



# ERIE COUNTY

2018 Hazard Mitigation Plan

# **ERIE COUNTY HAZARD MITIGATION PLAN**

**UPDATED 2018  
FOR ERIE COUNTY AND ALL MUNICIPAL GOVERNMENTS THEREIN**

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## 1.0 INTRODUCTION

This section presents an introduction to the hazard mitigation plan and defines the authority, scope and purpose of the plan.

### 1.1 BACKGROUND

Natural and man-made disasters have caused injury and death, damaged and destroyed property and disrupted business and government function. In an effort to lessen the effects of a disaster, Erie County Department of Public Safety, Erie County Department of Planning, and the county's 38 municipalities took part in this planning process to identify potential hazards and possible actions and activities to mitigate their vulnerability to those hazards.

FEMA (2017) advises that "effective mitigation requires that we all understand local risks, address the hard choices, and invest in long-term community well-being" (para.2). To address these choices, Erie County created a committee made up of elected officials, emergency management personnel, and department of planning personnel. It was the committee's goal to reduce the future costs of recovery, repair, and reconstruction by investing in mitigation actions.

### 1.2 PURPOSE

Erie County has undertaken this hazard mitigation plan update for several reasons, including the following.

- To protect life, safety, and property by reducing the potential for future damages and the economic losses that result from hazards
- To build partnerships for risk reduction involving government, organizations, businesses, and the public
- To identify long-term, broadly-supported strategies for risk reductions
- To align risk reduction with other county and municipal objectives
- To communicate priorities to potential sources of funding

### 1.3 SCOPE

The *Erie County 2017 Hazard Mitigation Plan* has been prepared in compliance with requirements set forth by the Federal Emergency Management Agency (FEMA) and the Pennsylvania Emergency Management Agency (PEMA) in order for the county and municipalities to be eligible for funding and technical



assistance from state and federal hazard mitigation programs. It thus applies to the county and all 38 municipalities and serves as their official hazard mitigation plan. It addresses both natural and human-made hazards of significant risk to the county and its municipalities. The committee reviews the plan annually and a complete plan update will take place at minimum every five years.

#### **1.4 AUTHORITY AND REFERENCES**

Authority for this plan originates from the following federal government 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 also 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.

Erie County's stakeholders and its consultant utilized several guidelines and reference documents specifically outlining the mitigation planning process throughout this update. The table below lists them.



Table 1.4.A	
GUIDES AND REFERENCE DOCUMENTS	
Document	Purpose
FEMA Local Mitigation Planning Handbook (2013)	FEMA's current official guide for local governments to develop, update, and implement local mitigation plans.
FEMA Plan Review Tool	Provides information on review guideline used by federal and state officials.
PEMA All-Hazard Mitigation Planning Standard Operating Guide (2013)	Provides information on the planning process timeline, required information, and planning partners.
FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (2013)	Provides information on resources available that can be used to identify and evaluate mitigation actions.
G-393: Hazard Mitigation for Emergency Managers Course	Provides information on the mitigation process for emergency managers
FEMA 386-1: Getting Started: Building Support for Mitigation Planning (2002)	Provides information on activities and issues involved in initiating the hazard mitigation plan process.
FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses (2001)	Provides information on how to perform a risk assessment.
FEMA 386-3: Developing the Mitigation Plan (2003)	Provides information on developing mitigation strategies and documentation of the planning process.
FEMA 386-4: Bringing the Plan to Life (2003)	Provides information on implementing the hazard mitigation plan.
FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning (2007)	Provides information on prioritizing mitigation actions using a benefit-cost review.
FEMA 386-6: Integrating Historic Property and Culture Resource Considerations into Hazard Mitigation Planning (2006)	Provides information on developing and implementing a pre-disaster planning strategy for historic properties and cultural resources.
FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning (2003)	Provides information on expanding hazard mitigation planning to address terrorism and technological hazards.
FEMA 386-8: Multijurisdictional Mitigation Planning (2006)	Provides information on the special considerations of multiple jurisdictions planning jointly.
FEMA 386-9 Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects (2008)	Provides information on developing mitigation projects that may be implemented using FEMA Hazard Mitigation Assistance.





## 2.0 COMMUNITY PROFILE

This section discusses the geography, environment, and other community demographics. It provides a general description of Erie County.

### 2.1 GEOGRAPHY AND ENVIRONMENT

Erie County is located in northwestern Pennsylvania with 76 miles of coastline along Lake Erie (PADEP, 2015). The county has a total area of 1,558 square miles, of which 799 square miles is land and 759 square miles is water (U.S. Census Bureau). Erie County is bordered by Ashtabula County, Ohio to the west; Lake Erie to the north; Chautauqua County, New York to the northeast; Warren County to the east, and Crawford County to the south. Lake Erie separates the county from Ontario, Canada along its entire northern border. Erie County was founded in 1803 from parts of Alleghany County. The county seat is the City of Erie, and the county contains one other city, Corry, along with 14 boroughs and 22 townships. The table to the right lists the municipalities; they are also displayed graphically in the map below.

Erie County's watersheds drain into two major river basins, the Lake Erie and Ohio River basins. The majority of the county (85.7%) lies within two watersheds: Lake Erie/Elk Creek and French Creek. The Lake Erie/Elk Creek watershed borders the coastline and extends south through all or part of 24 different municipalities. A series of streams comprise the watershed, with Elk Creek being the largest. They generally flow northwest from their headwaters toward Lake Erie. The French Creek watershed drains all or part of 21 municipalities in the southern and eastern part of the county, and also

Table 2.1.A

Erie County Municipalities	
Name	Type
Albion	Borough
Amity	Township
Concord	Township
Conneaut	Township
Corry	City
Cranesville	Borough
Edinboro	Borough
Elgin	Borough
Elk Creek	Township
Erie	City
Fairview	Township
Franklin	Township
Girard	Borough
Girard	Township
Greene	Township
Greenfield	Township
Harborcreek	Township
Lake City	Borough
Lawrence Park	Township
LeBoeuf	Township
McKean	Borough
McKean	Township
Mill Village	Borough
Millcreek	Township
North East	Borough
North East	Township
Platea	Borough
Springfield	Township
Summit	Township
Union	Township
Union City	Borough
Venango	Township
Washington	Township
Waterford	Borough
Waterford	Township
Wattsburg	Borough
Wayne	Township
Wesleyville	Borough



contains three of the nine glacial lakes in western Pennsylvania: Lake Pleasant, Lake LeBoeuf, and Edinboro Lake. Glacial activity attributed to the many wetland areas in the French Creek watershed.

Portions of two physiographic provinces bisect Erie County's topography. The area adjacent to Lake Erie lies in the Eastern Lake Section of the Central Lowlands Province, and is a relatively narrow zone consisting of a series of lake-parallel, low-relief ridges. Steep-sided, narrow valleys cut through these ridges into the underlying shales and siltstones and flow into Lake Erie. Erosion of the Lake Erie shoreline has resulted in a steep bluff adjacent to the lake. The majority of the county lies within the Northwestern Glaciated Plateau Section of the Appalachian Plateaus Province, and consists of rolling land that is notably higher in elevation than the coastal lowland. This area is typical of the glaciated portions of northwest Pennsylvania, characterized by broad uplands separated by linear flat-floored valleys and long, linear, rounded ridges. There are several unique scenic geological features located in Erie County, including Presque Isle peninsula, the Devils Backbone, and Titus Bog.

The influence of Lake Erie is profoundly evident in the climate of Erie County. In the Central Lowlands Province along the lakeshore, the lake has a moderating effect on temperatures, and the freeze-free season is normally extended to about 200 days. Temperatures above 90°F or below 0°F are extremely rare. The lake also reduces daily temperature ranges to less than 20°F in most months. Throughout the county, cloudiness and frequent snowfalls are prevalent in winter as a result of the "lake effect" of cold air passing over the relatively warm Lake Erie, picking up moisture. Annual precipitation averages close to 40 inches. Annual snowfall averages just under 80 inches per year near the lakeshore, with considerably more in the higher elevations of the county. Heavy snow squalls are capable of depositing one to two feet of snow on the county, though as the lake surface freezes over, snowfalls of this type become less frequent.

