Act 167, requiring counties to develop stormwater management plans for designated watersheds. This planning effort results in sound engineering standards and criteria being incorporated into local codes and ordinances to manage stormwater runoff from new development in a coordinated, watershed-wide approach. Without such planning, stormwater is either not controlled by municipal ordinances, or is addressed on a site-to-site or municipal boundary basis. Municipalities within the same watershed may require different levels of control of stormwater. The result is often the total disregard of downstream impacts or the compounding of existing flooding problems.

Act 167 Stormwater Management Plans are intended to improve stormwater management practices, mitigate potential negative impacts from future land uses, and to improve the condition of impaired waterways. This type of plan will provide local ordinances that incorporate standards and criteria to manage and maintain peak runoff flows throughout the combined watersheds as development occurs. Also, it is not the intent of this plan to solve existing flooding or runoff problems, but to identify them for future correction and assure that problems do not get worse. More specifically, this plan does not require the municipalities to correct existing drainage problems.

Allegheny County is completing the stormwater planning in two phases: Phase I prepared a Scope of Study to establish procedures used to prepare the Stormwater Management Plan and Phase II will include a technical assessment using the outcomes of Phase I and the development of the Stormwater Management Plan, including the development of conceptual solutions to the stormwater problem areas and the preparation of model ordinance. Allegheny County completed the Stormwater Management Plan Phase I Report in December 2014. Sixty-five municipalities in Allegheny County report having, or Allegheny County has record of them having, a stormwater management plan or stormwater management ordinances. This may number will likely increase as the County continues with Phase II of the Stormwater Management Plan.

Building Codes

Building codes are important in mitigation, because codes are developed for regions of the country in consideration of the hazards present within that region. Consequently, structures that are built to applicable codes are inherently resistant to many hazards such as strong winds, floods, and earthquakes, and can help mitigate regional hazards like wildfires. In 2003, the Commonwealth of Pennsylvania implemented the Uniform Construction Code (UCC) (Act 45 of 1999), a comprehensive building code that establishes minimum regulations for most new construction, including additions and renovations to existing structures.

The UCC applies to almost all buildings, excluding manufactured and industrialized housing (which are covered by other laws), agricultural buildings, and certain utility and miscellaneous buildings. The UCC has many advantages in requiring builders to use materials and methods that have been professionally

evaluated for quality and safety, as well as requiring inspections of completed work to ensure compliance. All municipalities in Allegheny County opt-in to the UCC.

5.2.1.2 Emergency Management

In Allegheny County Emergency Management is a comprehensive, integrated program of mitigation, preparedness, response, and recovery for all types of emergencies and disasters. In Pennsylvania, Emergency Management begins at the municipal level, as required by the PA Emergency Management Service Code. Every county, city, borough, and township in the Commonwealth are required to have an emergency management coordinator who is selected by the elected officials of the jurisdiction. The ultimate responsibility for Emergency Management always rests with the chief elected officials and governing body; however, the Emergency Management Coordinator's role is to develop plans, conduct training, and coordinate all available resources in the community pre- and post-disaster. All municipalities in Allegheny County – except Heidelberg Borough – have identified Emergency Management Coordinators. There is one regional EMA in the County: Allegheny Regional EMA covering Cheswick Borough, Springdale Borough, and Harmar Township. Allegheny County runs a robust quarterly training program for the local emergency management coordinators.

Effective partnerships are created in advance of a disaster by the Emergency Management Coordinator through the development of a proactive, comprehensive emergency operations plan and other planning, training, and exercise programs. Allegheny County runs two programs to proactively plan for, and be prepared for, all-hazards: the Local Emergency Planning Committee (LEPC) and the Citizen Corps Council (CCC). The LEPC was established in 1987 in compliance with SARA Title III (Emergency Planning and Community Right-to-Know Act of 1986). Composed of business leaders, environmental groups, public safety, medical and health, human/social services agencies and departments, the LEPC's primary agenda is to develop plans and programs to mitigate the effects of hazardous material releases in the community. The LEPC runs quarterly trainings with all of the municipality EMCs. The LEPC also functions as the CCC, which was formed to make all of the municipalities, and therefore the county, safer and better prepared to respond to the threats of terrorism, crime, public health issues, and disasters of all kinds. The group accomplishes this by working with Allegheny County Emergency Management to facilitate education, training, and volunteer service opportunities.

In addition to these emergency management capabilities, a number of communities have cooperative agreements and/or contracts to share a number of key emergency services. Table 5.2-2 lists the communities using joint emergency services organizations, and the type of services shared.

Table 5.2-3 Shared Emergency Services in Allegheny County

PROVIDER	COOPERATING JURISDICTIONS	TYPE OF SERVICE
Carnegie Police Department	Carnegie Borough Pennsbury Village Borough	Police Services
Crafton Police Department	Crafton Borough Thornburg Borough	Police Services
East McKeesport Police Department	East McKeesport Borough Wall Borough	Police Services
Elizabeth Borough Police Department	Elizabeth Borough West Elizabeth Borough	Police Services

Table 5.2-3 Shared Emergency Services in Allegheny County		
PROVIDER	**COOPERATING JURISDICTIONS**	**TYPE OF SERVICE**
Forest Hills Police Department	Forest Hills Borough Chalfant Borough	Police Services
McKeesport Police Department	City of McKeesport Dravosburg Borough	Police Services
North Versailles Police Department	North Versailles Township Wilmerding Borough	Police Services
Northern Regional Police Department	Bradford Woods Borough Marshal Township Pine Township Richland Township	Police Services
Ohio Township Police Department	Aleppo Township Ben Avon Borough Ben Avon Heights Borough Emsworth Borough Kilbuck Township Neville Township Ohio Township Sewickley Hills Borough	Police Services
Pennsylvania State Police – Findlay Barracks	Glenfield Borough Haysville Borough	Police Services
Sewickley Police Department	Glen Osborne Borough Sewickley Borough	Police Services
White Oak Police Department	South Versailles Township White Oak Borough	Police Services
Baldwin EMS	Baldwin Borough Pleasant Hills Borough West Mifflin Borough Whitaker Borough	Emergency Medical Services
Carnegie VFC	Carnegie Borough Pennsbury Village Borough	Emergency Medical Services
Clairton VFD	City of Clairton Glassport Borough	Emergency Medical Services
Eastern Area Prehospital Services	East McKeesport Borough Edgewood Borough Swissvale Borough Turtle Creek Borough Wall Borough Wilkinsburg Borough Wilmerding Borough	Emergency Medical Services
East Deer EMS	East Deer Township Frazer Township	Emergency Medical Services
Elizabeth Township Area EMS	Elizabeth Borough Elizabeth Township Liberty Borough Lincoln Borough Versailles Borough	Emergency Medical Services
Eureka VFD	Brackenridge Borough Fawn Township Tarentum Borough	Emergency Medical Services

Table 5.2-3 Shared Emergency Services in Allegheny County		
PROVIDER	**COOPERATING JURISDICTIONS**	**TYPE OF SERVICE**
Foxwall EMS	Aspinwall Borough Fox Chapel Borough	Emergency Medical Services
Jefferson Hills EMS	Forward Township Jefferson Hills Borough West Elizabeth Borough	Emergency Medical Services
Lower Valley Ambulance Service	Cheswick Borough Harmar Township Indiana Township Oakmont Borough Springdale Borough Springdale Township	Emergency Medical Services
McKeesport Ambulance Rescue Service	Dravosburg Borough City of Duquesne City of McKeesport Port Vue Borough	Emergency Medical Services
McCandless-Franklin Park Ambulance Authority	Bradford Woods Borough Franklin Park Borough Marshal Township McCandless Township Pine Township	Emergency Medical Services
Medical Rescue Team South Authority	Baldwin Township Castle Shannon Borough Dormont Borough Greentree Borough Mt. Lebanon Whitehall Borough	Emergency Medical Services
Munhall Area Prehospital Services	Homestead Borough Munhall Borough West Homestead Borough	Emergency Medical Services
Northwest EMS	Avalon Borough Bellevue Borough Ben Avon Borough Ben Avon Heights Borough Emsworth Borough Kennedy Township Kilbuck Township McKees Rocks Borough North Fayette Township Oakdale Borough Stowe Township	Emergency Medical Services
Parkview EMS	Blawnox Borough O'Hara Township	Emergency Medical Services
Priority One EMS	Braddock Borough East Pittsburgh Borough North Braddock Borough Rankin Borough	Emergency Medical Services

Table 5.2-3 Shared Emergency Services in Allegheny County		
PROVIDER	**COOPERATING JURISDICTIONS**	**TYPE OF SERVICE**
Quaker Valley Ambulance Authority	Aleppo Township Bell Acres Borough Edgeworth Borough Glen Osborne Borough Glenfield Borough Haysville Borough Leet Township Leetsdale Borough Sewickely Borough Sewickley Heights Borough Sewickely Hills Borough	Emergency Medical Services
Robinson EMS	Crafton Borough Robinson Township Rosslyn Farms Borough Thornburg Borough	Emergency Medical Services
Ross-West View EMS	Millvale Borough Ohio Township Reserve Township Ross Township West View Borough	Emergency Medical Services
Seneca Area EMS	Etna Borough Indiana Township Sharpsburg Borough	Emergency Medical Services
Southbridge EMS	Bridgeville Borough South Fayette Township	Emergency Medical Services
Tri-Community South EMS	Bethel Park Borough South Park Township Upper St. Clair Township	Emergency Medical Services
Valley Ambulance Authority	Coraopolis Borough Crescent Township Findlay Township Moon Township Neville Township	Emergency Medical Services
Woodland Hills EMS	Braddock Hills Borough Chalfant Borough Forest Hills Borough Wilkins Township	Emergency Medical Services
White Oak EMS	South Versailles Township White Oak Borough	Emergency Medical Services
Castle Shannon VFD	Castle Shannon Borough Baldwin Township	Fire Department
Avalon VFD	Avalon Borough Ben Avon Heights Borough	Fire Department
Cochran Hose Company	Edgeworth Borough Glen Osborne Borough Haysville Borough Sewickley Borough	Fire Department
United Fire and Rescue	East McKeesport Borough Wall Borough	Fire Department

Table 5.2-3 Shared Emergency Services in Allegheny County		
PROVIDER	**COOPERATING JURISDICTIONS**	**TYPE OF SERVICE**
Emsworth VFD	Emsworth Borough Glenfield Borough Kilbuck Township	Fire Department
Allegheny Valley VFD	Harmar Township Springdale Township	Fire Department
Ben Avon VFD	Ben Avon Borough Kilbuck Township	Fire Department
Crafton VFD	Crafton Borough Rosslyn Farms Borough Thornburg Borough	Fire Department
Ohio Township VFD	Ohio Township Sewickley Hills Borough	Fire Department
Aleppo Township VFD	Aleppo Township Sewickley Heights Borough	Fire Department
Pittsburgh Bureau of Fire	City of Pittsburgh Wilkinsburg Borough	Fire Department

During a disaster, response and recovery efforts are coordinated from an Emergency Operations Center that is staffed by paid and volunteer personnel and representatives from all emergency service departments and agencies involved in operations. When two or more municipalities are involved in a disaster, the county can assume overall emergency coordination. When two or more counties are involved in a disaster, the state can assume overall coordination. When two or more states are involved in a disaster, the federal government can assume overall coordination. The responsibility and authority for emergency management always lies with the lowest level of government affected, and a unified incident command system is implemented that is all inclusive, yet is meant to never usurp local authority.

5.2.1.3 Participation in the NFIP and the Community Rating System

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 usage within the scope of the floodplain regulations for their community. This helps keep insurance rates low and makes sure that the risk of flood damage is not increased by property development.

All municipalities except for one – Pennsbury Village Borough (which is located outside the SFHA) – participate in the NFIP. Table 5.2-3 includes the participation status and standing of each municipality, as well as the number of policies that are in force and the total amount of premiums and coverage for each municipality.

Table 5.2-4 Allegheny County NFIP Information by Municipality (CIS, 2015).				
MUNICIPALITY	**PARTICIPATION STATUS**	**COMMUNITY IN GOOD STANDING**	**POLICIES IN FORCE**	**TOTAL PREMIUM AND COVERAGE**
Aleppo Township	PARTICIPATING	Yes	6	$1,130,555.00
Aspinwall Borough	PARTICIPATING	Yes	13	$1,937,569.00

Table 5.2-4 Allegheny County NFIP Information by Municipality (CIS, 2015).

MUNICIPALITY	PARTICIPATION STATUS	COMMUNITY IN GOOD STANDING	POLICIES IN FORCE	TOTAL PREMIUM AND COVERAGE
Avalon Borough	PARTICIPATING	Yes	39	$7,765,599.00
Baldwin Borough	PARTICIPATING	Yes	6	$1,243,887.00
Baldwin Township	PARTICIPATING	Yes	8	$1,342,064.00
Bell Acres Borough	PARTICIPATING	Yes	2	$350,000.00
Bellevue Borough	PARTICIPATING	Yes	1	$105,000.00
Ben Avon Heights Borough	PARTICIPATING	Yes	8	$1,023,706.00
Ben Avon Borough	PARTICIPATING	Yes	52	$11,545,934.00
Bethel Park Municipality	PARTICIPATING	Yes	10	$2,443,721.00
Blawnox Borough	PARTICIPATING	Yes	21	$2,852,873.00
Brackenridge Borough	PARTICIPATING	Yes	5	$794,953.00
Braddock Hills Borough	PARTICIPATING	Yes	9	$3,885,621.00
Braddock Borough	PARTICIPATING	Yes	1	$280,000.00
Bradford Woods Borough	PARTICIPATING	Yes	7	$2,488,200.00
Brentwood Borough	PARTICIPATING	Yes	72	$10,462,228.00
Bridgeville Borough	PARTICIPATING	Yes	136	$30,096,609.00
Carnegie Borough	PARTICIPATING	Yes	21	$5,295,524.00
Castle Shannon Borough	PARTICIPATING	Yes	1	$280,000.00
Chalfant Borough	PARTICIPATING	Yes	6	$1,521,717.00
Cheswick Borough	PARTICIPATING	Yes	17	$3,649,357.00
Churchill Borough	PARTICIPATING	Yes	3	$95,109.00
Clairton City	PARTICIPATING	Yes	45	$10,800,525.00
Collier Township	PARTICIPATING	Yes	69	$11,525,986.00
Coraopolis Borough	PARTICIPATING	Yes	6	$958,173.00
Crafton Borough	PARTICIPATING	Yes	17	$1,389,143.00
Crescent Township	PARTICIPATING	Yes	2	$168,000.00
Dormont Borough	PARTICIPATING	Yes	4	$1,217,958.00
Dravosburg Borough	PARTICIPATING	Yes	2	$280,000.00
Duquesne City	PARTICIPATING	Yes	48	$7,654,304.00
East Deer Township	PARTICIPATING	Yes	1	$70,000.00
East Mckeesport Borough	PARTICIPATING	Yes	3	$1,756,166.00
East Pittsburgh Borough	PARTICIPATING	Yes	5	$400,352.00
Edgewood Borough	PARTICIPATING	Yes	6	$2,032,729.00
Edgeworth Borough	PARTICIPATING	Yes	17	$3,021,292.00
Elizabeth Borough	PARTICIPATING	Yes	125	$15,921,785.00
Elizabeth Township	PARTICIPATING	Yes	20	$2,688,945.00
Emsworth Borough	PARTICIPATING	Yes	187	$26,074,117.00
Etna Borough	PARTICIPATING	Yes	50	$5,487,508.00
Fawn Township	PARTICIPATING	Yes	21	$4,323,849.00

Table 5.2-4 Allegheny County NFIP Information by Municipality (CIS, 2015).

MUNICIPALITY	PARTICIPATION STATUS	COMMUNITY IN GOOD STANDING	POLICIES IN FORCE	TOTAL PREMIUM AND COVERAGE
Findlay Township	PARTICIPATING	Yes	21	$4,571,079.00
Forest Hills Borough	PARTICIPATING	Yes	12	$3,121,285.00
Forward Township	PARTICIPATING	Yes	15	$17,113,138.00
Fox Chapel Borough	PARTICIPATING	Yes	19	$5,424,869.00
Franklin Park Borough	PARTICIPATING	Yes	2	$191,000.00
Frazer Township	PARTICIPATING	Yes	2	$1,833,172.00
Glassport Borough	PARTICIPATING	Yes	12	$1,533,492.00
Glenfield Borough	PARTICIPATING	Yes	32	$4,947,191.00
Green Tree Borough	PARTICIPATING	Yes	6	$1,584,369.00
Hampton Township	PARTICIPATING	Yes	48	$12,038,394.00
Harmar Township	PARTICIPATING	Yes	51	$6,458,668.00
Harrison Township	PARTICIPATING	Yes	23	$2,390,140.00
Haysville Borough	PARTICIPATING	Yes	7	$1,752,103.00
Heidelberg Borough	PARTICIPATING	Yes	43	$7,367,748.00
Homestead Borough	PARTICIPATING	Yes	2	$1,003,593.00
Indiana Township	PARTICIPATING	Yes	23	$4,870,782.00
Ingram Borough	PARTICIPATING	Yes	3	$339,900.00
Jefferson Hills Borough	PARTICIPATING	Yes	37	$9,749,411.00
Kennedy Township	PARTICIPATING	Yes	7	$2,036,139.00
Kilbuck Township	PARTICIPATING	Yes	11	$2,395,800.00
Leet Township	PARTICIPATING	Yes	31	$3,568,130.00
Leetsdale Borough	PARTICIPATING	Yes	50	$18,443,059.00
Liberty Borough	PARTICIPATING	Yes	1	$55,000.00
Lincoln Borough	PARTICIPATING	Yes	4	$757,284.00
Marshall Township	PARTICIPATING	Yes	26	$7,860,429.00
McCandless, Town of	PARTICIPATING	Yes	71	$20,104,791.00
Mcdonald Borough	PARTICIPATING	Yes	18	$3,176,442.00
Mckees Rocks Borough	PARTICIPATING	Yes	83	$25,338,453.00
Mckeesport City	PARTICIPATING	Yes	21	$7,163,310.00
Millvale Borough	PARTICIPATING	Yes	137	$15,451,884.00
Monroeville Borough	PARTICIPATING	Yes	45	$18,260,582.00
Moon Township	PARTICIPATING	Yes	31	$6,202,357.00
Mount Oliver Borough	PARTICIPATING	Yes	0	$0.00
Mt. Lebanon Township	PARTICIPATING	Yes	59	$15,584,559.00
Munhall Borough	PARTICIPATING	Yes	0	$0.00
Neville Township	PARTICIPATING	Yes	10	$1,193,253.00
North Braddock Borough	PARTICIPATING	Yes	126	$24,758,875.00
North Fayette Township	PARTICIPATING	Yes	0	$0.00

Table 5.2-4 Allegheny County NFIP Information by Municipality (CIS, 2015).

MUNICIPALITY	PARTICIPATION STATUS	COMMUNITY IN GOOD STANDING	POLICIES IN FORCE	TOTAL PREMIUM AND COVERAGE
North Versailles Township	PARTICIPATING	Yes	52	$12,181,637.00
O'Hara Township	PARTICIPATING	Yes	10	$1,391,546.00
Oakdale Borough	PARTICIPATING	Yes	35	$7,996,032.00
Oakmont Borough	PARTICIPATING	Yes	79	$16,621,655.00
Ohio Township	PARTICIPATING	Yes	95	$21,090,938.00
Osborne Borough	PARTICIPATING	Yes	11	$2,478,285.00
Penn Hills Township	PARTICIPATING	Yes	48	$11,442,801.00
Pennsbury Village Borough	NOT PARTICIPATING	N/A	N/A	N/A
Pine Township	PARTICIPATING	Yes	7	$1,962,881.00
Pitcairn Borough	PARTICIPATING	Yes	67	$6,862,349.00
Pittsburgh City	PARTICIPATING	Yes	530	$190,228,943.00
Pleasant Hills Borough	PARTICIPATING	Yes	7	$1,295,423.00
Plum Borough	PARTICIPATING	Yes	38	$9,790,771.00
Port Vue Borough	PARTICIPATING	Yes	5	$2,315,354.00
Rankin Borough	PARTICIPATING	Yes	1	$28,000.00
Reserve Township	PARTICIPATING	Yes	17	$1,162,745.00
Richland Township	PARTICIPATING	Yes	17	$3,396,716.00
Robinson Township	PARTICIPATING	Yes	48	$13,208,225.00
Ross Township	PARTICIPATING	Yes	113	$30,561,419.00
Rosslyn Farms Borough	PARTICIPATING	Yes	6	$3,110,697.00
Scott Township	PARTICIPATING	Yes	47	$15,829,056.00
Sewickley Heights Borough	PARTICIPATING	Yes	21	$6,758,711.00
Sewickley Hills Borough	PARTICIPATING	Yes	4	$1,178,831.00
Sewickley Borough	PARTICIPATING	Yes	6	$1,162,851.00
Shaler Township	PARTICIPATING	Yes	159	$32,827,583.00
Sharpsburg Borough	PARTICIPATING	Yes	112	$17,899,284.00
South Fayette Township	PARTICIPATING	Yes	69	$19,082,242.00
South Park Township	PARTICIPATING	Yes	35	$6,110,363.00
South Versailles Township	PARTICIPATING	Yes	5	$300,418.00
Springdale Borough	PARTICIPATING	Yes	1	$1,002,880.00
Springdale Township	PARTICIPATING	Yes	1	$105,000.00
Stowe Township	PARTICIPATING	Yes	10	$3,630,238.00
Swissvale Borough	PARTICIPATING	Yes	8	$1,155,753.00
Tarentum Borough	PARTICIPATING	Yes	28	$4,186,072.00
Thornburg Borough	PARTICIPATING	Yes	6	$2,907,207.00
Trafford Borough	PARTICIPATING	Yes	12	$3,339,308.00
Turtle Creek Borough	PARTICIPATING	Yes	54	$5,679,083.00
Upper St. Clair Township	PARTICIPATING	Yes	84	$23,917,217.00

Table 5.2-4 Allegheny County NFIP Information by Municipality (CIS, 2015).				
MUNICIPALITY	PARTICIPATION STATUS	COMMUNITY IN GOOD STANDING	POLICIES IN FORCE	TOTAL PREMIUM AND COVERAGE
Verona Borough	PARTICIPATING	Yes	45	$7,965,687.00
Versailles Boroughs	PARTICIPATING	Yes	3	$399,346.00
Wall Boroughs	PARTICIPATING	Yes	10	$1,207,874.00
West Deer Township	PARTICIPATING	Yes	37	$5,916,340.00
West Elizabeth Borough	PARTICIPATING	Yes	14	$1,712,412.00
West Homestead Borough	PARTICIPATING	Yes	2	$455,000.00
West Mifflin Borough	PARTICIPATING	Yes	12	$2,039,410.00
West View Borough	PARTICIPATING	Yes	7	$1,513,421.00
Whitaker Borough	PARTICIPATING	Yes	0	$0.00
White Oak Borough	PARTICIPATING	Yes	19	$3,021,453.00
Whitehall Borough	PARTICIPATING	Yes	11	$2,388,485.00
Wilkins Township	PARTICIPATING	Yes	24	$5,048,440.00
Wilkinsburg Borough	PARTICIPATING	Yes	4	$576,302.00
Wilmerding Borough	PARTICIPATING	Yes	5	$3,863,150.00
TOTAL			**4,202**	**$965,307,573.00**

Community Rating System

The NFIP's Community Rating System (CRS) provides discounts on flood insurance premiums in those communities that establish floodplain management programs that go beyond NFIP minimum requirements. Under the CRS, communities receive credit for more restrictive regulations; acquisition; relocation, or flood-proofing of flood-prone buildings, preservation of open space; and other measures that reduce flood damage or protect the natural resources and functions of floodplains.

The CRS was implemented in 1990 to recognize and encourage community floodplain management activities that exceed the minimum NFIP standards. Section 541 of the 1994 Act amends Section 1315 of the 1968 Act to codify the CRS in the NFIP, and expands the CRS goals to specifically include incentives to reduce the risk of flood-related erosion and to encourage measures that protect natural and beneficial floodplain functions. These goals have been incorporated into the CRS, and communities now receive credit toward premium reductions for activities that contribute to them.

Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that meet a minimum of three of the following CRS goals:

- Reduce flood losses
- Reduce damage to property
- Protect public health and safety
- Prevent increases in flood damage from new construction

- Reduce the risk of erosion damage
- Protect natural and beneficial floodplain functions
- Facilitate accurate insurance rating
- Promote the awareness of flood insurance

There are 10 CRS classes that provide varied reduction in insurance premiums. Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction. CRS premium discounts on flood insurance range from 5 percent for Class 9 communities up to 45 percent for Class 1 communities. The CRS recognizes 18 creditable activities that are organized under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness.

Table 5.2-4 includes the municipalities in Allegheny County who currently participate in CRS, and their CRS class.

Table 5.2-5 Allegheny County Municipality CRS Participation (CIS, 2015).

MUNICIPALITY	CRS CLASS	DISCOUNT
Etna Borough	8	10%
Shaler Township	8	10%
Upper St. Clair Township	7	15%

5.2.2 Administrative and Technical Capability

Administrative capability is described by an adequacy of departmental and personnel resources for the implementation of mitigation-related activities. Technical capability relates to an adequacy of knowledge and technical expertise of local government employees or the ability to contract outside resources for this expertise in order to effectively execute mitigation activities. Common examples of skill sets and technical personnel needed for hazard mitigation include: planners with knowledge of land development/management practices, engineers or professionals trained in construction practices related to buildings and/or infrastructure (e.g. building inspectors), planners or engineers with an understanding of natural and/or human caused hazards, emergency managers, floodplain managers, land surveyors, scientists familiar with hazards in the community, staff with the education or expertise to assess community vulnerability to hazards, personnel skilled in geographic information systems, resource development staff or grant writers, fiscal staff to handle complex grant application processes.

Based on assessment results, municipalities in Allegheny County have moderate administrative and technical staff needed to conduct hazard mitigation-activities. There seems to be sufficient emergency management staff across the County and a majority of municipalities have engineering capabilities through contracted sources, such as Glenn Engineering, Senate Engineering, Gateway Engineering, Lennon, Smith, and Souleret Engineering. These specific, major firms are contracted by multiple municipalities within Allegheny County.

Three municipalities, Springdale and Cheswick Boroughs and Harmar Township, take a multi-municipal approach to address emergency management by sharing an emergency management coordinator. South Versailles Township currently has a contract with the White Oak Borough Police to use their services.

As for floodplain managers, the responses were split with municipalities having a responsible individual. This does not necessarily mean the communities do not someone administering floodplain regulations; instead, floodplain management duties may be a component of a job rather than a separate position. For Allegheny County, it is not out of the ordinary for a municipal official to hold more than one title. Those municipalities that noted having a floodplain manager often listed their municipal engineer or contracted engineering firm as responsible. If available, municipalities noted their code enforcement officer or Council as floodplain manager. None of the communities indicated their floodplain manager was certified by the Association of State Floodplain Managers.

A substantial number of the municipalities also have grant-writing or other fiscal staff either within the Office or contracted from outside sources. However, there seems to be a common lack of personnel with Geographic Information System (GIS) skills and/or a lack of personnel with solid planning knowledge or background, however only 15 municipalities ranked themselves as limited planning and regulatory capability.

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to mitigate hazard events. The adoption of hazard mitigation measures may be seen as an impediment to growth and economic development. In many cases, mitigation may not generate interest among local officials when compared with competing priorities. Therefore, the local political climate must be considered when designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing the adoption or implementation of specific actions. The Capability Assessment Survey was used as means to record how the stakeholder rated his or her municipality's community political capability. All municipalities either ranked themselves moderately or highly capable.

Within Allegheny County, technical capability varies widely between the municipalities (due to residents and resources). Even neighboring municipalities may exhibit extreme variations in technical capability. Overall, eleven municipalities ranked themselves as limited in administrative and technical capability, and the remaining municipalities ranked equally as either moderately or highly capable.

Generally speaking, the more financial resources a municipality has, the more technically capable it will be from a resource availability perspective. This is not necessarily the case, however when analyzing technical capability from a knowledge/skill level perspective. As such, technical capability must be analyzed by each individual municipality prior to implementing any hazard mitigation activity. It is important to note however, that much like fiscal capability, shortfalls in technical capability may be overcome by cooperative arrangements, coordinated efforts, and/or resource efficiency.

Outside of municipal administrative and technical capabilities, Allegheny County's seven COGs are an important administrative and technical capability available to member municipalities. COGs are authorized in Pennsylvania under the first Intergovernmental Cooperation Act of 1972. Generally, COGs

are voluntary coalitions that act as a forum for addressing regional challenges and improving intergovernmental cooperation. Common COG activities include data collection and analysis, code enforcement, grants application, technical assistance, purchasing program assistance, blight management, and Community Development Block Grant administration. Table 5.2-6 lists the Allegheny County COGS, member municipalities, and services provided by each COG.

Table 5.2-6 COG Membership and Services

COG NAME	MEMBER MUNICIPALITIES	SERVICES
Allegheny Valley North	Aspinwall Borough Blawnox Borough Brackenridge Borough Cheswick Borough East Deer Township Fawn Township Frazer Township Harmar Township Harrison Township Springdale Borough Springdale Township Tarentum Borough Verona Borough West Deer Township	• Grant solicitation/administration (federal, state, and county) • Joint Purchasing, which includes Spring and Fall Commodities, Police Vehicles, Public Works Vehicles, Police Ammunition and Rock Salt. • Economic Development Programs like the Alle-Kiski Coalition and Hydroelectric Power Project • Shared Equipment Program, including sewer cleaning and Maintenance and Highways programs • Shared services for code enforcement and drug and alcohol testing • Employee training programs • General consultant services
Char-West	Bridgeville Borough Carnegie Borough Collier Township Coraopolis Borough Crafton Borough Crescent Township Findlay Township Ingram Borough Kennedy Township McKees Rocks Borough Moon Township Neville Township North Fayette Township Oakdale Borough Pennsbury Village Borough Robinson Township Rosslyn Farms Borough South Fayette Township Stowe Township Thornburg Borough	• Community Development Block Grant Program Administration • Joint Purchasing, which includes Spring and Fall Commodities, Police Vehicles, Public Works Vehicles, Police Ammunition and Rock Salt. • Multi-Municipal Police Training and School Safety • Multi-Municipal Fire Chiefs Training • Multi-Municipal Planning • Sewer Vactor Program *to assist with obstructed sanitary sewer lines* • Cable Franchise Renewal Negotiations • Annual Membership Booklet • Federal Credit Union

Table 5.2-6 COG Membership and Services		
COG NAME	**MEMBER MUNICIPALITIES**	**SERVICES**
North Hills	Bradford Woods Borough Etna Borough Fox Chapel Borough Franklin Park Borough Hampton Township Indiana Township Marshall Township Town of McCandless Millvale Borough O'Hara Township Ohio Township Pine Township Reserve Township Richland Township Ross Township Shaler Township Sharpsburg Borough West Deer Township West View Borough	• Community Development Block Grant administration • Gypsy Moth Aerial Spraying • Household Hazardous Waste Collection • Leaf Composting • Administration of Agricultural Security Area • Sewer Vactor program *to assist with obstructed sanitary sewer lines* • Represents member communities in the 3 Rivers Wet Weather Committee • Solid Waste disposal and recycling • Joint Purchasing Program • Regional cooperation, including municipal directory, Cable TV rate review, electric choice, equipment sharing, municipal forum coordination, and survey requests and compilation • Uniform Code of Construction Board of Appeals • CDL drug and alcohol testing
Quaker Valley	Aleppo Township Avalon Borough Bell Acres Borough Bellvue Borough Ben Avon Borough Edgeworth Borough Emsworth Borough Glen Osborne Borough Glenfield Borough Haysville Borough Kilbuck Township Leet Township Leetsdale Borough Sewickley Borough	• Community Development Block Grant administration • Joint Purchasing, which includes Spring and Fall Commodities, Police Vehicles, Public Works Vehicles, Police Ammunition and Rock Salt. • Joint refuse contract with Waste Management • Joint cable contract with Comcast • Joint cable contract with Verizon • Joint Uniform Construction Code Appeals Board • Monthly meetings for member municipalities' managers/secretaries and quarterly police meetings to collaborate on and/or resolve issues • Local Technical Assistance (LTAP) Programs • Other workshops and trainings for municipal officials and police chiefs • Annual recycling day

Table 5.2-6 COG Membership and Services		
COG NAME	**MEMBER MUNICIPALITIES**	**SERVICES**
South Hills Area	Baldwin Borough Baldwin Township Bethel Park Municipality Brentwood Borough Castle Shannon Borough Dormont Borough Elizabeth Township Findlay Township Heidelberg Borough Jefferson Hills Borough Moon Township Mount Lebanon Municipality Mount Oliver Borough Peters Township Pleasant Hills Borough Scott Township South Park Township Upper St. Clair Township West Mifflin Borough Whitehall Borough	• Annual member information book • Cable TV rate review • Community Development Block Grant administration • SHACOG Credit Union and associated services *under an independently run Board of Directors* • Limited training programs • Sewer Vactor truck and camera program *to assist with obstructed sanitary sewer lines* • Solid waste collection and recycling • Telecommunications franchising authority • InterCOG purchasing alliance *cooperative purchasing to achieve savings in commodities*
Steel Rivers	Braddock Hills Borough City of Clairton Dravosburg Borough City of Duquesne Elizabeth Borough Forward Township Glassport Borough Homestead Borough Liberty Borough Lincoln Borough City of McKeesport Munhall Borough Port Vue Borough South Versailles Township Versailles Township West Elizabeth Borough West Homestead Borough West Newton Borough (Westmoreland County) Whitaker Borough White Oak Borough	• Community Development Block Grant administration • Blight remediation *with Turtle Creek Valley* • Brownfields grants *with Turtle Creek Valley* • Land Bank administration *designed to fight vacancy, abandonment, and foreclosures* • Blight Busters forum • InterCOG purchasing alliance *cooperative purchasing to achieve savings in commodities*

Table 5.2-6 COG Membership and Services		
COG NAME	**MEMBER MUNICIPALITIES**	**SERVICES**
Turtle Creek Valley	Braddock Borough Chalfant Borough Churchill Borough East McKeesport Borough East Pittsburgh Borough Edgewood Borough Forest Hills Borough Municipality of Monroeville Pitcairn Borough Plum Borough Rankin Borough Swissvale Borough Turtle Creek Borough North Braddock Borough North Versailles Township Municipality of Penn Hills Wall Borough Wilkins Township Wilkinsburg Borough Wilmerding Borough	• Community Development Block Grant administration • Utility and refuse billing account management and customer service • Conflict resolution services • Blight remediation *with Steel Rivers* • Brownfields grants *with Steel Rivers* • Land Bank administration *designed to fight vacancy, abandonment, and foreclosures* • Joint Public Works department *for Rankin and Braddock Boroughs* • Accounts payable services for municipalities • Real estate tax billing assistance • Rodent abatement • Community Investment and Tourism Fund grant administration • Delinquent sewage fee collection • InterCOG purchasing alliance *cooperative purchasing to achieve savings in commodities* • Multi-municipal planning administration • Uniform Code of Construction Board of Appeals • Sewer Vactor truck *to assist with obstructed sanitary sewer lines*

Some local organizations that could act as partners include the Allegheny County Conservation District, the Penn State Cooperative Extension, Allegheny County Economic Development, environmental advocacy groups, and watershed associations.