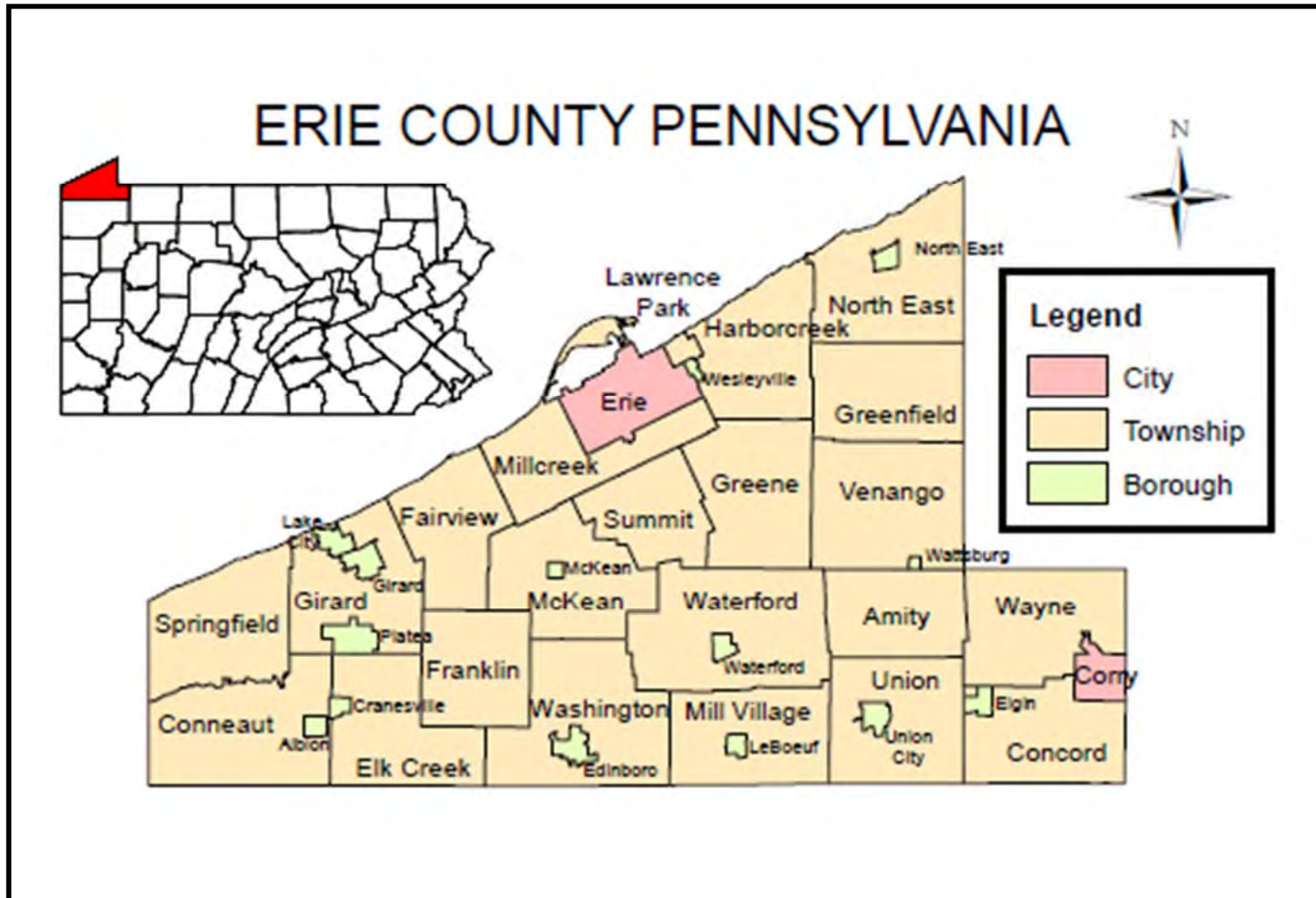
The Pennsylvania State Climatologist from the Department of Meteorology and Atmospheric Science of the Pennsylvania State University provided the following averages for Erie County (based on observations at Erie International Airport).

Table 2.1.B

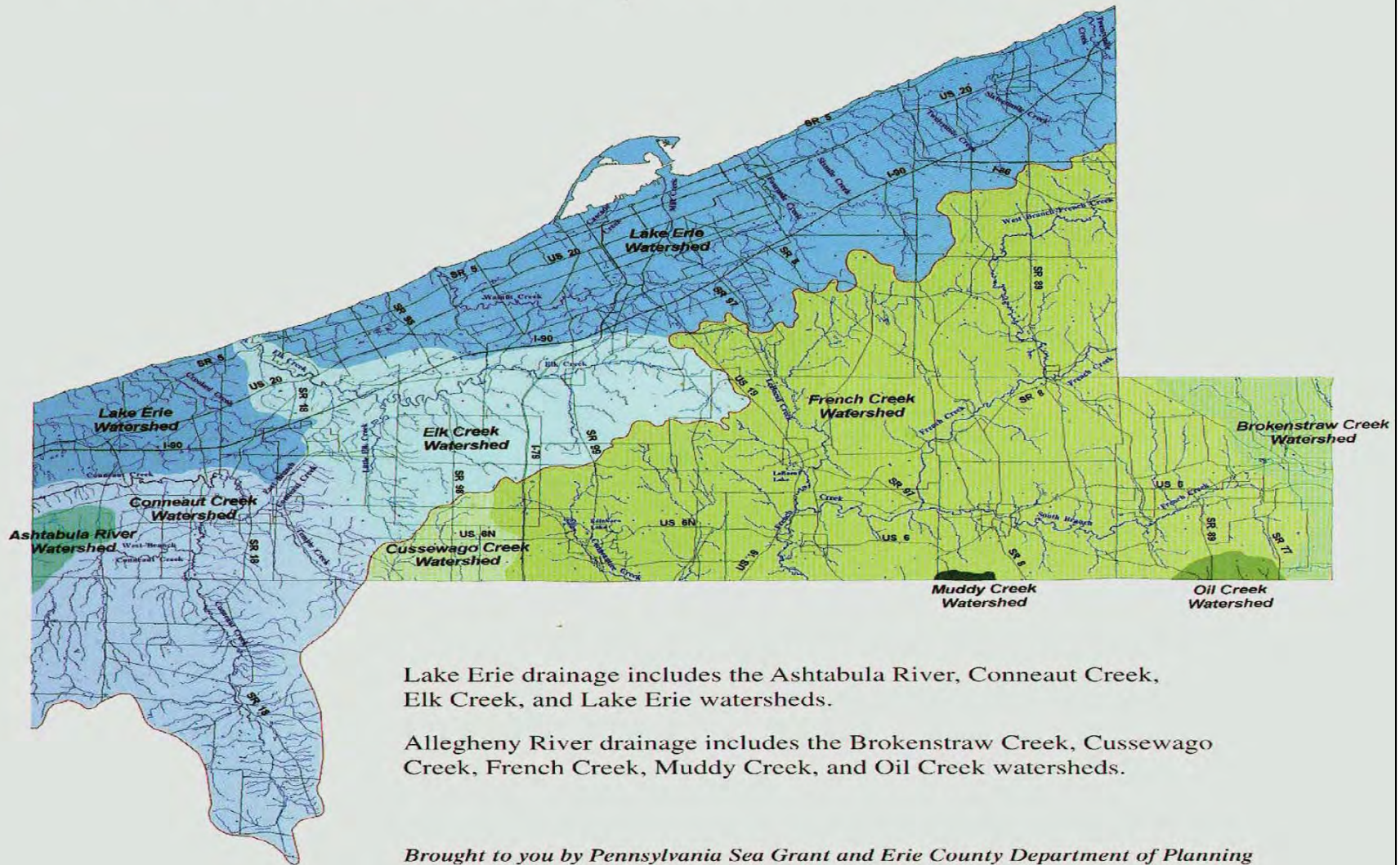
**ERIE COUNTY WEATHER AVERAGES**

Average January Temperature	Average July Temperature	Annual Average Temperature	Annual Average Snowfall	Annual Average Precipitation
27.0° F	71.3° F	49.3° F	79.4"	39.92"

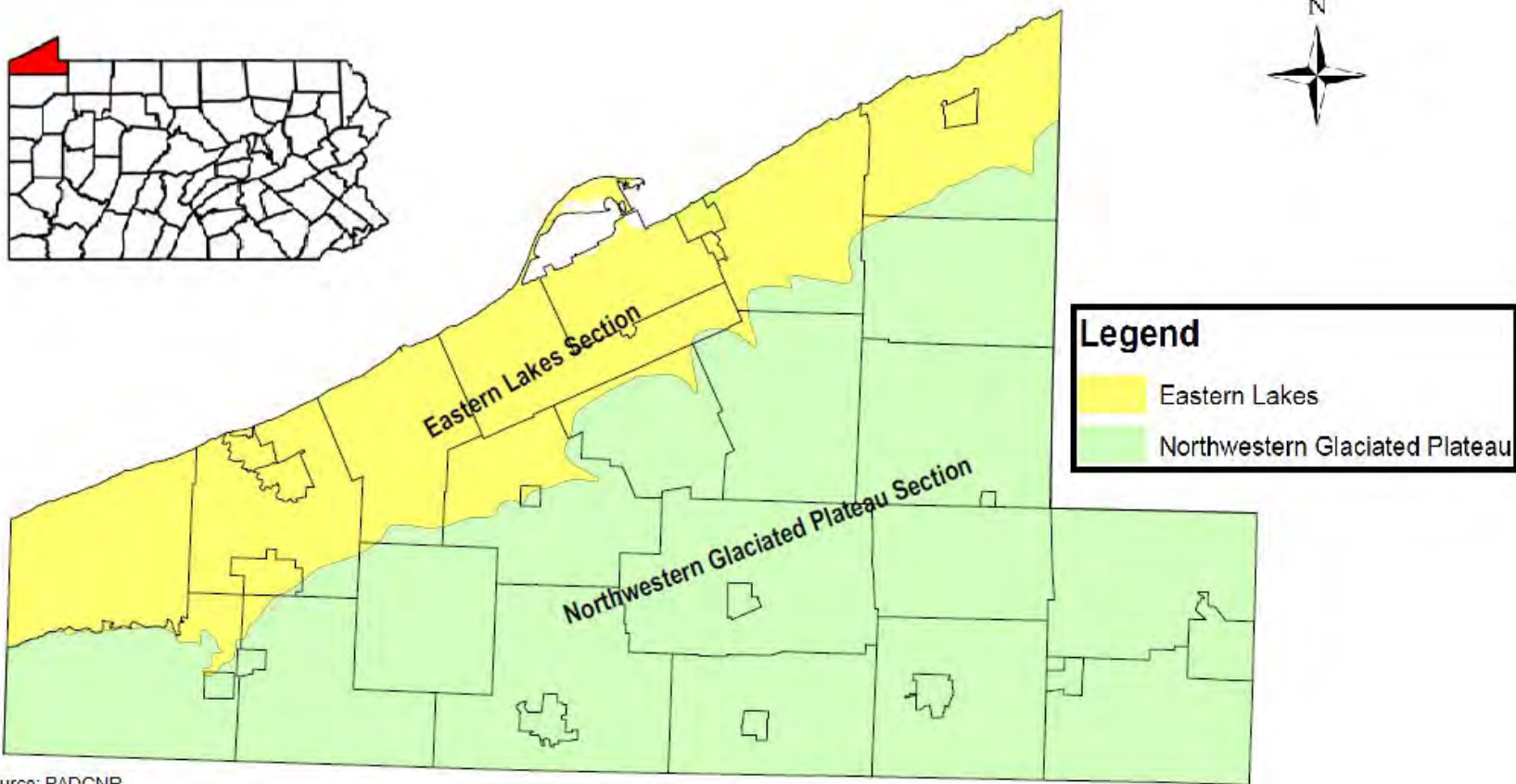




# MAP OF ERIE COUNTY WATERSHEDS



## PHYSIOGRAPHIC PROVINCES IN ERIE COUNTY



Source: PADCNR

## 2.2 COMMUNITY FACTS

### Economy

The food service industry is the largest employment sector in Erie County. According to the Pennsylvania Department of Labor & Industry (PADOL), General Electric Company is the largest employer in the county. The top ten employers are shown in the table below (PADOL, 2016). The unemployment rate in Erie County had been falling for the several years, from a high of 9.3% in 2010 to 5.3% in 2015, but rose to 6.7% in 2016 (PADOL, 2016).

General Electric Company
Erie Indemnity Co.
University of Pittsburgh Medical Center Hamot
State of Pennsylvania
Walmart Associates, Inc.
Saint Vincent Health Center
Federal Government
School District of the City of Erie
Erie County
Dr. Gertrude A Barber Center. Inc.

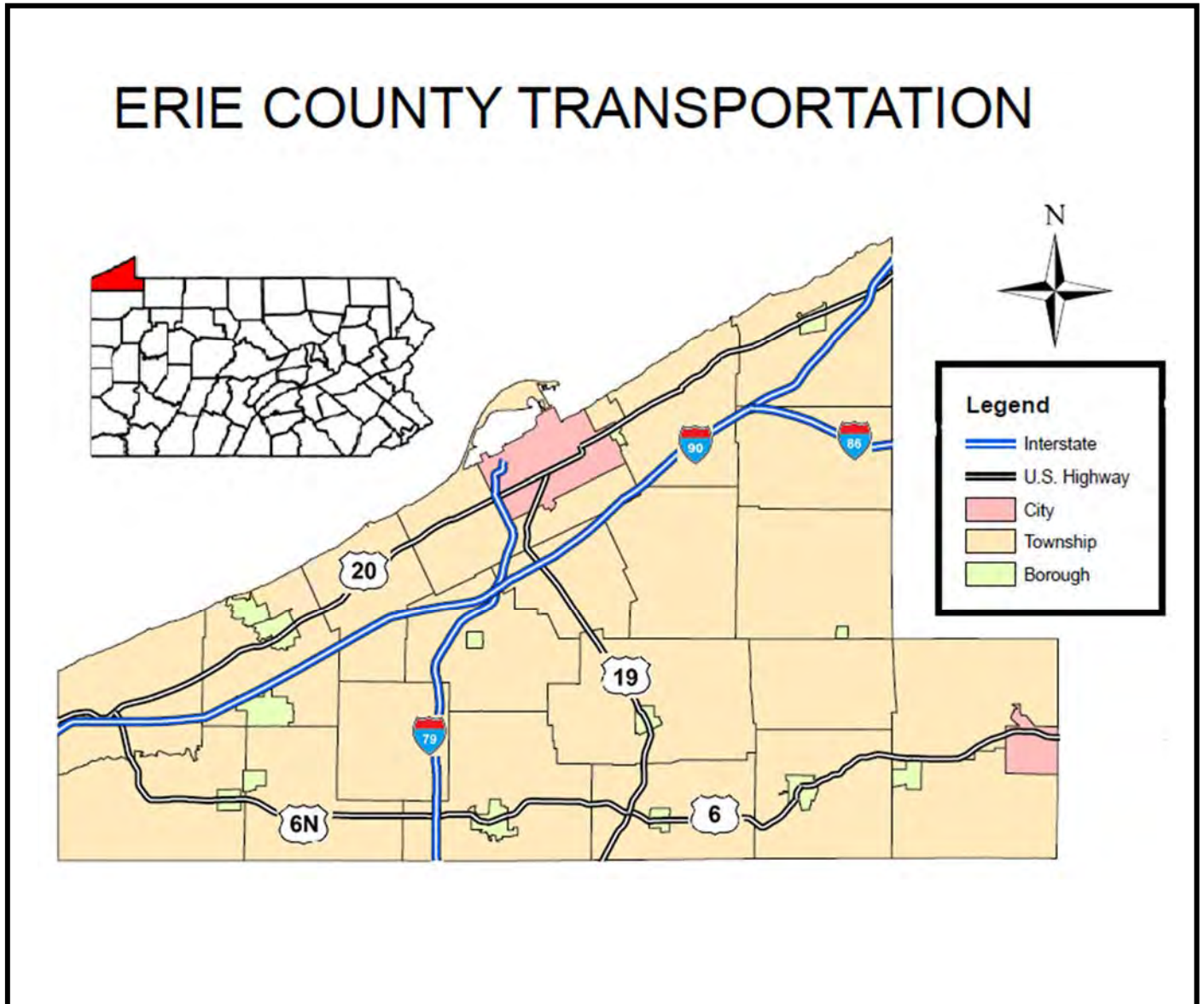
Year	Rate
2010	9.3%
2011	8.1%
2012	7.8%
2013	7.5%
2014	6.2%
2015	5.3%
2016	6.7%

### Transportation

#### Roads

Erie County has just over 70 miles of interstate highway. Interstates 86 and 90; U.S. Routes 6, 6N, and 20; and State Route 5 run east-west through the county. Interstate 79, U.S. Route 19, and State Routes 8 and 18 run north-south. In addition to the interstate, U.S. and state highway networks, residents in Erie County are served by municipally-maintained roads. There are approximately 1,700 miles of municipal roads across the county.