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

- Pennsylvania Department of Community and Economic Development;
- Pennsylvania Department of Conservation and Natural Resources;
- Pennsylvania Department of Environmental Protection; and
- Pennsylvania Department of Transportation.

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

- Army Corp of Engineers;
- Department of Housing and Urban Development (HUD);
- Department of Agriculture (DoA);
- Economic Development Administration;
- Emergency Management Institute (EMI);

- Environmental Protect Agency (EPA);
- FEMA; and
- Small Business Administration.

5.2.3 Financial Capability

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

Capital Improvement Program

Based on conversations with communities and the results of the Capability Assessment Survey, the fiscal capabilities vary greatly from community-to-community; on the assessment survey, one-third of communities felt their fiscal capability was limited; one-third felt their fiscal capability was moderate, and one-third felt fiscal capability was high. The most common fiscal tool available to communities was the Capital Improvement Program (CIP). A CIP is a community planning and fiscal management tool used to coordinate the timing and financing of capital improvements over a multi-year period – essentially, the prioritized list of improvements to roads, parks, and other facilities that the community plans to undertake in a given period. Typically, a CIP is a five-year plan, though many communities in Allegheny County indicated they reviewed the CIP annually. The City of Pittsburgh has been using its CIP recently to reinvest in public facilities and infrastructure with a focus on enhancing services, addresses, compliance, and leverages private dollars.

Impact Fees from Unconventional Gas Drilling

Another more recent fiscal mechanism available to Pennsylvania communities is the Pennsylvania Act 13 Impact Fee related to unconventional oil and gas well drilling. The Oil and Gas Act (Act 13 of 2012) presented major changes to the oil and gas industry in Pennsylvania, including the authorization for local governments to adopt an impact fee and the provision of stronger environmental protections. For example, oil and gas well pad setbacks from private water wells, streams, and buildings increased; bond amounts for catastrophic accidents increased; and public accessibility of information related to chemicals used onsite improved (Pittsburg Post-Gazette, 2012). A portion of the impact fees goes to county conservation districts, the Pennsylvania Fish and Boat Commission, the Pennsylvania Public Utility Commission, the Pennsylvania Department of Environmental Protection, the PEMA, the Pennsylvania Office of State Fire Commissioner, and the Pennsylvania Department of Transportation in order to address statewide issues. A portion of the impact fees also goes to local municipalities to address water, wastewater, and road infrastructure maintenance and improvements; emergency preparedness; environmental programs; tax reductions; increased safe/affordable housing; employee training; or planning initiatives. In 2014, over $1.5 million was dispersed to Allegheny County and all 130

municipalities. The money was used for public infrastructure construction, stormwater and sewer systems, emergency preparedness and public safety, environmental programs, information technology, and investments in capital reserve funds (PA PUC, 2015).

Community Development Block Grants

Allegheny County is also eligible for Community Development Block Grants (CDBG) funding from the US Department of Housing and Urban Development (HUD). The program is designed to assist the vulnerable populations within the community by ensuring affordable housing, creating jobs, and providing direct services. The amount of each grant is determined by a formula that accounts for the community's need, poverty, population, housing, and comparison to other areas. The annual appropriation is divided among the states and local jurisdictions (referred to as "non-entitlement communities" and "entitlement communities"). The majority of CDBG funds are required to be spent to benefit low- and moderate-income people. Also, there is a set of national objectives for the program, including addressing existing conditions that pose a threat to the health and welfare of the community (e.g., low-income housing in a floodplain). Allegheny County Economic Development oversees the CDBG program.

Water and Sewer Authority Fees

Water authorities are multipurpose authorities with water projects, many of which operate both water and sewer systems. The financing of water systems for lease back to the municipality is among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage. The cost of constructing or extending water supply lines can be funded by special assessments against abutting property owners. Tapping fees also help fund water system capital costs. Water utilities are directly operated by municipal governments and by privately owned public utilities regulated by the Pennsylvania Public Utility Commission. The PA DEP has a program to assist with consolidation of small individual water systems to make system upgrades more cost effective.

Sewer authorities include multipurpose authorities with sewer projects. The authorities issue bonds to finance acquisition of existing systems or to finance construction, extension, and improvements. Sewer authority operating revenues originate from user fees. The fee frequently is based on the amount of water consumed, and payment is enforced by the ability to terminate service or the imposition of liens against real estate. There are 78 public water supply systems and 31 sewer authorities in Allegheny County. The largest sewer authority in the County is the Allegheny County Sanitary Authority (ALCOSAN), which serves 83 communities. The water and sewer authority fees in Allegheny County usually apply to flood mitigation via stormwater management and water quality improvement projects, as large areas of the county use a combined sewer overflow system.

State and Federal Financial Resources and Grant Programs

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

important that money is available locally to implement policies and projects. Financial resources are particularly important if communities are trying to take advantage of state or federal mitigation grant funding opportunities that require local-match contributions.

Current state funding sources that may be available for hazard mitigation planning activities include, but are not limited to:

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

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

- Department of Commerce (DOC)/Economic Development Authority (EDA) Construction Grant Program
- Department of Energy Weatherization Assistance Program
- Department of Homeland Security Grant Program (HSGP)
- Department of Transportation/Federal Highway Administration Emergency Relief Program
- DOC/EDA Planning Grants
- DOC/EDA Revolving Loan Fund
- DOC/EDA Technical Assistance Grants
- FEMA Community Assistance Program – State Support Services Element (CAP-SSSE)
- FEMA Community Disaster Loan Program
- FEMA Community Rating System
- FEMA Emergency Management Performance Grants (EMPG)
- FEMA Environmental Planning and Historic Preservation Program (EHP)
- FEMA Flood Mitigation Assistance Program
- FEMA Hazard Mitigation Grant Program (HMGP)
- FEMA Individuals and Households Program (IHAP)
- FEMA National Dam Safety Program

- FEMA National Flood Insurance Program
- FEMA Pre-Disaster Mitigation Program
- FEMA Public Assistance Program (PA)
- FEMA Regional Catastrophic Preparedness Grant Program
- Housing and Urban Development (HUD) 5-H Homeownership Program
- HUD Community Development Block Grants (CDBG)
- HUD Disaster Housing Assistance Program
- HUD/Federal Housing Administration (FHA) Title 1 Home Repair Loan Program
- HUD/FHA Section 203(h) Mortgage Insurance for Disaster Victims
- HUD/FHA Section 203(k) Rehabilitation Mortgage Insurance Program
- HUD Partnership for Advancing Technology in Housing
- HUD Section 108 Loan Guarantee Programs
- Internal Revenue Service Casualty Loss-Special Disaster Provisions
- National Oceanic and Atmosphere Administration (NOAA) StormReady Program
- Natural Resources Conservation Service (NRCS) easement programs
- Small Business Administration Disaster Loan Programs
- United States Army Corps of Engineers (USACE) General Investigation (GI)
- USACE Continuing Authorities Program
- USACE Flood Plain Management Services Program (FPMS)
- USACE Inspection of Completed Works Program (ICW)
- USACE National Levee Safety Program
- USACE Planning Assistance to States
- USACE Rehabilitation and Inspection Program (RIP)
- United States Department of Agriculture (USDA)/Farm Service Agency (FSA) Emergency Conservation Program
- USDA/FSA Emergency Farm Loans
- USDA Non-insured Crop Disaster Assistance Program (NAP)
- USDA/NRCS Emergency Watershed Protection Program
- USDA Repair and Rehabilitation Loan
- USDA/Rural Housing Service (RHS) Community Facilities Loans and Grants
- USDA/RHS Rural Rental Loans
- USDA/RHS Section 502 Single-Family Housing Direct and Guaranteed Loans
- USDA/RHS Section 504 Repair Loans and Grants
- USDA/RHS Self-Help Housing Loans
- USDA/Risk Management Agency Federal Multi-Peril Crop Insurance
- USDA/Rural Business Service Business and Industrial Loans
- USDA Watershed Protection and Flood Prevention Program

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, programs not relating to certification are not common within the County. Throughout the 2015 Update process, municipalities stated their plans to make it a higher priority to collaborate with their colleagues to create new education and outreach programs for both younger and older populations.

Firewise Communities designation is an optional recognition program that empowers neighbors to take action to reduce wildfire risk. It is a five-step, voluntary process that helps communities develop an action plan that minimizes wildfire risk and helps build more safely. No communities are currently enrolled in Firewise, but the following five municipalities stated they were in the beginning or in the process of receiving their Firewise Communities Certification:

- Braddock Borough;
- Glassport Borough;
- Oakdale Borough;
- Penn Hills Township;
- Port Vue Borough; and
- Sewickley Borough.

StormReady Certification is an education and outreach program that helps arm communities with the communication and safety skills needed to save lives and property before, during, and after an event. Allegheny County, the City of Pittsburgh, and Heidelberg Borough are enrolled in the StormReady Program, in addition to Carnegie Mellon University, the University of Pittsburgh, and the RAND Corporation.

Municipalities reported their Certification is under development include:

- Braddock Borough;
- Cheswick Borough;
- Hampton Township;
- Harmar Township;
- Moon Township;
- Oakdale Borough;
- Penn Hills Township;
- Port Vue Borough;
- Sewickley Borough; and
- Springdale Borough.

Avalon Borough, which was recently readmitted into the NFIP, plans to offers education opportunities to residents on the process of purchasing flood insurance. They also hope to hole public awareness training

for updated Actions selected. Richland Township also hopes to use their newsletter as a way to disseminate information about the NFIP and how to purchase flood insurance.

Municipalities such as Baldwin Township, Findlay Township, and Glen Osborne Borough provide information and direction in the event of a pandemic or nuclear incident in their newsletter. Brentwood Borough, Castle Shannon Borough, Coraopolis Borough, Pine Township, Whitaker Borough, and the Cities of Duquesne and McKeesport provide information on their constantly updated website. Springdale Borough plans to create a new website that will include an evacuation route section. Through the Edgewood Borough's website they are able to send e-mails directly to their residents with any pertinent information. Penn Hills Township and White Oak borough established an account with Nixle to push emergency information to the public and continues use of the Fire Marshall Facebook page to inform the public. East McKeesport Borough reported an overall better coordination and communication with the residents pertaining to winter storms, wind storms, and evacuation procedures.

Castle Shannon Borough offers incident command training, riot training, and crowd control training to its Police and Fire Department. Elizabeth Borough hopes to hold training for police offers in responding to civil disturbances within the next year. Forest Hills Borough their first training session was held in 2013 and is continued on a two-year schedule, with the next session occurring this year. Oakdale Borough hosts two annual, community training events. Penn Hills Township, Pine Township, Sharpsburg Borough, and West Deer Township's Police also receive annual training on civil disturbances.

After the shooting at the Monroeville Mall, municipalities such as Frazer Township plan to work harder to hold law enforcement classes for its Police in case of a similar event occurring at the Pittsburgh Mills Mall. Evacuation plans of Pittsburgh Mills Mall, as well as the entire Township, are in the works of being posted on the Township website and/or newsletter. The municipality also plans to continue public safety meetings concerning gas wells and gas compressor stations. Kilbuck Township and Pine Township hope to improve their public training and utilize their website or newsletter to better to communicate their updated mitigation actions. West View Borough is currently looking at a reserves 911 system. The Borough currently has a "Ready PA" tab on their website and a tab for Allegheny County Health for individuals to review.

Pitcairn Borough has its own cable TV channel, website, and community PA system for transferring important information. Rankin Borough and South Versailles Township also noted using televised news releases. Utilizing different forms of media ensure active transferring of updates and direction to residents. Interestingly, Franklin Park Borough noted there is a diverse population from many countries with some a significant population who *may* not speak English. In result, the borough has developed a warning, "It is unsafe to go outside, please stay inside, lock doors, close windows, and shut down air condition and vents until are notified it is safe," in 13 languages. Wording that notifies residents they must evacuate now has also been developed.

Allegheny County EMA has been very successful in holding their training and quarterly meetings for municipalities to attend. Findlay Township, North Fayette Township, Rankin Borough, and South Park Towsnhip noted utilizing this resource, as well as any training offered by the Commonwealth.

5.2.5 Plan Integration

Plan integration recognizes that hazard mitigation is most effective when it works in concert with other plans, regulations, and programs. 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 Municipalities Planning Code in that protecting and promoting safety and health is a purpose of the code. Further, a purpose of the Municipalities Planning Code is "to minimize such problems as may presently exist or which may be foreseen," which is the focus of hazard mitigation planning.

When developing the HMP, the County Comprehensive Plan, EOP, and various land use ordinances and regulations provided key information. These documents are referenced where appropriate throughout the plan and links to the documents are included in Appendix A: Bibiography.

Moving forward, each of these documents should not be treated as unrelated and updated separately. The County and each participating municipality are responsible for incorporating the specific mitigation actions recommended in this Plan into the necessary planning documents, including the appropriate comprehensive plan, the County EOP, and any land use ordinances and regulations.

For example, zoning and other land use regulations can be amended to reflect the newly identified hazard areas, to ensure that development in those areas is minimized or at least conducted in a way that otherwise mitigates against the effects of hazards (e.g., requiring structures built in the floodplain to be elevated). As proposed changes to building codes are presented, their potential for mitigating damage due to hazards will be examined, and the changes will only be adopted if they are shown to lower risk. Changes to stormwater management plans will incorporate identified mitigation actions and will encourage increased participation in the NFIP.

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. This section highlights key opportunities for plan integration in Allegheny County.

Allegheny Places, the County Comprehensive Plan

As discussed in Section 5.2.1, Allegheny Places was last updated in full in 2008. Individual elements, like the Transportation Element, have since been updated. Article III of the Pennsylvania Municipalities Planning Code (Act 247 of 1968, as reenacted and amended) requires all Pennsylvania counties (except Philadelphia) to adopt a comprehensive plan and update it at least every 10 years. Coupling this

requirement with the DMA 2000-required five-year update cycle for HMPs, when possible, will allow the County to better integrate the County Comprehensive Plan and Multi-Jurisdictional HMP planning processes and strengthen public participation for both efforts. However, since the planning cycles for the HMP and Comprehensive Plan are currently not in sync, at the least, recommendations from the HMP can be incorporated into the updated Comprehensive Plan, especially in updates to the Environment Element, which discusses and defines environmentally sensitive and high-risk areas.

The HMP's risk assessment and Future Development and Vulnerability discussions will provide information for the development of the next County Comprehensive Plan and any local comprehensive plans by making available specific risk and vulnerability information for the entire county but more specifically the potential areas of growth. This will be especially important for the City of Pittsburgh, which is creating its first-ever Comprehensive Plan at the same time this HMP is being developed.

In addition, Allegheny Places established voluntary consistency reviews. These reviews allow Allegheny County Economic Development maintain consistency between and among not only plans but also ordinances, grants, permits, and development projects. ACED should consider incorporating a consistency check with the HMP into its reviews of other planning and regulatory efforts.

Allegheny County Emergency Operations Plan

The Pennsylvania Emergency Management Services Code (35 PA C.S. Sections 7701-7707, as amended) requires each county and municipality to prepare, maintain, and keep current an Emergency Operations Plan (EOP). Allegheny County Emergency Services is responsible for preparing and maintaining the County EOP. The risk assessment information presented in the existing HMP was used to update the hazard vulnerability assessment section of the County EOP. The updated risk assessment information will affect subsequent updates to the EOP.

The EOP is reviewed at least biennially. Whenever portions of the plan are implemented in an emergency event or training exercise, a review is performed and changes are made where necessary. It would be beneficial to sync the EOP review and the annual HMP review to ensure that any changes to one plan are captured in the other.

Plan for a Healthier Allegheny

The Plan for a Healthier Allegheny was released by the Allegheny County Health Department in May 2015. The focus on the plan is on comprehensive community health planning to measurably improve the health of residents. This document has a direct connection to the HMP in its third priority area, which is environmental health. The goal for this priority area is to "enhance quality of life by reducing pollution and other environmental hazards using coordinated, data-driven interventions." This element includes objectives and strategies to encourage responsible oil and gas well drilling and reduce methane emissions as well as encourage a county-wide Climate Action Plan to reduce greenhouse gas emissions and a resilience adaptation plan. While ACHD is approaching these two hazards from a human health perspective, there are strong connections to the risk reductions discussed in this HMP. The HMP would be an excellent source of the most up-to-date information on the location of unconventional oil and gas

wells. Any future climate action planning and resilience planning should be incorporated into future updates of the HMP, especially in the discussion of changing future hazard conditions. Climate action planning and resilience planning would reduce overall hazard risk in the future, not just risk to environmental hazards.

Stormwater Management Plan

The Allegheny County Stormwater Management Plan was completed under the guidance of Pennsylvania's Act 167 in December 2014. The purpose of the plan is to provide an accurate and consistent implementation strategy for comprehensive, countywide stormwater management and to eliminate the variability in municipal-level stormwater management. The Stormwater Management Plan allowed communities to self-identify areas of stormwater concern, including areas that flood and areas with past landslides. This data was used in the Risk Assessment portion of this HMP in the flood and landslide profiles. In addition, the Stormwater Management Plan asked municipalities to provide information on what kind of planning mechanisms were in place, which was used in this capability assessment to supplement municipal survey replies.

The second phase of the Stormwater Management Plan digs into the data collection, technical analysis, hydrologic modeling, and regulations of stormwater in Allegheny County. The timing of this phase is key to integrating the Stormwater Management Plan and the HMP; data collected for the HMP and actions identified by municipalities can be used and integrated into the Stormwater Management Plan Phase II.

The Stormwater Management Plan also established a Watershed Plan Advisory Committee divided into three geographic regions to accommodate the number of communities and stakeholders. Many members of the WPAC also served as members of the planning team for this HMP, and WPAC meetings were used to advertise the HMP planning process. The WPAC will continue to meet through September 2016 as the county continues developing the Plan's Phase II. As a result, the WPAC would be a good source of future flooding information and flood mitigation projects, especially with flooding being the primary hazard concern in the county.

6 Mitigation Strategy

6.1 Update Process Summary

6.1.1 Mitigation Goals and Objectives Review

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.

The 2011 HMP included 8 goals and 36 objectives, many of which were hazard-specific but said essentially the same thing. In reviewing the updated Risk Assessment and mitigation techniques, the HMPSC decided to eliminate the hazard-specific goals and, instead, felt that there should be a single goal that addresses reductions in the possibility of damage and loss to existing community assets stemming from all hazards. This would also ensure that additional goals would not have to be added to the mitigation strategy if more hazards were added to the plan. A list of the eight goals and corresponding objectives from the 2011 HMP as well as a review summary based on comments received from the HMPSC is included in Table 6.1-1.

Table 6.1-1 Review of changes to the 2011 HMP goals and objectives.

GOAL AND OBJECTIVES		COMMENTS
GOAL 1	**Reduce possibility of damage and loss to existing community assets including addressable structures, critical facilities, and infrastructure due to all hazards that affect Allegheny County.**	**Goal 1** will remain unchanged in 2015.
Objective 1A	Develop a comprehensive approach to reducing the possibility of damage and loss of function to critical facilities due to all hazards that affect Allegheny County.	For **Objective 1A**, the HMPSC decided to add "addressable structures" and "loss of life" to the objective. For **Objective 1B**, the HMPSC decided to change the objective to refer to all hazards identified in the risk assessment rather than simply flooding. **Objective 1C** has been re-worded to clean up the language, but is essentially unchanged since 2011.
Objective 1B	Protect existing assets with the highest relative vulnerability to the effects of flooding associated with the 100-year floodplain.	
Objective 1C	Educate homeowners about flood risk and promote the continuing purchase of flood insurance by property owners in flood hazard areas. Additionally, educate homeowners about mine subsidence insurance as well.	

Table 6.1-1 Review of changes to the 2011 HMP goals and objectives.		
GOAL AND OBJECTIVES		**COMMENTS**
Objective 1D	Address identified data limitations regarding lack of detailed information about: Individual structures located in the 100-year floodplain; flood probabilities other than the 100-year flood; and first floor elevations for priority areas. Basements/finished basements/crawl spaces	The HMPSC decided **Objective 1D** was more of an action than an objective. It is included in the 2015 Action Plan as **Action 43**. The HMPSC decided **Objective 1E** was more of an action than an objective. It is included in the 2015 Action Plan as requested by municipalities. **Objective 1F** has been moved to under Goal 4 as 2015's Objective 4A, which addresses natural resource protection. **Objective 1G** has been slightly reworded from "improve" to "expand" floodplain management. The HMPSC felt that most communities do not see storm and septic systems as part of traditional floodplain management. It has been re-numbered to 2015's Objective 1D.
Objective 1E	Implement flood barriers, walls, and floodproofing methods in addition to elevation/acquisition.	
Objective 1F	Address legal issues with stream restoration.	
Objective 1G	Improve floodplain management practices in regard to storm/septic systems with short duration floods.	
GOAL 2	**Reduce possibility of damage and loss to existing community assets including addressable structures, critical facilities, and infrastructure due to landslides.**	**Goal 2** has been deleted as Goal 1 now addresses all hazards.
Objective 2A	Develop a comprehensive approach to reducing the possibility of damage and loss of function to critical facilities due to landslides.	**Objective 2A** has been deleted because it is a hazard-specific duplicate of 2015's Objective 1A. **Objective 2B** has been deleted because it is a hazard-specific duplicate of 2015's Objective 1B. **Objective 2C** has been re-worded to address all hazards and has moved under Goal 1 as 2015's Objective 1F. **Objective 2D** has been removed because the legal basis for mitigation and mitigation planning is established through the Code of Federal Regulations. **Objective 2E** has been moved under the new Goal 2 as 2015's Objective 2F.
Objective 2B	Protect existing assets with the highest relative vulnerability to the effects of landslides.	
Objective 2C	Address identified data limitations regarding lack of detailed information about individual structures located in the highest landslide vulnerability areas.	
Objective 2D	Clarify or establish the legal basis for mitigation.	
Objective 2E	Require geologic studies, on-site monitoring, and site legislation for large new developments.	
GOAL 3	**Reduce possibility of damage and loss to existing community assets including addressable structures, critical facilities, and**	**Goal 3** has been deleted as Goal 1 now addresses all hazards.

Table 6.1-1 Review of changes to the 2011 HMP goals and objectives.		
GOAL AND OBJECTIVES		**COMMENTS**
	infrastructure due to hazardous material releases.	
Objective 3A	Develop a comprehensive approach to reducing the possibility of injury and loss of life for residents and occupants of existing addressable structures and critical facilities with the highest relative vulnerability to the effects of hazardous material releases from discrete locations.	**Objective 3A** has been deleted because it is a hazard-specific duplicate of 2015's Objective 1A. **Objective 3B** has been deleted; 2015's Objective 1F covers this concept. **Objectives 3C** and **3D** have been combined into the 2015 Objective 1G to address both hazardous material releases and transportation accidents.
Objective 3B	Address identified data limitations regarding lack of detailed information about probabilities for manmade events, including: - Contamination due to hazardous materials releases along key stretches of transportation corridors. - Terrorist incidents against areas of higher relative occupancy and critical facilities.	
Objective 3C	Develop a working relationship with the railroads.	
Objective 3D	Establish a reporting/coordination process for the railroads.	
GOAL 4	**Reduce possibility of damage and loss to existing community assets including addressable structures, critical facilities, and infrastructure due to mine subsidence.**	**Goal 4** has been deleted as Goal 1 now addresses all hazards.
Objective 4A	Develop a comprehensive approach to reducing the possibility of damage and loss of function to critical facilities due to mine subsidence.	**Objective 4A** has been deleted because it is a hazard-specific duplicate of Objective 2015's 1A. **Objectives 4B and 4C** have been deleted; 2015's Objective 1F covers these concepts. **Objective 4D** has been rolled into 2015's Objective 1C. **Objective 4E** has been deleted because the general concept of limiting development in dangerous areas is more thoroughly covered under the new objectives under Goal 3.
Objective 4B	Protect existing assets with the highest relative vulnerability to the effects of mine subsidence.	
Objective 4C	Address identified data limitations regarding lack of detailed information about individual structures located in the mine subsidence vulnerability areas.	
Objective 4D	Encourage purchase of mine subsidence insurance and provide information to residents.	
Objective 4E	Limit development over shallow mines.	

Table 6.1-1 Review of changes to the 2011 HMP goals and objectives.		
GOAL AND OBJECTIVES		**COMMENTS**
GOAL 5	**Reduce possibility of damage and loss to existing community assets including addressable structures, critical facilities, and infrastructure due to severe weather.**	**Goal 5** has been deleted as Goal 1 now addresses all hazards.
Objective 5A	Develop a comprehensive approach to reducing the possibility of damage and loss of function to critical facilities due to severe weather in terms of high winds and heavy snow and ice loading.	**Objective 5A** has been deleted because it is a hazard-specific duplicate of 2015's Objective 1A. **Objective 5B** has been deleted; 2015 Objective 1B covers this concept. **Objective 5C** has been deleted; 2015 Objective 1F covers this concept.
Objective 5B	Protect existing assets with the highest relative vulnerability to the effects of severe weather events.	
Objective 5C	Address identified data limitations regarding lack of detailed information about individual structures, other critical facilities and infrastructure with the highest relative vulnerability to the effects of high wind events and heavy snow loads including characteristics of individual structures such as construction type, age, condition, compliance with current building codes, etc.	
GOAL **6**	**Reduce possibility of damage and loss to existing community assets including addressable structures, critical facilities, and infrastructure due to wildfires.**	**Goal 6** has been deleted as Goal 1 now addresses all hazards.
Objective 6A	Develop a comprehensive approach to reducing the possibility of injury and loss of life due to the exposure of SARA Title III facilities to wildfires in forested areas.	**Objective 6A** has been deleted because it is a hazard-specific duplicate of 2015's Objective 1A. **Objective 6B** has been deleted because it is a hazard-specific duplicate of 2015's Objective 1A. **Objective 6C** has been deleted; 2015 Objective 1F covers this concept.
Objective 6B	Develop a comprehensive approach to reducing the possibility of damage and loss of function due to the exposure of critical facilities and infrastructure to wildfire.	
Objective 6C	Address identified data limitations regarding lack of detailed information about vegetation types and individual structures (e.g., roof construction) located within areas more prone to wildfire.	
GOAL 7	**Promote disaster-resistant future development to reduce and eliminate risk from all hazards.**	**Goal 7** will remain unchanged in the 2015 HMP but has been re-numbered to Goal 2.
Objective 7A	Encourage and facilitate the development or revision of comprehensive plans and zoning ordinances to limit new development in high hazard areas.	**Objective 7A** remains unchanged from 2011 but has been re-numbered to 2015 Objective 2A.

Table 6.1-1 Review of changes to the 2011 HMP goals and objectives.		
GOAL AND OBJECTIVES		**COMMENTS**
Objective 7B	Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards.	**Objective 7B** remains unchanged from 2011 but has been re-numbered to 2015 Objective 2B. **Objective 7C** remains unchanged from 2011 but has been re-numbered to 2015 Objective 2C. **Objective 7D** remains unchanged from 2011 but has been re-numbered to 2015 Objective 2D. **Objective 7E** remains unchanged from 2011 but has been re-numbered to 2015 Objective 2E.
Objective 7C	Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.	
Objective 7D	Discourage activities that exacerbate existing hazardous conditions.	
Objective 7E	Address identified data limitations regarding lack of detailed information about development build-out potential in high hazard areas.	
GOAL 8	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	**Goal 8** has been re-worded to reflect the fact that hazard mitigation is a key component of resilience and sustainability. It has been re-numbered to Goal 3 in the 2015 HMP.
Objective 8A	Provide public education to increase awareness of hazards and opportunities for mitigation for all hazards identified that could impact Allegheny County. All interested individuals will be encouraged to participate in hazard mitigation planning and training activities. Managers of public facilities will be knowledgeable in hazard mitigation techniques and the components of the community's mitigation plan.	**Objective 8A** has been re-worded to reflect the changes in this goal and re-numbered to 2015 Objective 3A. The sub-bullets have been deleted to simplify the objective. **Objective 8B** remains unchanged from 2011 but has been re-numbered to 2015 Objective 3B **Objective 8C** remains unchanged from 2011 but has been re-numbered to 2015 Objective 3C **Objective 8D** remains unchanged from 2011 but has been re-numbered to 2015 Objective 3D
Objective 8B	Promote partnerships between the municipalities and the County to continue to develop a County-wide approach to identifying and implementing mitigation actions for all hazards.	
Objective 8C	Promote disaster resistance in the business community from all hazards.	
Objective 8D	Monitor and publicize the effectiveness of mitigation initiatives implemented in the community.	

6.1.2 Mitigation Progress and Successes

For the plan update, Allegheny County Department of Emergency Services and individual municipalities provided progress on mitigation actions and success that were accomplished since 2011. This section reflects progress and successes as of June, 2015.

Perhaps one of the biggest mitigation successes countywide was the completion of Allegheny County's Risk MAP process in 2014. Throughout the Risk MAP process, communities were able to get a better understanding of their flood risk, and all communities updated their floodplain ordinances. Many noted that the 2014 ordinances were stricter than previous ordinances. All communities reporting this progress via the NFIP compliance form note that the PA model ordinance was used. In addition, the non-regulatory Risk MAP products are used in a number of communities to communicate risk; for example, the City of Pittsburgh Department of City Planning links to the RiskMAP3.com portal and provides instructions on how to look up properties. While this does not necessarily represent a permanent risk reduction, the awareness can help build community understanding of risk. In addition, Avalon Borough and North Braddock Borough were suspended from the NFIP at the time of the 2011 HMP but have since re-entered the program. Additionally, East McKeesport joined the program, bringing total countywide participation to 129 of 130 communities.

Stormwater management and storm sewer system maintenance and upgrades are another area of mitigation success since 2011. The Allegheny County Stormwater Management Plan used an online mapping platform allowing municipal officials to catalog stormwater and flooding-related issues. This mapping effort has helped communities and the county understand where flooding is an issue, particularly outside the SFHA. Municipalities have also been taking action on stormwater management. Baldwin Borough passed a robust stormwater management ordinance that requires any additional pervious area to be runoff-neutral, meaning that runoff must be treated on-site and released at a rate that does not affect downstream communities. South Fayette Township has established a Stormwater Study Work Group to convene around stormwater management issues in the community. The City of Pittsburgh continues to focus on stormwater management in many of its planning efforts. Many other communities are beginning to audit their stormwater regulations to ensure they comply with PA DEP and, where applicable, MS4 regulations.

East Deer Township reports it has completed upgrades of ½ mile of sanitary sewer line that will decrease the probability of basement flooding due to inundation of the sanitary line by stormwater. In addition, new storm drains have been installed along Front & Grant streets as part of another effort to divert storm water from sanitary lines and thus mitigate potential basement flooding. Fox Chapel Borough has replaced storm sewer catch basins on Squaw Run Road and replaced the bridge pier on the same roadway to prevent roadway failure. Etna Borough is using vacant community facilities as stormwater management/natural areas after demolition, prohibiting redevelopment and lessening flood losses. Forest Hills Borough completed a stream restoration and stormwater runoff project in Main Park in 2014 to reduce flooding. Kennedy Township also completed a stream restoration project at Clever Road in 2013. The City of McKeesport worked with the Army Corps of Engineers, who cleaned out parts of Long Run Creek to reduce flooding. The City's Public Works department also scheduled more regular cleanings of catch basins and small streams. Similarly, Oakdale Borough has cleaned debris and silt from around

bridges and three areas that had been causing flooding. The community reports the cleanout has had a huge positive impact on the frequency and severity of flooding.

In terms of structural mitigation efforts, Blawnox Borough relocated its fire station outside the SFHA, and Etna Borough completed the purchase and installation of flood barriers at the municipal building. Elizabeth Borough recent put a project out to bid to restore an area that tends to flood with heavy rains, diverting water to the creek rather than towards the houses. Hampton Township purchased 16 properties in the SFHA in the Allison Park area of the Township, and they are planning a second phase project to further reduce flood losses. O'Hara Township acquired and demolished two properties on Powers Run Road that were in the floodplain and opened up the creek to further prevent flooding. This activity was funded by the township. Pitcairn Borough has made progress in re-routing Dirty Camp Run; the community reports that it is currently acquiring final easements and relocating utilities. South Fayette Township reports that it has made progress in floodproofing its sewer lines and pump station, including measures to prevent stormwater from entering the sewer lines and working on preventing overflows at the pump station. Springdale Borough installed new pipes on Butler Street to mitigate flooding. Port Vue, Wall Borough, and the Borough of White Oak took steps to mitigate landslide damage. Wall Borough installed a new retaining wall (95% complete) and a new guide rail while White Oak addressed these hazards at Center Street and Stepanik Lane. Port Vue restricted traffic to one lane on Arlington Avenue, prohibited truck traffic, sectioned off the area prone to landslides, replaced/redirected sewer lines that were contributing to the slide, planted vegetation to prevent erosion and sliding, and incorporated landslide strategies into the Emergency Operations Plan.

Collier Township used the data in the HMP to ensure that the subdivision ordinance sections on landslide and mine subsidence hazards appropriately reflected risk. The community intends to continue periodic review of ordinances to ensure concurrence. The City of Duquesne adopted an airport hazard ordinance to reduce losses associated with air traffic accidents. Edgewood borough reports that it has updated the zoning, SALDO, stormwater management, and MS4 ordinances with stricter language to decrease the probability of flooding hazards. Pennsbury Village has completed evacuation planning and emergency operations plans as an inter-jurisdictional effort with Carnegie Borough.

A number of communities mentioned advances in their public warning systems and education capabilities. Communities in the 10-mile EPZ of the Beaver Valley Power Station report that evacuation routes are mapped and available online. Blawnox Borough established a warning system that connects to the borough website and connects directly to residents via the Swiftreach program, and updated the EOP to ensure it concurs with the HMP. Castle Shannon Borough uses reverse 911 to contact communities in an emergency, and the City of Duquesne and Oakdale Borough also report using Swiftreach. East McKeesport has also improved its ability to communicate with residents during hazard events. Forest Hills Borough continues to use its website and resident newsletter to encourage residents in low-lying areas to purchase flood insurance. Franklin Park Borough, which is very diverse, has developed two sets of emergency warnings in 13 different languages: one tells residents to shelter in place, the other directs residents to evacuate immediately. Frazier Township, which is one of the few places in the county with Marcellus wells, holds an annual meeting with the police, fire, and pipeline company representatives to update public

safety risks and coordinate response. Munhall Borough has established a preparedness team to better respond to rail incidents.