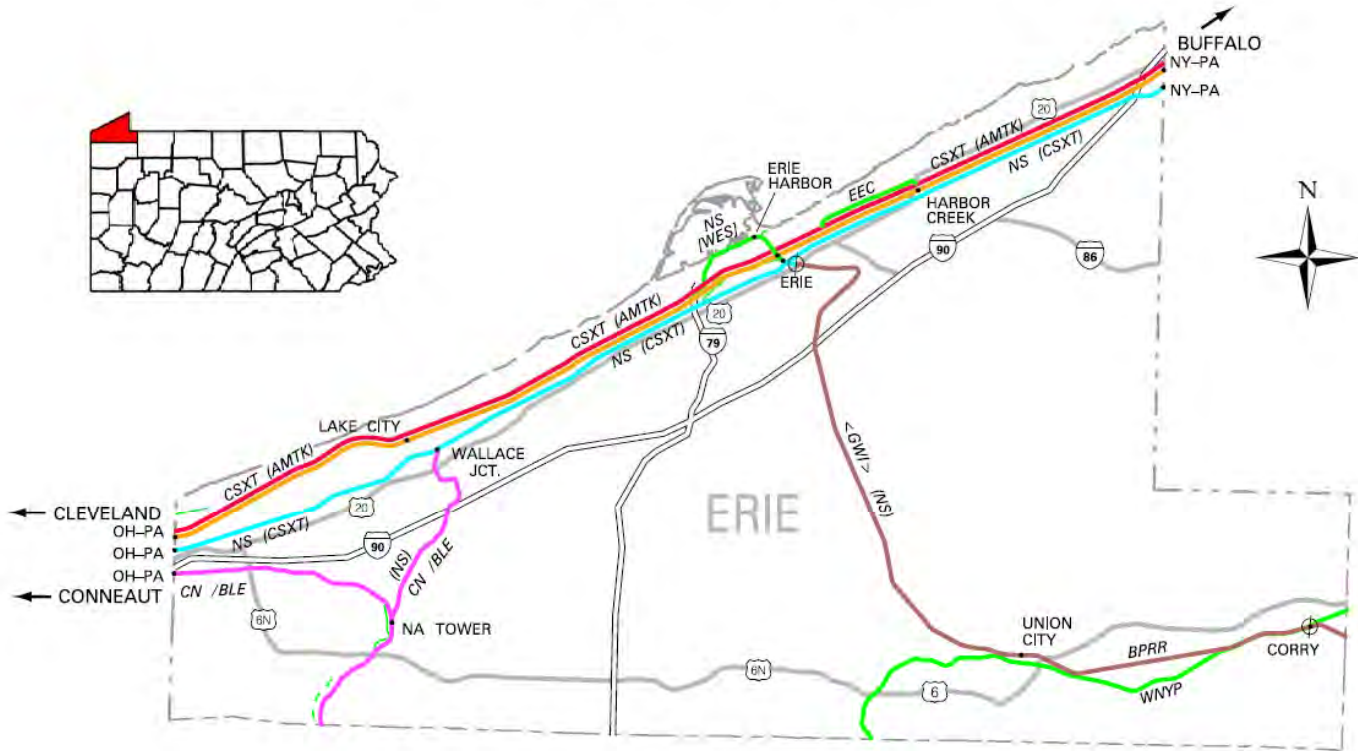


### Rail

Multiple companies provide freight service through Erie County, including three Class 1 providers: CSX Transportation, Canadian National Bessemer & Lake Erie Railroad, and Norfolk Southern Railroad. The majority of the lines run from Chautauqua County, New York to Ashtabula County, Ohio, passing through the City of Erie. The Buffalo & Pittsburgh regional line runs from the City of Erie through Corry, and into Warren County. Amtrak provides passenger service in Erie County.



## ERIE COUNTY RAILROADS



**Legend**

- CSX Transport
- Norfolk Southern
- Canadian National Bessemer & Lake Erie Railroad
- Commuter Rail
- Buffalo & Pittsburgh Railroad
- Local Line Haul

Source: Pennsylvania Railroad Map 2017

### Air

Erie International Airport (ERI) is Erie County's only commercial airport. American Airlines, Delta and United provide passenger service at ERI. Daily flights are available to





Chicago O'Hare International Airport, Philadelphia International Airport and to Detroit Metropolitan Airport.