Finally, the City of Pittsburgh was named one of the Rockefeller Foundation's 100 Resilient Cities in its second cohort (December 2014). The program is intended to help cities around the world become more resilient to the physical, social, and economic challenges of the 21st century. Pittsburgh joins US cities like New York, New Orleans, and Oakland and international hubs like Sydney, Singapore, London, and Milan in its designation. Pittsburgh was selected in part because the city has been using innovation as the primary approach to address the post-industrial landscape, meet air and water quality requirements, and spur 'green' job creation. The 100 Resilient Cities framework supports looking not only at the traditional hazards discussed in this plan, like flooding and hazardous material releases/pollution, but also the chronic stressors that exacerbate hazards like aging infrastructure. While focused on the City of Pittsburgh, there will likely be applicability to other Allegheny County communities as the City moves forward with understanding and mitigating its hazards and stressors.

Table 6.1-2 captures progress on all actions since 2005. Many of the outreach, education, and training actions are considered ongoing.

Table 6.1-2 Review of previous mitigation actions.

COMMUNITY	ACTION	PROGRESS
Community: Mount Lebanon, Harrison Township	**Action 1:** Provide an annual table-top training for emergency management staff.	Mount Lebanon reports this is an ongoing and annual activity.
Community: Mount Lebanon	**Action 2:** Initiate, recruit, and train CERT team to remedy large manpower shortages during emergency events.	Mount Lebanon would like to cancel this action due to a lack of interest. The community was unable to find enough interested people to create CERT team.
Community: Mount Lebanon	**Action 3:** Develop a continuity plan for municipal services and buildings.	This action has been completed for the Public Safety Building, which is the EOC. However, it is considered ongoing for the other municipal offices and is included in the 2015 Action Plan.
Community: Mount Lebanon	**Action 4:** Provide GIS/mapping capabilities for Fire Department vehicles so that staff can view floodplains and utilities in the field.	This action has been completed.
Community: Churchill Borough	**Action 5:** Equip the pump station with a surge protector.	Churchill Borough has not provided progress on this action but ACES does not believe the action has been completed; it will stay in the 2015 Action Plan.
Community: Churchill Borough, Aspinwall Borough	**Action 6:** Provide community outreach and education about flooding.	Aspinwall Borough reports that they include this information in their Resident Handbook, but other action has been limited due to a change in management. Aspinwall would like to continue this action. Churchill Borough did not provide a status update on this action.

Table 6.1-2 Review of previous mitigation actions.

COMMUNITY	ACTION	PROGRESS
Community: Wall Borough	**Action 7**: Take measures to prevent road sliding into homes on Marie Street. There is no guiderail to protect homes from vehicular traffic.	This action is complete. A new guide rail has been installed at this location, and the new retaining wall was 95% complete as of April 2015.
Community: Rosslyn Farms Borough, North Fayette Township, Carnegie Borough, Turtle Creek Borough	**Action 8:** Identify properties in the community at high risk of flooding for purposes of property protection.	This action is ongoing and is included in the 2015 Action Plan. Frazer Township evaluates floodprone areas regularly after storm events.
Community: Frazer Township	**Action 9:** Prepare for possibility of wildfires by supporting Firemen Training with annual donations.	This action is ongoing but is not related to mitigation; it refers to funding response. As a result, it has been deleted from the Action Plan.
Community: Frazer Township	**Action 10:** Conduct Active Shooter Training with Frazer Township Police Department and Mutual Aid Police Departments to prepare for potential mall shootings, bombings, or other types of emergencies within the Pittsburgh Mill Mall and surrounding businesses.	This action is ongoing and is considered a high priority. It will be included in the 2015 Action Plan.
Community: West Elizabeth Borough	**Action 11:** Establish a pre-warning system for flooding.	This action has not been completed and is included in the 2015 Action Plan.
Community: North Fayette Township	**Action 12:** Coordinate with PennDOT, Allegheny County Maintenance, and North Fayette Township Transportation on winter storm response.	This action is ongoing and is included in the 2015 Action Plan.
Community: Carnegie Borough	**Action 13:** Participate in the StormReady program.	No progress is reported on this action. It is included in the 2015 Action Plan.
Community: Dormont Borough	**Action 14:** Monitor storage of public pool chemicals and Port Authority subway tunnel.	No progress is reported on this action. It is included in the 2015 Action Plan.
Community: East McKeesport Borough	**Action 15:** Improve sheltering.	No progress was made on this action and the community would like to discontinue the action.
Community: East McKeesport Borough	**Action 16:** Upgrade water source/water line size.	This action has been deferred to the local water authority. It has been deleted from the 2015 Action Plan.
Community: East McKeesport Borough	**Action 17:** Upgrade or replace equipment.	This action is ongoing as funds become available, especially for public works equipment. It is included in the 2015 Action Plan.
Community: Forest Hills Borough	**Action 18:** Use website and newsletter to encourage residents in low lying areas to consider flood insurance.	This action is ongoing and is included in the 2015 Action Plan.
Community: Munhall Borough	**Action 19:** Establish a preparedness team to be better prepared to respond to rail incidents.	This action has been completed.

Table 6.1-2 Review of previous mitigation actions.

COMMUNITY	ACTION	PROGRESS
Community: Upper Saint Clair Township and West View Borough	**Action 20:** Review floodplain management ordinances with the possibility of adopting more stringent regulatory floodplain management standards.	This action was completed with the 2014 FIRM map updated and ordinance adoption.
Community: Upper Saint Clair Township	**Action 21:** Review zoning regulations pertaining to airports.	No progress is reported on this action. It is included in the 2015 Action Plan.
Community: Jefferson Hills Borough	**Action 22:** Identify critical road drainage concerns in landslide-prone areas.	No progress is reported on this action. It is included in the 2015 Action Plan.
Community: Blawnox Borough and Whitehall Borough	**Action 23:** Construct new fire station.	This action has been completed.
Community: Blawnox Borough	**Action 24:** Identify hazards within the Borough and correct said hazards through the enforcement of building codes.	This action is ongoing and is included in the 2015 Action Plan.
Community: Blawnox Borough	**Action 25:** Update emergency management plan and ensure it corresponds with the hazard mitigation plan update.	This action has been completed.
Community: Blawnox Borough	**Action 26:** Establish warning system to notify the public of hazardous situations by website and through the Swiftreach notification system.	This action has been completed.
Community: Etna Borough	**Action 27:** Provide elevation and flood-proofing projects to homes in hazard areas.	This action has not been completed and is included in the 2015 Action Plan.
Community: Etna Borough	**Action 28:** Purchase and install flood barriers around police, fire, and municipal complex.	This action has been completed.
Community: Elizabeth Township	**Action 29:** Provide tabletop disaster exercises with local law enforcement, EMS, emergency management, schools, local officials, and fire companies for flooding/winter storm scenarios.	No progress is reported on this action. It has been deleted from the 2015 Action Plan because it is focused on preparedness and response rather than mitigation.
Community: Kennedy Township	**Action 30:** Obtain equipment and crew necessary to clear debris from water detention facility.	This action is ongoing and is included in the 2015 Action Plan.
Community: Oakdale Borough	**Action 31:** Establish a legal means to keep waterways open.	This action is ongoing and is included in the 2015 Action Plan. The community has removed debris and silt from around bridges and will continue to identify areas where clearance is needed.
Community: Hampton Township	**Action 32:** Install regional storm water facility and aquire/demolish structures within the floodplain.	This action is completed. The Township has purchased 16 properties in the floodplain in the lower Allison Park area. The Township would like to undertake a second phase of acquisitions.
Community: Fox Chapel Borough	**Action 33:** Replace storm sewer catch basins on Squaw Run Road.	This action is completed.

Table 6.1-2 Review of previous mitigation actions.

COMMUNITY	ACTION	PROGRESS
Community: Fox Chapel Borough	**Action 34:** Replace bridge pier on Squaw Run Road East, to prevent road failure.	This action is completed.
Community: Pleasant Hills Borough	**Action 35:** Remedy basement flooding and sanitary sewer overflows.	No progress is reported on this action. It is included in the 2015 Action Plan.
Community: Harrison Township	**Action 36:** Promote storm water management and provide NFIP information to the public.	No progress is reported on this action. It is included in the 2015 Action Plan.
Community: North Versailles Township	**Action 37:** Implement storm water projects.	This action is ongoing and is included in the 2015 Action Plan. Future stormwater projects will be incorporated into Phase II of the County Stormwater Management Plan.
Community: North Braddock Borough	**Action 38:** Demolish vacant structures.	This action has not yet been completed, but it is going to be completed using CDGB funding through a Safe Neighborhood Demolition contract. It is included in the 2015 Action Plan.
Community: South Park Township	**Action 39:** Clear river banks per Commonwealth regulations for 100 yards above and below established bridges and replace with proper foliage.	This action is not yet complete because the lead agency, PA DEP, prohibited the completion of the action. However, the action is still relevant to the Township and is included in the 2015 Action Plan.
Community: Port Vue Borough	**Action 40:** Address landslide hazard on Arlington Avenue in Port Vue.	This action is ongoing and is included in the 2015 Action Plan. The Borough has restricted traffic to one lane and prohibited truck traffic. The landslide area has been sectioned off with barriers. The sanitary sewers were replaced by pipe bursting through old sections. The stormwater flow has been redirected and vegetation has been planted to reduce erosion. A landslide strategy has been added to the municipal EOP, and the borough is educating residents in the affected area on stormwater management.
Community: Whitaker Borough, Collier Township	**Action 41:** Review subdivision ordinances and ensure that development is not in high hazard landslide/mine subsidence areas.	Collier Township completed this action when it updated its comprehensive plan. Whitaker Borough uses the Allegheny County Subdivision ordinance, which includes provisions for landslide and mine subsidence. However, both communities consider this action ongoing with a need for subdivision application reviews. It is included in the 2015 Action Plan.
Community: Edgewood Borough	**Action 42:** Reduce flooding in Greendale by increasing the capacity of the storm sewer system.	This action is ongoing as funding becomes available; it is included in the 2015 Action Plan.

Table 6.1-2 Review of previous mitigation actions.

COMMUNITY	ACTION	PROGRESS
Community: West Elizabeth Borough, Shaler Township	**Action 43:** Demolish houses in flood areas.	Shaler Township has removed homes in the Bottoms where Pine Creek comes through. West Elizabeth has not made progress. However, both communities consider this an ongoing action, so it is included in the 2015 Action Plan.
Community: Plum Borough	**Action 44:** Research and analyze existing floodplains in jurisdiction.	Plum Borough did not provide a status update for this action. However, the community got new flood maps in 2014 that used the latest-and-best data, so the action can be considered completed.
Community: Millvale Borough	**Action 45:** Repair creek walls and floor.	No progress is reported on this action. It is included in the 2015 Action Plan.
Community: Wilkins Township	**Action 46:** Purchase flood-prone homes along Larimer Avenue and Wilbur Avenue.	No progress is reported on this action. It is included in the 2015 Action Plan.
Community: Town of McCandless	**Action 47:** Remove obstructions in floodplains as properties redevelop.	The community reports that there has not been any demolition since 2011, but the community hopes to have more in the next five years. It is included in the 2015 Action Plan.
Community: Springdale Borough	**Action 48:** Mitigate flooding on Butler Street with a new pipe.	This action is completed.
Community: Pitcairn Borough	**Action 49:** Re-route Dirty Camp Run to prevent further flooding.	This action is in progress. The Borough is in the utility relocation phase of construction and the final easements are being acquired. It is included in the 2015 Action Plan.
Community: Penn Hills Township	**Action 50:** Clean bank and bed areas, dredge bed and under bridge, and reconstruct bridge base. This will reduce flooding at/near bridges, reduce erosion of banks, and prevent blockage of roads.	The Township has cleared backs of streams and has cleared creeks and areas under bridges of debris. However, the action is considered ongoing and is included in the 2015 Action Plan.
Community: Bethel Park	**Action 51:** Revise stormwater management and floodplain ordinances to meet new state requirements and revise landslide ordinances to limit development in landslide prone areas.	The floodplain ordinance was updated in 2014 using the PA Model Ordinance. The stormwater management ordinance has not been updated but is expected with Phase II of the county Stormwater Plan. The landslide ordinance has also not been updated. These two revisions are included in the 2015 Action Plan.
Community: West Homestead Borough	**Action 52:** Maintain West Run channel and remove obstructions to prevent flooding.	No progress is reported on this action, and that area flooded in 2014. It is included in the 2015 Action Plan.
Community: Millvale Borough	**Action 53:** Continue ongoing updates and reviews of fire assignments and planning through the fire department for quick response to structure fires and continue blight/abandonment program to demolish abandoned properties.	No progress is reported on this action. The blight/abandonment part of the action is included in the 2015 Action Plan. The fire assignments evaluation has been discontinued because it is more related to response than mitigation.

Table 6.1-2 Review of previous mitigation actions.

COMMUNITY	ACTION	PROGRESS
Community: Millvale Borough	**Action 54:** Continue program to clean out Girty's Run at least twice a year. Coordinate with Girty's Run Authority to separate storm water and sewer lines. Provide rain barrel and water garden programs to decrease the amount of water entering the storm sewer lines during a heavy rain event.	Part of this action has been completed, as flooding has reduced in the area. The borough has done some education and programming around rain barrels and green infrastructure. However, the status of Girty's Run cleanups and storm sewer separation is unknown. These two aspects of this action are included in the 2015 Action Plan.
Community: Millvale Borough	**Action 55:** Continue updates to road crew equipment for snow removal, including updates to salt spreaders and plows.	No progress is reported on this action, but since it is focused on response it has been deleted from the Action Plan.
Community: Castle Shannon Borough	**Action 56:** Maintain drainage systems.	This action has been completed. The Public Works department maintains the system and hires outside contractors as needed to assist.
Community: Heidelberg Borough	**Action 57:** Develop a class to educate property owners about the NFIP.	This action has been discontinued due to lack of funding and personnel.
Community: Heidelberg Borough	**Action 58:** Participate in winter storm exercise.	This action is completed through the winter storm exercises run through PEMA. It will not be carried over in 2015 because it is focused on response rather than mitigation.
Community: All Municipalities in Allegheny County	**Action 59:** In the event of a pandemic or nuclear incident, provide information to the public in the form of website postings, televised news releases, and newspaper news releases.	Communities in Allegheny County generally responded that they had protocols to inform the public in the case of any kind of disaster event, usually in the form of reverse 911, Nixle systems, and municipal websites. However, this action has been deleted because it is focused on response instead of mitigation. In addition, pandemic planning is covered under the Pandemic Plan and Points of Distribution program. For municipal-specific comments on this action, please see Appendix C.
Community: All Municipalities in Allegheny County	**Action 60:** Establish evacuation routes to be used in the event of a nuclear incident and post this information on municipal websites.	In general, communities in Allegheny County responded that this was an ongoing activity. According to ACES, this is action is addressed in the county EOP and is addressed by the use of a Public Information Officer. Evacuation route planning is completed via Annex 7 of the EOP and is ongoing, updated every two years. Because this is addressed thoroughly in the EOP, it has been deleted from the HMP. For municipal-specific comments on this action, please see Appendix C.
Community: All Municipalities in Allegheny County	**Action 61:** Provide training to local law enforcement on responding to civil disturbances.	The County provides training through the county police. These are hosted at the Public Safety Building and should be considered ongoing. For municipal-specific comments on this action, please see Appendix C.

Table 6.1-2 Review of previous mitigation actions.		
COMMUNITY	**ACTION**	**PROGRESS**
Community: Allegheny County Department of Emergency Services	**Action 62:** Implement a system for tracking the progress of the mitigation actions selected for the maintenance/update of this hazard mitigation plan update.	The County maintains a spreadsheet of all the mitigation actions and participation in the plan. The county would like to keep this action and add a renewed focus on action implementation.
Community: Allegheny County Department of Emergency Services	**Action 63:** Conduct a cost-benefit analysis to determine whether new construction of critical facilities should be built to withstand an earthquake event.	This action should be discontinued. The risk of earthquakes is incredibly small, and all communities use the UCC, which would ensure that new critical facilities are appropriately constructed.
Community: Allegheny County Department of Emergency Services	**Action 64:** Create a pamphlet to educate residents about the potential of earthquakes and what to do during one.	The county has used Red Cross earthquake preparedness materials through LEPC and Quarterly Training in the past. However, with a renewed focus on all-hazards planning and education, the county would like to change this action to state to "Use the county LEPC and Quarterly Trainings to distribute all-hazards education and preparedness materials to communities."

6.2 Mitigation Goals and Objectives

Based on results of the goals and objectives evaluation exercise and input from the County, a list of goals and corresponding objectives was developed. Table 6.2-1 details the mitigation goals and objectives established for the 2015 HMP. Goal 4 is a new goal for the 2015 HMP, as are Objectives 1E, 1H, 4B, and 4C.

Table 6.2-1 2015 Mitigation Goals and Objectives.	
GOAL 1	**Reduce possibility of damage and loss to existing community assets including addressable structures, critical facilities, and infrastructure due to all hazards that affect Allegheny County.**
Objective 1A	Develop a comprehensive approach to reducing the possibility of damage to addressable structures, loss of function to critical facilities, and injuries/loss of life due to all hazards that affect Allegheny County.
Objective 1B	Protect existing assets with the highest relative vulnerability to the hazards identified in the HMP.
Objective 1C	Encourage the use of flood and mine subsidence insurance purchases to protect and educate residents about flood and subsidence risk.
Objective 1D	Expand the conventional thinking on floodplain management to include storm/septic systems and short duration floods.
Objective 1E	Protect and maintain county and local infrastructure.
Objective 1F	Identify building-related data required to more fully assess the vulnerability of structures to identified hazards and plan to capture detailed data.

Table 6.2-1	2015 Mitigation Goals and Objectives.
Objective 1G	Leverage existing relationships and develop new ones to increase coordination and mitigate hazardous materials incidents and transportation accidents.
Objective 1H	Use structural flood mitigation techniques to reduce future loss of life and property, including acquisition, elevation, and relocation for residential structures and wet and dry floodproofing for non-residential structures.
GOAL 2	**Promote disaster-resistant future development to reduce and eliminate risk from all hazards.**
Objective 2A	Encourage and facilitate the development or revision of comprehensive plans and zoning ordinances to limit new development in high hazard areas.
Objective 2B	Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards.
Objective 2C	Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.
Objective 2D	Discourage activities that exacerbate existing hazardous conditions.
Objective 2E	Address identified data limitations regarding lack of detailed information about development build-out potential in high hazard areas.
Objective 2F	Require geologic studies, on-site monitoring, and site legislation for large new developments.
GOAL 3	**Promote hazard mitigation as a public value that ensures safer, more sustainable communities.**
Objective 3A	Provide public education that reinforces the connections between sustainability, safety, and risk reduction for all hazards identified that could impact Allegheny County.
Objective 3B	Promote partnerships between the municipalities and the County to continue to develop a County-wide approach to identifying and implementing mitigation actions for all hazards.
Objective 3C	Promote disaster resistance in the business community from all hazards.
Objective 3D	Monitor and publicize the effectiveness of mitigation initiatives implemented in the community.
Goal 4	**Protect natural resources within hazard areas and use them to reduce risk and losses.**
Objective 4A	Address legal issues with stream restoration.
Objective 4B	Leverage the technical skills and knowledge of non-profit and non-governmental entities involved in natural resources protection.
Objective 4C	Protect the natural function of waterways.

6.3 Identification and Analysis of Mitigation Techniques

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

- **Local plans and regulations:** Government authorities, policies, or codes that influence the way land and buildings are developed and built. Examples include, but are not limited to: comprehensive plans, subdivision regulations, building codes and enforcement, and NFIP and CRS.
- **Structure and infrastructure**: Modifying existing structures and infrastructure or constructing new structures to reduce hazard vulnerability. Examples include, but are not limited to: acquisition and elevation of structures in flood prone areas, utility undergrounding, structural retrofits, floodwalls and retaining walls, detention and retention structures, and culverts.
- **Natural systems protection:** Actions that minimize damage and losses and also preserve or restore the functions of natural systems. Examples include, but are not limited to: sediment and erosion control, stream corridor restoration, forest management, conservation easements, and wetland restoration and preservation.
- **Education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate the hazards, and may also include participation in national programs. Examples include, but are not limited to: radio or television spots, websites with maps and information, provide information and training, NFIP outreach, StormReady, and Firewise Communities.

Table 6.3-1 is identifies mitigation techniques for the hazards identified in the risk assessment. The matrix is used to help identify specific mitigation actions to be included in the mitigation action plan.

Table 6.3-1 Mitigation techniques used for all hazards in Allegheny County

HAZARD (IN ORDER OF RISK FACTOR RANKING)	MITIGATION TECHNIQUE			
	LOCAL PLANS AND REGULATIONS	STRUCTURE AND INFRASTRUCTURE	NATURAL SYSTEMS PROTECTION	EDUCATION AND AWARENESS
Flood, Flash Flood, Ice Jam	X	X	X	X
Winter storm	X	X		X
Environmental Hazards	X			X
Tornado, Windstorm	X	X		X
Transportation Accidents	X			X
Utility Interruption	X	X		X
Dam and Lock Failure	X			X
Terrorism	X			X
Civil Disturbance	X			X
Drought	X			X
Landslide	X	X		X
Levee failure	X			X

Table 6.3-1 Mitigation techniques used for all hazards in Allegheny County				
HAZARD (IN ORDER OF RISK FACTOR RANKING)	MITIGATION TECHNIQUE			
	LOCAL PLANS AND REGULATIONS	STRUCTURE AND INFRASTRUCTURE	NATURAL SYSTEMS PROTECTION	EDUCATION AND AWARENESS
Subsidence, Sinkhole	X			X
Urban Fire and explosion	X	X		X
Nuclear Incidents	X			X
Wildfire	X			X
Pandemic	X			X
Hurricane, Tropical Storm, Nor'easter	X	X	X	X
Radon Exposure	X			X
Earthquake	X			X

6.4 Mitigation Action Plan

All municipalities that participated in the plan update process have selected mitigation actions that they would like to accomplish within the next 5 years. Table 6.4-1 lists all the mitigation actions for the 2015 HMP Update. Each mitigation action is intended to address one or more of the goals and objectives identified in Section 6.2. The prioritization of these actions follows in Table 6.4-2.

Table 6.4-1 Mitigation Action Plan	
Community: Mount Lebanon; Harrison Township	**Action 1: Provide an annual table-top training for emergency management staff.**
Category:	Education and Awareness
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	Mount Lebanon Fire Department/Emergency Management, Harrison Township Commissioners
Implementation Schedule:	Annually
Funding Source:	General emergency management budget line item, staff time
Community: Mount Lebanon	**Action 2: Develop a continuity plan for municipal services and buildings.**
Category:	Plans and Regulations
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	Fire Department/Emergency Management
Implementation Schedule:	Within 2 years
Funding Source:	Staff time
Community: Churchill Borough	**Action 3: Equip the pump station with a surge protector.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Tornado, Windstorm; Utility Interruption
Lead Agency/Department:	EMC, Borough Council
Implementation Schedule:	Within 5 years

Table 6.4-1 Mitigation Action Plan	
Funding Source:	PennVEST; Community Infrastructure and Tourism Fund Grant
Community: Churchill Borough; Aspinwall Borough; McKees Rocks Borough	**Action 4: Provide community outreach and education about flooding.**
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Municipal EMCs
Implementation Schedule:	Annually
Funding Source:	Staff time
Community: Rosslyn Farms Borough; North Fayette Township; Carnegie Borough; Turtle Creek Borough	**Action 5: Identify properties in the community at high risk of flooding for purposes of property protection.**
Category:	Plans and Regulations
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Rosslyn Farms Borough EMC, North Fayette Township Administration, Carnegie Borough Police Department, US Army Corps of Engineers
Implementation Schedule:	As funds become available
Funding Source:	FEMA/PEMA
Community: Frazer Township	**Action 6: Conduct Active Shooter Training with Frazer Township Police Department and Mutual Aid Police Departments to prepare for potential mall shootings, bombings, or other types of emergencies within the Pittsburgh Mill Mall and surrounding businesses.**
Category:	Education and Awareness
Hazard(s) Addressed:	Terrorism
Lead Agency/Department:	Frazer Township Police Department
Implementation Schedule:	Every other year
Funding Source:	Allegheny County and Township's general fund
Community: West Elizabeth Borough; Oakdale Borough	**Action 7: Establish a flood warning system and install stream gauges.**
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	EMC
Implementation Schedule:	Within 3 years
Funding Source:	USGS grants and Borough general fund
Community: North Fayette Township	**Action 8: Coordinate with PennDOT, Allegheny County Maintenance, and North Fayette Township Transportation on winter storm response.**
Category:	Plans and Regulation
Hazard(s) Addressed:	Winter Storms
Lead Agency/Department:	PennDOT, Allegheny County Maintenance, North Fayette Township Department of Transportation

Table 6.4-1 Mitigation Action Plan	
Implementation Schedule:	Annually
Funding Source:	Staff time
Community: Carnegie Borough	**Action 9: Participate in the StormReady program.**
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Tornado, Windstorm
Lead Agency/Department:	Police Department
Implementation Schedule:	Within 2 years
Funding Source:	Staff time
Community: Dormont Borough	**Action 10: Monitor storage of public pool chemicals and Port Authority subway tunnel.**
Category:	Education and Awareness
Hazard(s) Addressed:	Environmental Hazards; Terrorism; Transportation Accidents
Lead Agency/Department:	Fire Department, County HAZ-MAT
Implementation Schedule:	Ongoing
Funding Source:	Staff time
Community: East McKeesport Borough	**Action 11: Upgrade or replace equipment.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Winter Storms
Lead Agency/Department:	EMC, Public Works
Implementation Schedule:	As funds become available
Funding Source:	General fund
Community: Forest Hills Borough; Avalon Borough; Ben Avon Borough; Richland Township	**Action 12: Use website and newsletter to encourage residents in low lying areas to consider flood insurance.**
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	EMC
Implementation Schedule:	Ongoing
Funding Source:	General fund
Community: Upper Saint Clair Township	**Action 13: Review zoning regulations pertaining to airports.**
Category:	Plans and Regulations
Hazard(s) Addressed:	Transportation Accidents
Lead Agency/Department:	Community Development Department
Implementation Schedule:	Within 3 years
Funding Source:	Staff time; PennDOT (technical assistance)
Community: Jefferson Hills Borough	**Action 14: Identify and correct critical road drainage concerns in landslide-prone areas.**
Category:	Plans and Regulations
Hazard(s) Addressed:	Landslide

Table 6.4-1 Mitigation Action Plan	
Lead Agency/Department:	Local, county, state governments
Implementation Schedule:	As issues arise
Funding Source:	General fund
Community: Blawnox Borough	**Action 15: Identify hazards within the Borough and correct said hazards through the enforcement of building codes.**
Category:	Plans and Regulations
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	Borough manager and council
Implementation Schedule:	Ongoing
Funding Source:	Staff time
Community: Etna Borough	**Action 16: Provide elevation and flood-proofing projects to homes in hazard areas.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough
Implementation Schedule:	Ongoing, through 2020
Funding Source:	FEMA/PEMA
Community: Kennedy Township	**Action 17: Obtain equipment and crew necessary to clear debris from water detention facility.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	EMC
Implementation Schedule:	As funds become available
Funding Source:	West View Water Authority and general fund
Community: Oakdale Borough	**Action 18: Establish a legal means to keep waterways open and continue to remove silt from streams.**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	EMC
Implementation Schedule:	Every other year
Funding Source:	Municipal budget
Community: Hampton Township	**Action 19: Conduct Phase 2 of the Lower Allison Park flood retention project.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	EMC and consultants
Implementation Schedule:	Within 5 years
Funding Source:	PennDOT, DEP, FEMA/PEMA, Allegheny County
Community: Pleasant Hills Borough	**Action 20: Remedy basement flooding and sanitary sewer overflows using green infrastructure.**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter

Table 6.4-1 Mitigation Action Plan	
Lead Agency/Department:	Borough
Implementation Schedule:	Ongoing
Funding Source:	PENNVEST and resident surcharge
Community: Harrison Township	**Action 21: Promote storm water management and provide NFIP information to the public.**
Category:	Plans and Regulations; Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Commissioners
Implementation Schedule:	Within 2 years
Funding Source:	Staff time
Community: North Versailles Township	**Action 22: Implement stormwater projects.**
Category:	Structure and Infrastructure; Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Public Safety Department
Implementation Schedule:	Ongoing
Funding Source:	Municipal budget; PA H2O grants
Community: North Braddock Borough; Wall Borough	**Action 23: Demolish vacant structures through the Safe Neighborhood Demolition Program.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Winter Storms; Urban Fire and Explosion
Lead Agency/Department:	Borough
Implementation Schedule:	Annually
Funding Source:	CDBG funds
Community: South Park Township	**Action 24: Clear river banks per Commonwealth regulations for 100 yards above and below established bridges and replace with proper foliage.**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Township
Implementation Schedule:	As resources become available
Funding Source:	FEMA/PEMA; DEP; municipal budget
Community: Port Vue Borough	**Action 25: Continue to structurally address landslide hazard on Arlington Avenue in Port Vue and educate residents about the landslide hazard.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Landslide
Lead Agency/Department:	Port Vue officials/TRCOG
Implementation Schedule:	Ongoing
Funding Source:	TRCOG; municipal budget
Community: Whitaker Borough; Collier Township	**Action 26: Continue to conduct subdivision reviews to ensure new development is not in high hazard landslide/mine subsidence areas.**

Table 6.4-1 Mitigation Action Plan	
Category:	Plans and Regulations
Hazard(s) Addressed:	Landslide; Subsidence, Sinkhole
Lead Agency/Department:	Whitaker Borough Planning Commission; Collier Township Planning Commission, Engineer, Code Officer, and Zoning Officer
Implementation Schedule:	Ongoing
Funding Source:	Staff time
Community: Edgewood Borough	**Action 27: Reduce flooding in Greendale by increasing the capacity of the storm sewer system.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough
Implementation Schedule:	As funds become available
Funding Source:	PA H2O; local tax revenue
Community: West Elizabeth Borough; Shaler Township	**Action 28: Demolish houses in floodprone areas identified in the HMP.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	West Elizabeth Borough Code Enforcement Department, Shaler Township EMA
Implementation Schedule:	As funds become available
Funding Source:	CBDG; FEMA/PEMA
Community: Millvale Borough	**Action 29: Repair Girtys Run walls and floor.**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough
Implementation Schedule:	Within 3 years
Funding Source:	Municipal budget; PA H2O Program; DEP
Community: Wilkins Township	**Action 30: Purchase flood-prone homes along Larimer Avenue and Wilbur Avenue.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Wilkins Township and County EMA
Implementation Schedule:	As funds become available
Funding Source:	Township, FEMA/PEMA
Community: McCandless Township	**Action 31: Remove obstructions in floodplains as properties redevelop.**
Category:	Structure and Infrastructure; Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Planning and Building
Implementation Schedule:	Ongoing
Funding Source:	Property owners

Table 6.4-1 Mitigation Action Plan	
Community: Pitcairn Borough	**Action 32: Continue Dirty Camp Run Flood Control Project to completion, improve/replace related infrastructure, and conduct stream restoration to support project.**
Category:	Structure and Infrastructure; Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough and DEP
Implementation Schedule:	Within 2 years
Funding Source:	Municipal budget; DEP
Community: Penn Hills Township	**Action 33: Clean bank and bed areas, dredge bed and under bridge, and reconstruct bridge base to reduce flooding at/near bridges, reduce erosion of banks, and prevent blockage of roads.**
Category:	Structure and Infrastructure; Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Public Works and Planning Departments
Implementation Schedule:	Within 5 years
Funding Source:	Municipal budget; PennDOT
Community: Bethel Park	**Action 34: Revise storm water management ordinance to meet state requirements and revise ordinances adressing landslides to limit development in landslide prone areas.**
Category:	Plans and Regulations
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Landslide
Lead Agency/Department:	Engineering and Planning Departments
Implementation Schedule:	Within 5 years
Funding Source:	Municipal budget; Staff time
Community: West Homestead Borough	**Action 35: Maintain West Run channel and remove obstructions to prevent flooding.**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Engineering Department
Implementation Schedule:	Annually
Funding Source:	DEP; Municipal budget
Community: Millvale Borough	**Action 36: Continue blight/abandonment program to demolish abandoned properties.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Urban Fire
Lead Agency/Department:	Borough
Implementation Schedule:	Annually
Funding Source:	CDBG funds
Community: Millvale Borough	**Action 37: Continue program to clean out Girty's Run at least twice a year.**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter

Table 6.4-1 Mitigation Action Plan	
Lead Agency/Department:	Borough
Implementation Schedule:	Twice annually
Funding Source:	Municipal budget;
Community: Millvale Borough	**Action 38: Coordinate with Girty's Run Authority to separate storm water and sewer lines.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough
Implementation Schedule:	Within 5 years
Funding Source:	PA H2O; sewer service fees
Community: All Municipalities in Allegheny County	**Action 39: Provide training to local law enforcement on responding to civil disturbances.**
Category:	Education and Awareness
Hazard(s) Addressed:	Civil Disturbances
Lead Agency/Department:	County and Local EMCs
Implementation Schedule:	Annually
Funding Source:	Staff time; Allegheny County Police Department
Community: Allegheny County Department of Emergency Services	**Action 40: Use the County's mitigation action tracking spreadsheet to encourage implementation of actions identified in this hazard mitigation plan update.**
Category:	All Categories (since it will cover tracking all types of projects)
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	Allegheny County Department of Emergency Services
Implementation Schedule:	Annually
Funding Source:	Staff time
Community: Allegheny County Department of Emergency Services and All Municipalities	**Action 41: Use the county LEPC and Quarterly Trainings to distribute all-hazards education and preparedness materials to communities.**
Category:	Education and Awareness
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	Allegheny County Department of Emergency Services
Implementation Schedule:	Within 1 year
Funding Source:	Staff time
Community: Allegheny County Department of Emergency Services and All Municipalities	**Action 42: Address identified data limitations regarding lack of detailed information about: Individual structures located in the 100-year floodplain; flood probabilities other than the 100-year flood; presence of basements/finished basements/crawl spaces and first floor elevations for priority areas.**
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Allegheny County Department of Emergency Services; local EMCs; Allegheny County GIS
Implementation Schedule:	Ongoing