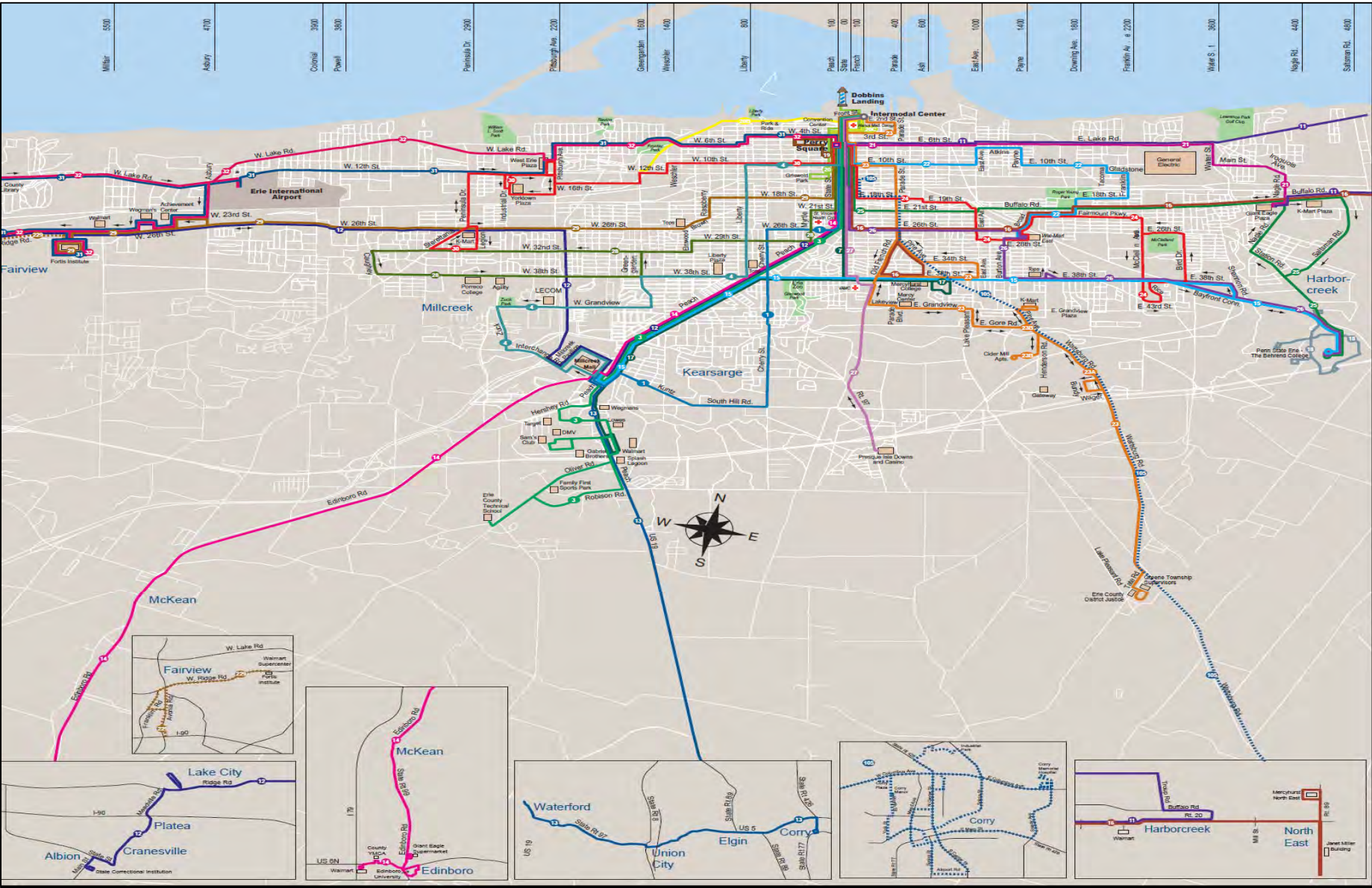
Public Transit

The Erie Metropolitan Transit Authority (EMTA) provides public transportation in Erie County. Service times vary by route. Some routes operate on a weekday-Saturday-Sunday schedule while others only operate on specific days. EMTA offers trolley and shuttle services Monday to Friday during regular business hours. EMTA also offers curb to curb paratransit service to eligible disabled persons seven days a week (EMTA, 2017).

Currently, EMTA has 29 routes which include pick-up and drop off locations at hospitals, shopping centers, Erie International Airport, educational institutes, etc. The map below shows an overview of the routes provided ([www.ride-the-e.com](http://www.ride-the-e.com)).



# ERIE METROPOLITAN TRANSIT AUTHORITY MAP



## **Medical Access**

There are four hospitals in Erie County: Corry Memorial Hospital, Millcreek Community Hospital, Saint Vincent Health Center, and University of Pittsburgh Medical Center Hamot. Both Corry Memorial Hospital, located in the City of Corry, and Millcreek Community Hospital, located in Millcreek Township, are part of Lake Erie College of Osteopathic Medicine Health System, while St. Vincent Health Center is a member of the Allegheny Health Network. UPMC Hamot and St. Vincent Health Center are both located in the City of Erie (PADOH, 2017).

## **Utilities**

### Electricity

There are two electric service providers in Erie County: FirstEnergy Penelec and Northwestern Rural Electric Cooperative (NREC). First Energy owns or controls generating capacities including nuclear, coal, natural gas, hydro, wind and solar facilities. NREC uses several sources to provide electric service to its customers including nuclear and hydro.

### Internet

Erie County has a total of 18 internet providers, ranging from national providers to local companies. These include Spectrum, Verizon, Velocity.net, Windstream, Time Warner Cable, Enterprise Providers, Sunesys, Earthlink, AT&T, Sprint, T-Mobile, Hughes Net, and Dish Network (Broadbandnow.com, 2016).

### Natural Gas

Three companies provide natural gas service within Erie County: National Fuel, North East Heat & Light Company, and Vineyard Oil and Gas (Erie Regional chamber and Growth Partnership).

### Sewer

The majority of the residents in the county use septic systems; however, there are multiple municipal sewer providers throughout the county. Below is a list of providers and the communities they serve.

- **Albion Borough Sewer System:** Albion Borough, Cranesville Borough, parts of Conneaut and Elk Creek Townships
- **City of Corry Sewer System:** Corry City, and parts of Concord and Wayne Townships as well as Columbus Township (Warren County)



- **Borough of Edinboro Sewer System:** Edinboro Borough and parts of Washington Township
- **City of Erie Sewer System:** Erie City, Lawrence Park Township, Wesleyville Borough, and parts of Fairview, Harborcreek, Millcreek, and Summit Townships
- **Fairview Township Sewer System:** Fairview Township
- **Girard Borough Sewer System:** Girard Borough and parts of Girard Township
- **Green Township Sewer System:** Greene Township
- **Harborcreek Township Sewer System:** Harborcreek Township
- **Lake City Borough Sewer System:** Lake City Borough
- **Lawrence Park Township Sewer System:** Lawrence Park Township
- **McKean Borough Sewer System:** McKean Borough
- **McKean Township Sewer System:** McKean Township
- **Millcreek Township Sewer System:** Millcreek Township
- **North East Borough Sewer System:** North East Borough and parts of North East Township
- **Summit Township Sewer System:** Summit Township
- **Union City Borough Sewer System:** Union City Borough and parts of Union Township
- **Washington Township Sewer System:** Washington Township
- **Waterford Borough Sewer System:** Waterford Borough and parts of Waterford Township
- **Wesleyville Borough Sewer System:** Wesleyville Borough

### Telecommunications

Erie County is home to two telecommunications providers: Verizon North, LLC and Windstream PA, LLC (Pennsylvania Public Utility Commission, 2016). There are a number of cellular communications providers in the area.

### Water

Most residents of Erie County use private wells for source water. However, there are several municipal water systems throughout the county. Below is a list of the providers and the areas they serve.



- **Albion Borough Water System:** Albion Borough, Cranesville Borough, and parts of Conneaut and Elk Creek Townships
- **City of Corry Water System:** Corry City, parts of Concord and Wayne Townships, and Columbus Township (Warren County)
- **Borough of Edinboro Water System:** Edinboro Borough and parts of Washington Township
- **City of Erie Water System:** Erie City, Lawrence Park Township, Wesleyville Borough, and parts of Fairview, Harborcreek, Millcreek, and Summit Townships
- **Fairview Township Water System:** Fairview Township
- **Girard Borough Water System:** Girard Borough
- **Green Township Water System:** Greene Township
- **Lake City Borough Water System:** Lake City Borough
- **North East Borough Water System:** North East Borough and parts of North East Township
- **Summit Township Water System:** Summit Township
- **Union City Borough Water System:** Union City Borough and parts of Union Township
- **Washington Township Water System:** Washington Township
- **Waterford Borough Water System:** Waterford Borough and parts of Waterford Township

### 2.3 POPULATION AND DEMOGRAPHICS

According to the Census Bureau's 2015 population estimate, the total population of Erie County is 280,566. Of that, 37% live within the City of Erie. The median age in the county is 38.8, below the state median age of 40.5 (U.S. Census Bureau, 2015).

Over 90% of the population in Erie County has at least a high school diploma or GED, which is

ERIE COUNTY DEMOGRAPHICS	
Total Population	278,045
Male	137,224
Female	140,821
Total Housing Units	120,094
Percent high school diploma or higher	90.8%
Percent Bachelor's degree or higher	26.1%
Median Household Income	\$45,971
Families below poverty level	17.1%
Unemployment Rate	6.7%



equivalent to statewide averages. The median household income is \$45,971, considerably below state (\$53,889) and national (\$53,599) levels. Just over 17% of families are living below the poverty line. Table 2.3.B provides a summary of basic demographic data for Erie County (U.S. Census Bureau, 2015).

As stated prior, there are thirty-eight municipalities in Erie County. The demographics for these municipalities are shown in the table below. All data are from the U.S. Census Bureau.

Table 2.3.B

MUNICIPAL DEMOGRAPHICS						
	Population	High School Diploma or Higher (%)	Median Age	Median Household Income	Total Housing Units	Poverty (%)
Albion Borough	1,468	88.8%	44.6	\$46,818	715	15.7%
Amity Twp.	1,073	85.8%	51.0	\$58,250	413	7.7%
Concord Twp.	1,344	89.4%	41.0	\$50,795	521	10.7%
Conneaut Twp.	4,290	81.4%	41.1	\$51,417	856	12.1%
Corry City	6,420	89.0%	40.2	\$37,454	2,852	24.0%
Cranesville Borough	614	93.6%	40.7	\$58,214	230	9.8%
Edinboro Borough	6,335	95.4%	23.1	\$34,074	2,628	26.9%
Elgin Borough	214	94.1%	45.2	\$57,500	69	2.4%
Elk Creek Twp.	1,798	91.4%	46.3	\$58,836	774	7.6%
Erie City	99,475	86.9%	34.3	\$34,253	45,883	26.6%
Fairview Twp.	10,102	97.1%	46.9	\$77,316	4,079	5.4%
Franklin Twp.	1,633	92.7%	49.2	\$59,063	626	6.6%
Girard Borough	3,104	94.7%	38.4	\$52,284	1,335	9.8%
Girard Twp.	5,102	90.7%	44.4	\$48,482	2,126	17.0%
Greene Twp.	4,706	94.9%	45.4	\$67,570	1,955	4.4%
Greenfield Twp.	1,933	90.0%	41.6	\$60,714	790	6.9%
Harborcreek Twp.	17,234	93.3%	40.8	\$62,516	6,422	7.6%
Lake City Borough	2,965	91.8%	34.6	\$41,571	1,111	12.2%
Lawrence Park Twp.	3,982	91.9%	39.1	\$49,953	1,583	7.0%
Le Boeuf Twp.	1,698	94.5%	44.4	\$60,125	714	10.3%
McKean Borough	383	95.7%	40.0	\$47,031	213	6.0%
McKean Twp.	4,409	95.8%	43.9	\$55,263	1,773	8.6%
Mill Village Borough	392	94.9%	47.6	\$46,625	164	17.1%
Mill Creek Twp.	53,515	94.5%	41.8	\$56,099	23,496	10.4%
North East Borough	4,294	89.5%	34.6	\$45,889	1,807	18.0%
North East Twp.	6,315	94.0%	42.9	\$58,750	2,571	11.0%
Platea Borough	411	86.8%	45.2	\$52,083	184	19.6%
Springfield Twp.	3,425	86.3%	42.6	\$45,185	1,482	16.4%



Table 2.3.B

MUNICIPAL DEMOGRAPHICS						
	Population	High School Diploma or Higher (%)	Median Age	Median Household Income	Total Housing Units	Poverty (%)
Summit Twp.	6,603	94.3%	48.5	\$58,750	2,928	2.7%
Union City Borough	3,217	88.1%	39.7	\$38,300	1,431	17.4%
Union Twp.	1,655	89.7%	41.5	\$52,109	700	10.0%
Venango Twp.	2,297	88.7%	45.0	\$64,806	912	5.7%
Washington Twp.	4,432	95.4%	37.8	\$72,159	1,693	13.8%
Waterford Borough	1,538	93.3%	42.4	\$41,856	637	9.0%
Waterford Twp.	3,920	92.8%	37.9	\$54,673	1,692	17.1%
Wattsburg Borough	403	89.8	30.9	\$43,571	194	8.9%
Wayne Twp.	1,659	90.2%	48.4	\$52,426	753	8.2%
Wesleyville Borough	3,226	91.6%	36.6	\$51,725	1,515	12.5%

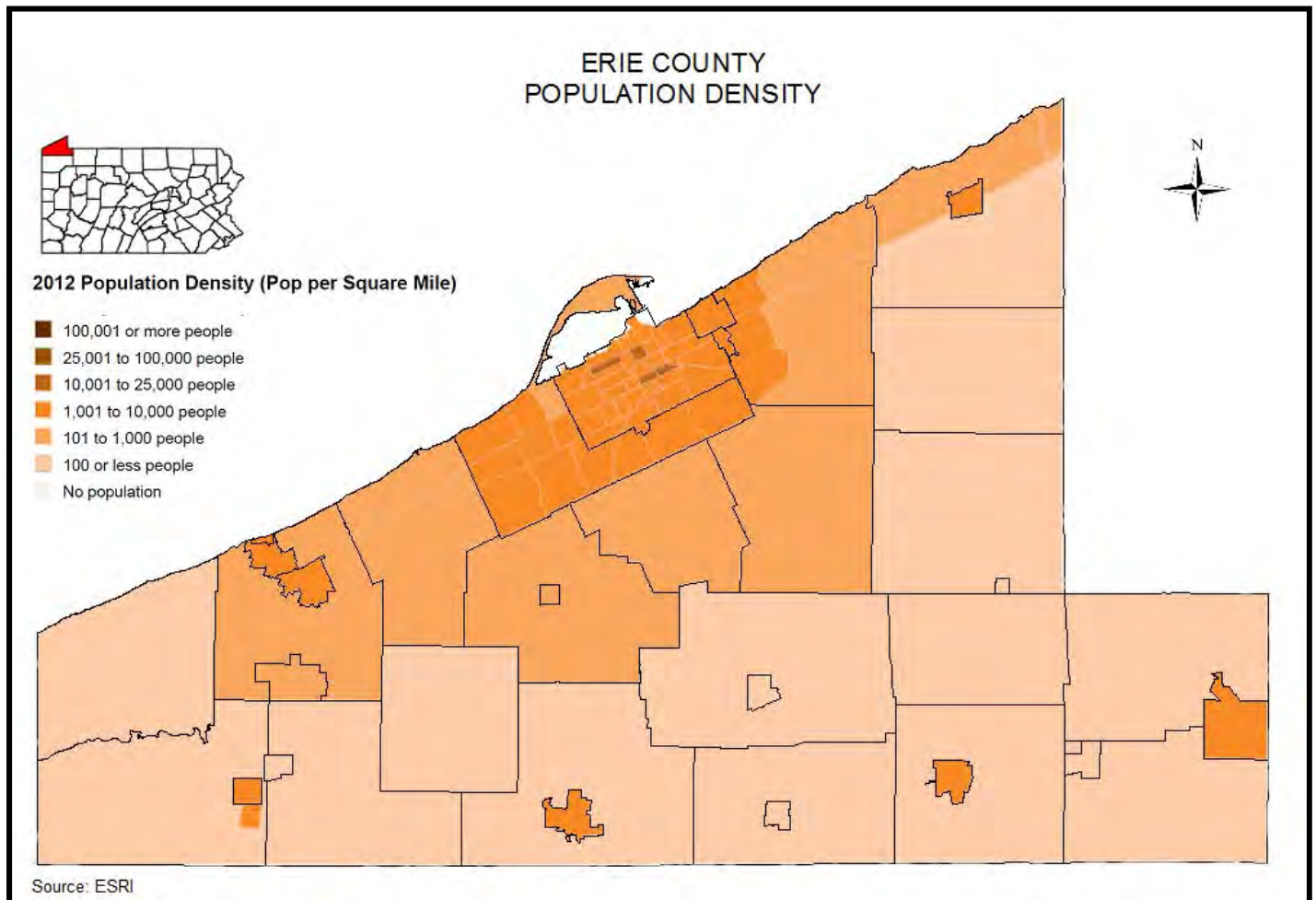
There are also five colleges/universities in the county with seven campuses. When in session, populations in the immediate areas increase significantly.

Table 2.3.C

UNIVERSITY POPULATIONS			
University	Location	Total Students	Students Living on Campus
Edinboro University (Main Campus)	219 Meadville Street Edinboro, PA 16444	5,233	1,988
Porreco College of Edinboro University	2951 West 38 <sup>th</sup> Street Erie, PA 16506	327	0
Gannon University	109 University Square Erie, PA 16501	4,343	1,479
Mercyhurst University (Main Campus)	501 East 38 <sup>th</sup> Street Erie, PA 16546	2,774	1677
Mercyhurst College North East	16 West Division Street North East, PA 16428	732	155
Penn State Erie, The Behrend College	4701 College Drive Erie, PA 16563	4,138	1,642
Lake Erie College of Osteopathic Medicine	1858 West Grandview Boulevard Erie, PA 16509	4,140	0

*Information obtained from College/University Annual Clergy, Fire, and Security Reports*





## 2.4 LAND USE AND DEVELOPMENT

Land use in Erie County is diverse, including urbanized and suburban areas, small villages, and rural agricultural and undeveloped areas. The City of Erie is the county's predominant urban area. The highest densities of industrial, commercial and residential development are concentrated in the city and its surrounding areas. The remainder of the county is generally low-density with a mixture of residential, agriculture and open space land uses. There are a number of small boroughs, with village style development, located throughout the county. The City of Corry is Erie County's second largest city located in the county's southeast corner. According to the USDA 2012 Census of Agriculture, there are 1,422 farms in the county, comprising 168,631 acres of farm land. As of 2017, 8,145 acres of farmland have been permanently preserved by the county's agricultural conservation easement program, thus protecting them from other styles of development and helping to