Table 6.4-1 Mitigation Action Plan	
Funding Source:	Staff time
Community: Aspinwall Borough	**Action 43: Floodproof municipal facilities.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager and EMC
Implementation Schedule:	As funds become available
Funding Source:	FEMA/PEMA
Community: Aspinwall Borough	**Action 44: Continue to coordinate with Norfolk Southern about rail traffic, conducting rail exercises, and training municipal staff on how to improve reactions if an incident occurs.**
Category:	Education and Awareness; Plans and Regulations
Hazard(s) Addressed:	Environmental Hazards; Transportation Accidents
Lead Agency/Department:	EMC
Implementation Schedule:	Ongoing
Funding Source:	Staff time
Community: Aspinwall Borough	**Action 45: Conduct an education and awareness campaign about the Borough's emergency management policies, procedures, and reasoning, including providing a resource guide so residents know where to turn for information.**
Category:	Education and Awareness
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	EMC
Implementation Schedule:	Within 2 years
Funding Source:	Staff time
Community: Baldwin Township; Castle Shannon Borough; Munhall Borough	**Action 46: Create response plan for train derailment events and, in Baldwin, for fires in the commercial/industrial district in coordination with surrounding municipalities.**
Category:	Plans and Regulations
Hazard(s) Addressed:	Transportation Accidents; Urban Fire and Explosion
Lead Agency/Department:	Municipal Managers and EMCs
Implementation Schedule:	Within 2 years
Funding Source:	Staff Time
Community: Baldwin Township; Oakdale Borough	**Action 47: Perform regular maintenance on drainage systems with an emphasis on projects with greatest impact on reducing flooding and controlling runoff.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Landslide
Lead Agency/Department:	Public Works
Implementation Schedule:	Ongoing
Funding Source:	Public Works operations budget

Table 6.4-1 Mitigation Action Plan	
Community: Baldwin Township; East McKeesport Borough	**Action 48: Monitor subsidence risk factors, plan for subsidence events, educate residents, and refer new developments to the Mine Subsidence Insurance Program if the development is an area that has been undermined.**
Category:	Education and Awareness; Plans and Regulations
Hazard(s) Addressed:	Subsidence, Sinkhole
Lead Agency/Department:	Public Works, Township Engineer
Implementation Schedule:	Ongoing
Funding Source:	Staff Time
Community: Baldwin Township	**Action 49: Monitor drought conditions and water supply resources to provide early warning to residents about the need to conserve water.**
Category:	Education and Awareness
Hazard(s) Addressed:	Drought
Lead Agency/Department:	Municipal Manager partnered with PA American Water and USACE
Implementation Schedule:	As drought conditions warrant
Funding Source:	Staff time
Community: Baldwin Township	**Action 50: Conduct tornado awareness activities and educate residents on proper sheltering**
Category:	Education and Awareness
Hazard(s) Addressed:	Tornado, Windstorm
Lead Agency/Department:	Municipal Manager partnered with PA American Water and USACE
Implementation Schedule:	Within 1 year
Funding Source:	Staff time
Community: Ben Avon Borough	**Action 51: Mitigate landslides along Cambridge Road by continuing installation of retaining wall segments to stabilize hillside.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Landslide
Lead Agency/Department:	Public works
Implementation Schedule:	Within 5 years
Funding Source:	Municipal budget
Community: Blawnox Borough	**Action 52: Review EAPs of dams to conform with DEP standards and include additional information as needed**
Category:	Plans and Regulations
Hazard(s) Addressed:	Dam and Lock Failure
Lead Agency/Department:	EMC
Implementation Schedule:	Within 2 years
Funding Source:	Staff time
Community: Brentwood Borough	**Action 53: Continue education to borough organizations on evacuation routes**
Category:	Education and Outreach

Table 6.4-1 Mitigation Action Plan	
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	EMC
Implementation Schedule:	Annually
Funding Source:	Staff time
Community: Bridgeville Borough	**Action 54: Acquire floodprone properties in the Baldwin Street area of the Borough.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager and council
Implementation Schedule:	As funds become available
Funding Source:	FEMA/PEMA
Community: City of Duquesne	**Action 55: Update municipal emergency response plan.**
Category:	Plans and Regulations; Education and Awareness
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	EMC
Implementation Schedule:	Within 5 years
Funding Source:	Staff time
Community: Elizabeth Borough	**Action 56: Complete the Irwin Street/Fallen Timber Storm Drainage Project to prevent flooding.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager; Twin Rivers COG
Implementation Schedule:	Within 5 years
Funding Source:	Municipal budget; Community Infrastructure and Tourism Fund
Community: Etna Borough; Oakdale Borough	**Action 57: Purchase and install flood barriers at the Fire Station**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager and council
Implementation Schedule:	Within 5 years
Funding Source:	Municipal budget; FEMA/PEMA
Community: Etna Borough	**Action 58: As old facilities become vacant, acquire, demolish, and establish stormwater management areas prohibiting redevelopment as established in municipal comprehensive plan.**
Category:	Plans and Regulations; Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager and council; Zoning and Occupancy Enforcement Officer
Implementation Schedule:	As facilities become vacant
Funding Source:	Municipal budget; FEMA/PEMA

Table 6.4-1 Mitigation Action Plan	
Community: Etna Borough	**Action 59: Construct flood wall behind industrial site at Crescent Avenue/Grant Avenue to and past the Butler/Kittanning Street Bridge and purchase Stop Barrier for the Bridge and for Butler Street near Duquesne Electric Company.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager and council
Implementation Schedule:	As funds become available
Funding Source:	Municipal budget; PennVEST
Community: Forest Hills Borough	**Action 60: Conduct a comprehensive review and revision, if needed, of zoning ordinances that emphasizes hazard-resistant future development.**
Category:	Plans and Regulations
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	Borough manager and council
Implementation Schedule:	4-5 years
Funding Source:	Municipal budget
Community: Fox Chapel Borough; Hampton Township; Marshall Township; Oakmont Borough; Ross Township	**Action 61: Adopt MS4 protocols, plans, and procedures to deal with flooding.**
Category:	Plans and Regulations; Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Municipal manager and council/supervisors
Implementation Schedule:	Ongoing to comply with MS4 permits
Funding Source:	Municipal budget
Community: Frazer Township	**Action 62: Continue annual public safety meetings concerning gas wells and gas compressor station hazards.**
Category:	Education and Awareness
Hazard(s) Addressed:	Environmental Hazards; Urban Fire and Explosion
Lead Agency/Department:	EMC
Implementation Schedule:	Annually
Funding Source:	Staff time
Community: Frazer Township	**Action 63: Review the evacuation plan of Pittsburgh Mills as well as the entire township and post the information to the website or include in a newsletter.**
Category:	Education and Awareness
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	EMC
Implementation Schedule:	Annually
Funding Source:	Staff time
Community: Hampton Township	**Action 64: Update the township GIS mapping system and program.**

Table 6.4-1 Mitigation Action Plan	
Category:	Plans and Regulations
Hazard(s) Addressed:	All hazards, emphasis on natural hazard events
Lead Agency/Department:	Department of Community Development
Implementation Schedule:	Within 5 years
Funding Source:	DCED
Community: Hampton Township	**Action 65: Implement a five-year maintenance program for existing flood retention and detention ponds.**
Category:	Plans and Regulations; Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Hanpton Shaler Water Authority
Implementation Schedule:	Every five years
Funding Source:	Water Authority budget
Community: Kilbuck Township	**Action 66: Further develop/update the Township's emergency plans, public trainings, and improve all-hazards communication by posting information on website.**
Category:	Education and Awareness
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	EMC
Implementation Schedule:	Annually
Funding Source:	Staff time
Community: Liberty Borough	**Action 67: Mitigate the impact and risks associated with the response and recovery operations during utility outage emergencies by obtaining natural gas generators for the municipal building and the fire station.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Tornado, Windstorm; Utility Interruption; Winter Storm
Lead Agency/Department:	EMC
Implementation Schedule:	Within 5 years
Funding Source:	FEMA/PEMA
Community: City of McKeesport	**Action 68: Improve enforcement of building codes in floodplain areas.**
Category:	Plans and Regulations
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Community Development Department
Implementation Schedule:	Ongoing
Funding Source:	Staff time
Community: City of McKeesport	**Action 69: Work with realtors to conduct real estate disclosures related to sales in floodplains.**
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Community Development Department
Implementation Schedule:	Within 2 years

Table 6.4-1 Mitigation Action Plan	
Funding Source:	Staff time
Community: Mount Oliver	**Action 70: Monitor areas at risk to subsidence by remaining aware of changes in groundwater levels, with a focus on areas of Transverse Park that have sunk in the past.**
Category:	Education and Awareness
Hazard(s) Addressed:	Subsidence, Sinkhole
Lead Agency/Department:	EMC
Implementation Schedule:	Ongoing
Funding Source:	Staff time
Community: Pine Township	**Action 71: Use municipal newsletter to provide information to residents to help educate them on preparedness, with an emphasis on severe weather-related events.**
Category:	Education and Awareness
Hazard(s) Addressed:	Drought; Earthquake; Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Tornado, Windstorm; Winter Storm
Lead Agency/Department:	EMC
Implementation Schedule:	Within 1 year
Funding Source:	Staff time
Community: Pitcairn Borough	**Action 72: Because the Borough has a high proportion of renters, engage rental housing owners to floodproof properties and educate tenants about flooding issues.**
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager
Implementation Schedule:	Within 1 year
Funding Source:	Staff time
Community: City of Pittsburgh	**Action 73: Implement development of a model that looks at not only hydrology but also social/community development impacts, economics, and hazard mitigation potential to make strategic, directed investments in flood reduction and stormwater management**
Category:	Plans and Regulations; Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Pittsburgh Water and Sewer Authority; Office of Sustainability
Implementation Schedule:	Within 4 years
Funding Source:	Sewer service fees
Community: City of Pittsburgh	**Action 74: Use Pittsburgh's selection as one of the 100 Resilient Cities named by the Rockefeller Foundation to strengthen integration between planning mechanisms in the city of Pittsburgh and look holistically at risk reductions and improvements in quality of life.**
Category:	Plans and Regulations
Hazard(s) Addressed:	All hazards, emphasis on Flood, Flash Flood, Ice Jam; Environmental Hazards; and Transportation Accidents

Table 6.4-1 Mitigation Action Plan	
Lead Agency/Department:	Chief Resilience Officer
Implementation Schedule:	Within 2 years
Funding Source:	Rockefeller Foundation
Community: City of Pittsburgh	**Action 75: Review this HMP and use its data on hazard-prone properties to direct land use planning, zoning updates, and investment in safe areas as the City prepares its first Comprehensive Plan.**
Category:	Plans and Regulations
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	City of Pittsburgh Department of City Planning
Implementation Schedule:	As comprehensive plan and land use ordinances are updated
Funding Source:	Staff time
Community: City of Pittsburgh	**Action 76: Develop a Climate Action Plan to address air quality and ensure responsible future development.**
Category:	Plans and Regulations
Hazard(s) Addressed:	Environmental Hazards
Lead Agency/Department:	Office of Sustainability; City of Pittsburgh Department of City Planning
Implementation Schedule:	Within 5 years
Funding Source:	Staff time
Community: City of Pittsburgh	**Action 77: Implement the Grid Security Project in the 2030 Districts Downtown and in Oakland to not only reduce energy use but also create resilience through microgrid security projects.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Utility Interruption
Lead Agency/Department:	Office of Sustainability
Implementation Schedule:	Within 10 years
Funding Source:	Public-Private Partnerships
Community: City of Pittsburgh	**Action 78: Use green infrastructure to improve river water quality, comply with the Clean Water Act, and reduce flooding, especially on city-owned or controlled properties.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Office of Sustainability
Implementation Schedule:	Ongoing
Funding Source:	EPA
Community: Sharpsburg Borough	**Action 79: Investigate and prioritize additional floodproofing of municipal facilities.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager
Implementation Schedule:	Within 5 years

Table 6.4-1 Mitigation Action Plan	
Funding Source:	FEMA/PEMA
Community: Sharpsburg Borough	**Action 80: Conduct stream restoration to reduce flooding.**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager
Implementation Schedule:	Within 5 years
Funding Source:	Municipal budget
Community: South Fayette Township	**Action 81: Purchase backup power for the township building and/or relocate building out of the floodplain.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager
Implementation Schedule:	Within 5 years
Funding Source:	FEMA/PEMA
Community: Springdale Borough	**Action 82: Purchase generators for Springdale Borough Water Plants, which generate water for 3,400 in the Borough and have emergency interconnects to several surrounding boroughs**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Public Works
Implementation Schedule:	Within 5 years
Funding Source:	FEMA/PEMA; PennVEST
Community: West Deer Township	**Action 83: Develop a formal procedure for administering an evacuation of homes in danger of flooding.**
Category:	Plans and Regulations; Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	EMC
Implementation Schedule:	Within 2 years
Funding Source:	Staff time
Community: West Elizabeth Borough	**Action 84: Install duck bills on storm sewers to prevent backflow onto Water Street and into cellars.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Public Works
Implementation Schedule:	Within 5 years
Funding Source:	Municipal budget
Community: West View Borough	**Action 85: Create a better emergency notification system, possibly using reverse 911 and the website.**
Category:	Education and Awareness
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	EMC
Implementation Schedule:	Annually

Table 6.4-1 Mitigation Action Plan	
Funding Source:	Staff time
Community: Wilmerding Borough	**Action 86: Continue to monitor evacuation plans to ensure adequacy as the Borough changes and develops.**
Category:	Education and Awareness
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	EMC
Implementation Schedule:	Annually
Funding Source:	Staff time
Community: Allegheny County Economic Development	**Action 87: Consider adding hazard-specific criteria to the County's consistency review checklists for development, plans, ordinances, and grants.**
Category:	Plans and Regulations
Hazard(s) Addressed:	All hazards
Lead Agency/Department:	Allegheny County Economic Development Planning Division
Implementation Schedule:	Within 5 years
Funding Source:	Staff time
Community: All Municipalities in Allegheny County	**Action 88: If funding becomes available, acquire, elevate, or floodproof structures, with an emphasis on mitigating Repetitive Loss and Severe Repetitive Loss properties.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager
Implementation Schedule:	As funds become available
Funding Source:	FEMA/PEMA
Community: Heidelberg Borough	**Action 89: Clear Chartiers Creek banks of saplings, brush, and other plant matter to reduce flooding instances.**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager
Implementation Schedule:	Within 5 years
Funding Source:	Municipal budget
Community: Oakmont Borough	**Action 90: Complete stream restoration of Plum Creek to restore natural ecology and address flooding**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager
Implementation Schedule:	Within 5 years
Funding Source:	Municipal budget; DEP, DCNR, and DCED grant funding
Community: O'Hara Township	**Action 91: Separate sewer lines**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough

Table 6.4-1 Mitigation Action Plan	
Implementation Schedule:	Within 5 years
Funding Source:	Municipal tax dollars
Community: East Deer Township	**Action 92: Create an educational program via newsletter to inform citizens regarding hazards identified in the community and how to mitigate with an immediate focus on conveying the new floodplain locations, followed by information on purchasing insurance (especially the difference between homeowner's and floodplain insurance).**
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	EMC
Implementation Schedule:	Within 1 year
Funding Source:	Staff time
Community: Fawn Township	**Action 93: Dredge Bull Creek and clear it of debris.**
Category:	Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Chairman, Township Supervisors
Implementation Schedule:	Within 3 years
Funding Source:	Municipal budget

Table 6.4-1 Mitigation Action Plan	
Community: Bell Acres Borough; Brackenridge Borough; Carnegie Borough; Castle Shannon Borough; Clairton; Collier Township; Coraopolis Borough; Dravosburg Borough; Duquesne; East Deer Township; Elizabeth Borough; Elizabeth Township; Emsworth Borough; Etna Borough; Fawn Township; Forward Township; Glassport Borough; Hampton Township; Harmar Township; Indiana Township; Jefferson Hills Borough; Leetsdale Borough; McCandless Township; McKees Rocks Borough; McKeesport; Monroeville; Moon Township; Munhall Borough; Neville Township; North Fayette Township; O'Hara Township; Penn Hills Township; Pitcairn Borough; Pittsburgh; Plum Borough; Reserve Township; Richland Township; Scott Township; Sewickley Borough; Shaler Township; Sharpsburg Borough; South Fayette Township; South Park Township; South Versailles Township; Tarentum Borough; Verona Borough; West Elizabeth Borough; White Oak Borough	**Action 94: Reduce possibility of damage and loss of function to community-identified critical facilities in the floodplain.**
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter
Lead Agency/Department:	Borough manager
Implementation Schedule:	As funds become available
Funding Source:	FEMA/PEMA
Community: Allegheny County GIS	**Action 95: Consider conducting a more enhanced Hazus model to further refine flood loss estimates using parcel data.**
Category:	Plans and Regulations
Hazard(s) Addressed:	Flood, Flash Flood, Ice Jam
Lead Agency/Department:	Allegheny County GIS
Implementation Schedule:	Within 5 years

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

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

Cumulative results of the prioritization of mitigation actions are included in Table 6.4-2.

Table 6.4-2 Mitigation Action Prioritization.