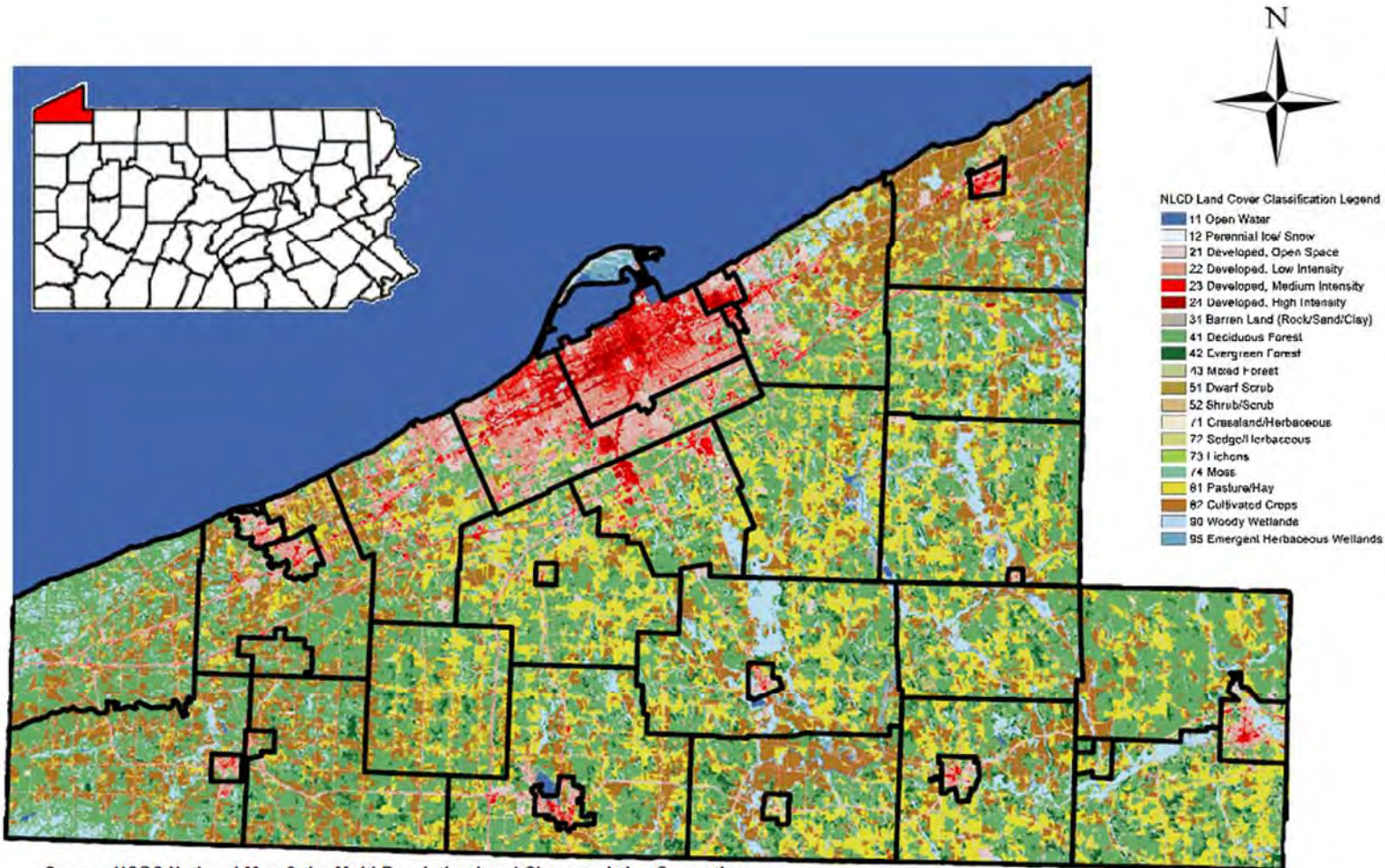
maintain the character of the county's rural areas. The brown and yellow areas of the map below represent those supporting cultivated crops and pasture land (respectively). These areas could be adversely impacted by drought conditions as well as other severe weather hazards (e.g., intense or prolonged precipitation, extreme heat, or extreme cold).

Land cover significantly affects hazard vulnerability. For example, as urbanization occurs, areas that were once covered with trees and grass are often replaced by impervious surfaces of roads, roofs, and parking lots. This urbanization reduces infiltration of rainwater thus increasing the amount of stormwater runoff and the potential for flash flooding (USGS, 2005). The pink and red sections of the map below would best represent these areas, and could thus be susceptible to damage during high-density rain events. As development continues, projects that enhance infiltration, such as retention basins, permeable pavement installations, etc. could mitigate some forms of flash flooding. More densely-developed areas may also be subject to risk from infrastructure decay, as roadways, water/sewer systems, and other infrastructure age. Increases in structural development often correlate with increases of strain on infrastructure systems. The increase in usage, combined with age and deterioration, may hasten an infrastructure failure.

The transportation system profoundly influences land use and development. Roads, rails, airports, and ports are important for the transportation of people, goods and services; thus, development occurs around transportation hubs. Whereas "good" infrastructure can support increased development, aging or faulty infrastructure may discourage it. As such, the general infrastructure decay hazard may result in economic risk. In addition to the highways, rails and airport discussed above, Erie County is also home to the Port of Erie. The Port of Erie, along with the other two ports in the state (the ports of Philadelphia and Pittsburgh), combine to move over 100 million tons of goods with an economic benefit of nearly \$50 billion dollars annually (PennDOT, 2017). The Port of Erie's economic influence can be impacted by various lake hazards as well as infrastructure decay.



# ERIE COUNTY LAND COVER MAP



Source: USGS National Map & the Multi-Resolution Land Characteristic Consortium



## 2.5 INVENTORY ASSETS

This plan identifies potentially-vulnerable community assets such as critical facilities, critical infrastructure, historical properties, commercial/industrial facilities, etc. Assets contribute directly to the quality of life in the community as well as ensure its continued operation. As such, government facilities are often listed, as are water/wastewater and transportation infrastructure. Assets can also be irreplaceable items within the community, such as historical structures or even vulnerable populations (including the elderly or youths).

### Methodology

Inventorying assets first involves determining what in the community can be affected by a hazard event. The hazard profiles contained in Section 4 contain generalized loss estimates that, in some cases identify the types of facilities that could be impacted by the hazards considered in this plan. Additionally, the committee used its meetings during the update process to significantly revise the previous version of the list. In Table 2.5.A, assets are grouped into the following categories.

- **Critical Facilities:** Governmental facilities, water/wastewater facilities, emergency services facilities, medical facilities (hospitals/clinics), and transportation infrastructure
- **Vulnerable Populations:** Schools, nursing homes, and senior centers
- **Economic Assets:** Large commercial/industrial facilities or large employers (not covered in other categories)
- **Special Considerations:** Community outreach facilities, post offices, and libraries
- **Historical Considerations:** Areas/structures listed on the National Register of Historic Places



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
<b>ALBION BOROUGH</b>						
Albion Borough Office / Police Department	Government Building Emergency Services - Police	Critical	26 Smock Avenue	Albion	16401	Albion Borough
Albion Fire Department	Emergency Services - Fire	Critical	19 Smock Avenue	Albion	16401	Albion Borough
Northwestern Middle School	Education	Vulnerable	150 Harthan Way	Albion	16401	Albion Borough
Northwestern Senior high School	Education	Vulnerable	200 Harthan Way	Albion	16401	Albion Borough
Albion Area Public Library	Library	Special Considerations	111 E Pearl St	Albion	16401	Albion Borough
United States Post Office	Post Office	Special Considerations	35 East State Street	Albion	16401	Albion Borough
<b>AMITY TOWNSHIP</b>						
Amity Municipal Building	Government Building	Critical	15030 Casler Road	Union City	16438	Amity Township
<b>CONCORD TOWNSHIP</b>						
Concord Municipal Building	Government Building	Critical	12677 Ormsbee Road	Corry	16047	Concord Township
<b>CONNEAUT TOWNSHIP</b>						
Albion Borough Waste Water Treatment Plant	Utility - Wastewater	Critical	N/A			Conneaut Township
Conneaut Township Office	Government Building	Critical	12500 U.S. Route 6N	Albion	16401	Conneaut Township
Harrington Covered Bridge	Historic	Historic	Township Road	Albion	16401	Conneaut Township
Northwestern Elementary School	Education	Vulnerable	10450 John Williams Avenue	Albion	16401	Conneaut Township
State Correctional Institute Albion	Correctional Facility	Critical	10746 Route 18	Albion	16475	Conneaut Township
<b>CORRY CITY</b>						
City of Corry Police Department	Emergency Services - Police	Critical	20 East South Street	Corry	16047	Corry City
Concord Elementary School	Education	Vulnerable	230 East South Street	Corry	16047	Corry City
Corry Area Intermediate School	Education	Vulnerable	100 West Main Street	Corry	16047	Corry City