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
NO.	NAME	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Total Score
1	Provide an annual table-top training for emergency management staff.	0	1	3	2.5	1	1.425
2	Develop a continuity plan for municipal services and buildings.	1	2.5	3	2	3	2.3
3	Equip the pump station with a surge protector.	3	1.5	1	2.5	3	2.075
4	Provide community outreach and education about flooding.	1.5	3	1	3	3	2.3
5	Identify properties in the community at high risk of flooding for purposes of property protection.	3	3	1	3	2	2.45
6	Conduct Active Shooter Training with Frazer Township Police Department and Mutual Aid Police Departments to prepare for potential mall shootings, bombings, or other types of emergencies within the Pittsburgh Mill Mall and surrounding businesses.	2	2	1	1.5	1	1.575
7	Establish a flood warning system and install stream gauges.	2	3	1	3	2	2.25
8	Coordinate with PennDOT, Allegheny County Maintenance, and North Fayette Township Transportation on winter storm response.	1	3	1	3	3	2.2
9	Participate in the StormReady program.	2	3	2.5	3	3	2.7
10	Monitor storage of public pool chemicals and Port Authority subway tunnel.	1	1	1	1	1	1
11	Upgrade or replace equipment.	1	1	1	1	2	1.15
12	Use website and newsletter to encourage residents in low lying areas to consider flood insurance.	2	3	1	3	2	2.25
13	Review zoning regulations pertaining to airports.	2	3	1	2.5	1	2.025
14	Identify and correct critical road drainage concerns in landslide-prone areas.	1	2	1	2	0	1.3

Table 6.4-2 Mitigation Action Prioritization.

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
NO.	NAME	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Total Score
15	Identify hazards within the Borough and correct said hazards through the enforcement of building codes.	3	3	2.5	3	2	2.75
16	Provide elevation and flood-proofing projects to homes in hazard areas.	3	3	1	3	2	2.45
17	Obtain equipment and crew necessary to clear debris from water detention facility.	2	2	1	3	1	1.8
18	Establish a legal means to keep waterways open and continue to remove silt from streams.	2	1	1	3	1	1.5
19	Conduct Phase 2 of the Lower Allison Park flood retention project.	3	3	1	3	2	2.45
20	Remedy basement flooding and sanitary sewer overflows using green infrastructure.	3	2.5	1	3	1	2.15
21	Promote storm water management and provide NFIP information to the public.	3	3	1	3	3	2.6
22	Implement stormwater projects.	3	3	1	3	1.5	2.375
23	Demolish vacant structures through the Safe Neighborhood Demolition Program.	2.5	2	1	2	1	1.75
24	Clear river banks per Commonwealth regulations for 100 yards above and below established bridges and replace with proper foliage.	3	2	1	3	1	2
25	Continue to structurally address landslide hazard on Arlington Avenue in Port Vue and educate residents about the landslide hazard.	2	3	1	2	2	2.1
26	Continue to conduct subdivision reviews to ensure new development is not in high hazard landslide/mine subsidence areas.	3	3	2	1.5	3	2.575
27	Reduce flooding in Greendale by increasing the capacity of the storm sewer system.	3	2	1	3	1	2

Table 6.4-2 Mitigation Action Prioritization.

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
NO.	NAME	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Total Score
28	Demolish houses in floodprone areas identified in the HMP.	3	2.5	1	3	1.5	2.225
29	Repair Girty's Run walls and floor.	2.5	2	1	3	1	1.9
30	Purchase flood-prone homes along Larimer Avenue and Wilbur Avenue.	3	2.5	1	3	1.5	2.225
31	Remove obstructions in floodplains as properties redevelop.	3	2	1	3	1.5	2.075
32	Continue Dirty Camp Run Flood Control Project to completion, improve/replace related infrastructure, and conduct stream restoration to support project.	3	2	1	3	1	2
33	Clean bank and bed areas, dredge bed and under bridge, and reconstruct bridge base to reduce flooding at/near bridges, reduce erosion of banks, and prevent blockage of roads.	2.5	1.5	1	3	1	1.75
34	Revise storm water management ordinance to meet state requirements and revise ordinances adressing landslides to limit development in landslide prone areas.	3	3	2	2.5	2	2.575
35	Maintain West Run channel and remove obstructions to prevent flooding.	2.5	1.5	1	3	1	1.75
36	Continue blight/abandonment program to demolish abandoned properties.	3	2	2	1.5	1	1.975
37	Continue program to clean out Girty's Run at least twice a year.	2	2	1	2.5	1	1.725
38	Coordinate with Girty's Run Authority to separate storm water and sewer lines.	3	1.5	1	3	2	2
39	Provide training to local law enforcement on responding to civil disturbances.	2	1.5	1	1	2	1.5

Table 6.4-2 Mitigation Action Prioritization.

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
NO.	NAME	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Total Score
40	Use the County's mitigation action tracking spreadsheet to encourage implementation of actions identified in this hazard mitigation plan update.	3	3	3	3	3	3
41	Use the county LEPC and Quarterly Trainings to distribute all-hazards education and preparedness materials to communities.	3	2	3	3	3	2.7
42	Address identified data limitations regarding lack of detailed information about: Individual structures located in the 100-year floodplain; flood probabilities other than the 100-year flood; and first floor elevations for priority areas. Basements/finished basements/crawl spaces	3	1	1	3	1.5	1.775
43	Floodproof municipal facilities.	3	2.5	1	3	3	2.45
44	Continue to coordinate with Norfolk Southern about rail traffic, conducting rail exercises, and training municipal staff on how to improve reactions if an incident occurs.	3	3	2	3	2.5	2.725
45	Conduct an education and awareness campaign about the Borough's emergency management policies, procedures, and reasoning, including providing a resource guide so residents know where to turn for information.	2	2	3	2	2	2.2
46	Create response plan for train derailment events and, in Baldwin, for fires in the commercial/industrial district in coordination with surrounding municipalities.	3	2.5	3	3	2	2.7
47	Perform regular maintenance on drainage systems with an emphasis on projects with greatest impact on reducing flooding and controlling runoff.	2	1.5	1	3	1	1.65

Table 6.4-2 Mitigation Action Prioritization.

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
NO.	NAME	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Total Score
48	Monitor subsidence risk factors, plan for subsidence events, educate residents, and refer new developments to the Mine Subsidence Insurance Program if the development is an area that has been undermined.	3	2	1	2	1.5	1.925
49	Monitor drought conditions and water supply resources to provide early warning to residents about the need to conserve water.	2.5	2	1	1.5	3	1.975
50	Conduct tornado awareness activities and educate residents on proper sheltering	2.5	2	1	2	3	2.05
51	Mitigate landslides along Cambridge Road by continuing installation of retaining wall segments to stabilize hillside.	3	2	1	2	1	1.85
52	Review EAPs of dams to conform to DEP standards and include additional information as needed.	2	2	2	1	1	1.7
53	Continue education to borough organizations on evacuation routes.	2	2	3	2	3	2.35
54	Acquire floodprone properties in the Baldwin Street area of the Borough.	3	3	1	3	3	2.6
55	Update municipal emergency response plan.	2.5	2	3	2	2.5	2.375
56	Complete the Irwin Street/Fallen Timber Storm Drainage Project to prevent flooding.	3	2	1	3	1	2
57	Purchase and install flood barriers at the Fire Station.	3	2.5	1	3	3	2.45
58	As old facilities become vacant, acquire, demolish, and establish stormwater management areas prohibiting redevelopment as established in municipal comprehensive plan.	3	2.5	2	3	1	2.35

Table 6.4-2 Mitigation Action Prioritization.

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
NO.	NAME	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Total Score
59	Construct flood wall behind industrial site at Crescent Avenue/Grant Avenue to and past the Butler/Kittanning Street Bridge and purchase Stop Barrier for the Bridge and for Butler Street near Duquesne Electric Company.	3	1.5	1	3	2	2
60	Conduct a comprehensive review and revision, if needed, of zoning ordinances that emphasizes hazard-resistant future development.	3	3	3	3	1	2.7
61	Adopt MS4 protocols, plans, and procedures to deal with flooding.	3	3	1	3	1	2.3
62	Continue annual public safety meetings concerning gas wells and gas compressor station hazards.	3	2	1	3	2.5	2.225
63	Review the evacuation plan of Pittsburgh Mills as well as the entire township and post the information to the website or include in a newsletter.	2	2	3	2.5	2.5	2.35
64	Update the township GIS mapping system and program.	3	2	3	1	1	2.1
65	Implement a five-year maintenance program for existing flood retention and detention ponds.	2.5	1.5	1	3	1	1.75
66	Further develop/update the Township's emergency plans, public trainings, and improve all-hazards communication by posting information on website.	2.5	1.5	3	2.5	2	2.225
67	Mitigate the impact and risks associated with the response and recovery operations during utility outage emergencies by obtaining natural gas generators for the municipal building and the fire station.	3	2.5	3	3	3	2.85
68	Improve enforcement of building codes in floodplain areas.	2.5	2	1	3	1.5	1.975
69	Work with realtors to conduct real estate disclosures related to sales in floodplains.	3	3	1	3	3	2.6

Table 6.4-2 Mitigation Action Prioritization.

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
NO.	NAME	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Total Score
70	Monitor areas at risk to subsidence by remaining aware of changes in groundwater levels, with a focus on areas of Transverse Park that have sunk in the past.	2	2	1	1.5	1	1.575
71	Use municipal newsletter to provide information to residents to help educate them on preparedness, with an emphasis on severe weather-related events.	2	2	3	3	1	2.2
72	Because the Borough has a high proportion of renters, engage rental housing owners to floodproof properties and educate tenants about flooding issues.	3	2.5	1	3	1.5	2.225
73	Implement development of a model that looks at not only hydrology but also social/community development impacts, economics, and hazard mitigation potential to make strategic, directed investments in flood reduction and stormwater management.	3	2.5	1	3	1	2.15
74	Use Pittsburgh's selection as one of the 100 Resilient Cities named by the Rockefeller Foundation to strengthen integration between planning mechanisms in the city of Pittsburgh and look holistically at risk reductions and improvements in quality of life.	3	3	3	3	2	2.85
75	Review this HMP and use its data on hazard-prone properties to direct land use planning, zoning updates, and investment in safe areas as the City prepares its first Comprehensive Plan.	3	2.5	3	3	2	2.7
76	Develop a Climate Action Plan to address air quality and ensure responsible future development.	2.5	2.5	2	3	1.5	2.325

Table 6.4-2 Mitigation Action Prioritization.

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
NO.	NAME	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Total Score
77	Implement the Grid Security Project in the 2030 Districts Downtown and in Oakland to not only reduce energy use but also create resilience through microgrid security projects.	3	2	2	2	2.5	2.275
78	Use green infrastructure to improve river water quality, comply with the Clean Water Act, and reduce flooding, especially on city-owned or controlled properties.	3	3	1	3	1	2.3
79	Investigate and prioritize additional floodproofing of municipal facilities.	2	2.5	1	3	3	2.25
80	Conduct stream restoration to reduce flooding.	2.5	2.5	1	3	1.5	2.125
81	Purchase backup power for the township building and/or relocate building out of the floodplain.	2.5	3	3	3	3	2.9
82	Purchase generators for Springdale Borough Water Plants, which generate water for 3,400 in the Borough and have emergency interconnects to several surrounding boroughs	3	3	3	3	3	3
83	Develop a formal procedure for administering an evacuation of homes in danger of flooding.	2	2	2	2.5	3	2.225
84	Install duck bills on storm sewers to prevent backflow onto Water Street and into cellars.	2.5	2	1	3	1	1.9
85	Create a better emergency notification system, possibly using reverse 911 and the website.	2	2.5	3	2.5	2.5	2.5
86	Continue to monitor evacuation plans to ensure adequacy as the Borough changes and develops.	2	1.5	3	1.5	1	1.825
87	Consider adding hazard-specific criteria to the County's consistency review checklists for development, plans, ordinances, and grants.	3	2.5	3	2.5	1.5	2.55

Table 6.4-2 Mitigation Action Prioritization.

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
NO.	NAME	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Total Score
88	If funding becomes available, acquire, elevate, or floodproof structures, with an emphasis on mitigating Repetitive Loss and Severe Repetitive Loss properties.	3	2.5	1	3	2	2.3
89	Clear Chartiers Creek banks of saplings, brush, and other plant matter to reduce flooding instances.	2	2.5	1	3	1.5	2.025
90	Complete stream restoration of Plum Creek to restore natural ecology and address flooding	2.5	2.5	1	3	1.5	2.125
91	Separate sewer lines	3	1.5	1	3	2	2
92	Create an educational program via newsletter to inform citizens regarding hazards identified in the community and how to mitigate with an immediate focus on conveying the new floodplain locations, followed by information on purchasing insurance (especially the difference between homeowner's and floodplain insurance).	2	3	1	3	2	2.25
93	Dredge Bull Creek and clear it of debris.	2.5	1.5	1	3	1	1.75
94	Reduce possibility of damage and loss of function to community-identified critical facilities in the floodplain.	3	3	1	3	3	2.6
95	Consider conducting a more enhanced Hazus model to further refine flood loss estimates using parcel data.	3	2	1	3	2	2.15

7 PLAN MAINTENANCE

7.1 Update Process Summary

Monitoring, evaluating and updating this plan, is critical to maintaining its value and success in Allegheny 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 described here is similar to and builds upon the maintenance schedule established in the 2011 HMP. Allegheny County Emergency Services will continue to act as the lead agency for plan development, and the plan will be evaluated on or around the anniversary of plan adoption.

Allegheny County has approached and will continue to approach plan maintenance through the quarterly EMC trainings. Trainings occurring in November always address damage assessments, while the March training each year addresses hazard mitigation; Allegheny County Emergency Services selects a mitigation topic to cover every year. Training notes have not been historically kept, but a sample agenda from the 2015 Quarterly training is in Appendix C. In addition, the County will include documentation of annual plan reviews in the next plan update. In addition, the public has had continual access to the plan and mitigation activities have been underway in many communities and the county. For more information, see Section 6.1.2: Mitigation Successes. In addition, Allegheny County Emergency Services and Allegheny County Economic Development work with the municipalities year-round to advance mitigation and preparedness through trainings and technical assistance.

7.2 Monitoring, Evaluating, and Updating the Plan

The Allegheny County Department of Emergency Services that served on HMPSC established for the 2015 HMP Update is designated to administer the plan maintenance processes of monitoring, evaluation and updating with support and representation from all participating municipalities. Mr. Steven Wilharm of the Allegheny County Department of Emergency Services will lead the HMPSC in all associated plan maintenance requirements, including annual reviews. The Allegheny Department of Emergency Services 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 Allegheny Department of Emergency Services will oversee the progress made on the implementation of action items identified in the 2015 HMPU and modify actions, as needed, to reflect changing conditions. At the March quarterly training, Allegheny County Emergency Services will address hazard mitigation progress with each municipality through the local EMCs. The EMCs will be asked to work with the Allegheny Department of Emergency Services to provide and document updates on applicable mitigation actions and feedback on changing hazard vulnerabilities within their communities.

In addition, Allegheny County Emergency Services will continue to collaborate with Allegheny County Economic Development as the HMPSC. ACED will be invited to participate in the quarterly training to share planning, land use, and other countywide planning efforts that will reduce or eliminate risk. Should a significant disaster occur within the County, the Allegheny Department of Emergency Services will reconvene within 30 days of the disaster to review and update the HMP.

Upon each HMP evaluation, the Allegheny Department of Emergency Services 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 Allegheny Department of Emergency Services 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 into them.

The 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 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

As was done during the development of the 2015 HMP, the Allegheny Department of Emergency Services will involve the public during the evaluation and update of the. The public will have access to an electronic copy of the current HMP through their local municipal office, the Department of Emergency Services, and Allegheny County Economic Development. Allegheny County Emergency Services will also keep a paper copy of the plan should a citizen not have ready electronic access. This paper copy will include physical copies of the community flood vulnerability maps to ensure communities can view and use large-scale, full color maps to aid in mitigation efforts. Information on upcoming events related to the HMP or solicitation for comments will be announced via newsletters, newspapers, mailings, and on the County website (http://www.alleghenycounty.us/emerserv/index.aspx). The Allegheny Department of Emergency Services will incorporate all relevant comments during the next update of the HMP.

8 PLAN ADOPTION

The Plan was submitted to the Pennsylvania Emergency Management Agency for final review October 5, 2015. It was forwarded to FEMA for final review and approval-pending-adoption on October 6, 2015. FEMA granted approval-pending-adoption on October 20, 2015. Full approval from FEMA was received on *<Month Day, Year>*.

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

Allegheny County 2015 Hazard Mitigation Plan

County Adoption Resolution

Resolution No. _____

Allegheny County, Pennsylvania

WHEREAS, the municipalities of Allegheny 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, Allegheny 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 Allegheny County 2015 Hazard Mitigation Plan has been developed by the Allegheny County Emergency Management Agency and the Allegheny County Planning Commission in cooperation with other county departments, local municipal officials, and the citizens of Allegheny County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Allegheny County 2015 Hazard Mitigation Plan, and

WHEREAS, the Allegheny 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 Allegheny that:

- The Allegheny 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 Allegheny County 2015 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2015

ATTEST:

_____

ALLEGHENY COUNTY COUNCIL

By _____

By _____

By _____

Allegheny County 2015 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. _____

<Borough/Township of Municipality Name>, Allegheny County, Pennsylvania

WHEREAS, the *<Borough/Township of Municipality Name>*, Allegheny County, Pennsylvania is most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the *<Borough/Township of Municipality Name>* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Allegheny County 2015 Hazard Mitigation Plan has been developed by the Allegheny County Emergency Management Agency and the Allegheny County Planning Commission in cooperation with other county departments, and officials and citizens of *<Borough/Township of Municipality Name>*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Allegheny County 2015 Hazard Mitigation Plan, and

WHEREAS, the Allegheny County 2015 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the *<Borough/Township of Municipality Name>*:

- The Allegheny County 2015 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the *<Borough/Township>*, and
- The respective officials and agencies identified in the implementation strategy of the Allegheny County 2015 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2015

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

_____ By _____

By _____

9 APPENDICES