Table 2.5.A

<b>ASSET INVENTORY</b>						
<b>Asset Name</b>	<b>Type</b>	<b>Category</b>	<b>Address</b>	<b>City</b>	<b>Zip</b>	<b>Municipality</b>
Corry Area Middle School	Education	Vulnerable	540 East Pleasant Street	Corry	16047	Corry City
Corry Area Primary School	Education	Vulnerable	423 Wayne Street	Corry	16047	Corry City
Corry Armory	Historic	Historic	205 East Washington Street	Corry	16047	Corry City
Corry City Offices	Government Building	Critical	100 South Center Street	Corry	16047	Corry City
Corry Fire Department	Emergency Services - Fire	Critical	26 East Washington Street	Corry	16047	Corry City
Corry Fire Department	Emergency Services - Fire	Critical	25 East South Street	Corry	16047	Corry City
Corry High School	Education	Vulnerable	540 East Pleasant Street	Corry	16047	Corry City
Corry Manor	Nursing Facility	Vulnerable	64 Worth Street	Corry	16047	Corry City
Corry-Lawrence Airport	Transportation	Critical	800 Spring Street	Corry	16047	Corry City
Corry Memorial Hospital	Hospital	Critical	612 West Smith Street	Corry	16047	Corry City
Corry Wastewater Treatment Plant	Utility - Wastewater	Critical	100 Sciota Street	Corry	16047	Corry City
St. Thomas School	Education	Vulnerable	229 West Washington Street	Corry	16047	Corry City
Unites States Post Office	Post Office	Special Considerations	101 South Center Street	Corry	16407	Corry City
Wright Elementary School	Education	Vulnerable	426 Wright Street	Corry	16047	Corry City
<b>CRANESVILLE BOROUGH</b>						
Cranesville Borough Offices	Government Building	Critical	10195 John Williams Avenue	Cranesville	16410	Cranesville Borough
Cranesville Christian Academy	Education	Vulnerable	10029 Reed Street	Cranesville	16410	Cranesville Borough
Cranesville Fire Department	Emergency Services - Fire	Critical	9920 Meadville Street	Cranesville	16410	Cranesville Borough
Unites States Post Office	Post Office	Special Considerations	10283 East Crane Street	Cranesville	16410	Cranesville Borough
<b>EDINBORO BOROUGH</b>						
Academy Hall	Historic	Historic	High Street & Division Street	Edinboro	16412	Edinboro Borough
Edinboro Fire Department	Emergency Services - Fire	Critical	125 Meadville Street	Edinboro	16412	Edinboro Borough
Edinboro Manor	Nursing Facility	Vulnerable	419 Waterford Street	Edinboro	16412	Edinboro Borough



Table 2.5.A

<b>ASSET INVENTORY</b>						
<b>Asset Name</b>	<b>Type</b>	<b>Category</b>	<b>Address</b>	<b>City</b>	<b>Zip</b>	<b>Municipality</b>
Edinboro Municipal Authority STP	Utility - Wastewater	Critical	301 Water Street	Edinboro	16412	Edinboro Borough
Edinboro Borough Offices / Police Department	Government Building Emergency Services - Police	Critical	124 Meadville Street	Edinboro	16412	Edinboro Borough
Edinboro University of Pennsylvania	Education	Critical	219 Meadville Street	Edinboro	16444	Edinboro Borough
Edinboro University Police Department	Emergency Services - Police	Critical	911 Scotland Road	Edinboro	16412	Edinboro Borough
Unites States Post Office	Post Office	Special Considerations	300 Waterford Street	Edinboro	16412	Edinboro Borough
<b>ELGIN BOROUGH</b>						
Elgin -Beaver Dam Company	Emergency Services - Fire	Critical	17920 North Main Street	Elgin	16413	Elgin Borough
Elgin Borough Offices	Government Building	Critical	18282 North Main Street	Elgin	16413	Elgin Borough
Unites States Post Office	Post Office	Special Considerations	18250 Main Street	Elgin	16413	Elgin Borough
<b>ELK CREEK TOWNSHIP</b>						
Elk Creek Municipal Building	Government Building	Critical	10405 High Street	Albion	16401	Elk Creek Township
<b>ERIE CITY</b>						
Bethel Christian School of Erie	Education	Vulnerable	1781 West 38th Street	Erie	16508	Erie City
Blessed Sacrament School	Education	Vulnerable	2510 Greengarden Boulevard	Erie	16502	Erie City
Boston Store	Historic	Historic	716-728 State Street	Erie	16501	Erie City
Burton Elementary School	Education	Vulnerable	1661 Buffalo Road	Erie	16510	Erie City
Cashier's House	Historic	Historic	413 State Street	Erie	16501	Erie City
Cathedral Center	Education	Vulnerable	160 West 11th Street	Erie	16501	Erie City
Cathedral Preparatory School	Education	Vulnerable	225 West 9th Street	Erie	16501	Erie City
Charles Manning Reed Mansion	Historic	Historic	524 Peach Street	Erie	16501	Erie City
City of Erie City Hall / Police Department	Government Building Emergency Services - Police	Critical	626 State Street	Erie	16501	Erie City
City of Erie STP	Utility - Wastewater	Critical	68 Port Access Road	Erie	16507	Erie City



Table 2.5.A

**ASSET INVENTORY**

Asset Name	Type	Category	Address	City	Zip	Municipality
Diehl Elementary School	Education	Vulnerable	2327 Fairmont Parkway	Erie	16501	Erie City
Dickson Tavern	Historic	Historic	201 French Street	Erie	16507	Erie City
Dr. Gertrude A Barber Center	Education	Vulnerable	136 East avenue	Erie	16507	Erie City
East Middle School	Education	Vulnerable	1001 Atkins Street	Erie	16503	Erie City
Edison Elementary School	Education	Vulnerable	1921 east Lake Road	Erie	16511	Erie City
Elmwood Gardens of Presbyterian Lodge	Nursing Facility	Vulnerable	2628 Elmwood Avenue	Erie	16508	Erie City
Emerson-Gridley Elementary School	Education	Vulnerable	816 Park Avenue	Erie	16502	Erie City
Erie Armory	Historic	Historic	Parade Street & East 6 <sup>th</sup> Street	Erie	16507	Erie City
Erie County Prison	Correctional Facility	Critical	1618 Ash Street	Erie	16503	Erie City
Erie County Sheriff's Department	Emergency Services - Police	Critical	140 West 6th Street	Erie	16501	Erie City
Erie Day School	Education	Vulnerable	1372 West 6th Street	Erie	16505	Erie City
Erie Federal Courthouse	Historic	Historic	17 South Park Row	Erie	16501	Erie City
Erie Fire Department Engine 11	Emergency Services - Fire	Critical	1747 West 8th Street	Erie	16505	Erie City
Erie Fire Department Engine 12 South Central	Emergency Services - Fire	Critical	3507 Peachtree Street	Erie	16508	Erie City
Erie Fire Department Engine 13	Emergency Services - Fire	Critical	1027 East 28th Street	Erie	16504	Erie City
Erie Fire Department Engine 3 Central	Emergency Services - Fire	Critical	144 West 12th Street	Erie	16501	Erie City
Erie Fire Department Engine 6	Emergency Services - Fire	Critical	1740 West 26th Street	Erie	16508	Erie City
Erie Fire Department Engine 8	Emergency Services - Fire	Critical	83 East Avenue	Erie	16503	Erie City
Erie High School	Education	Vulnerable	3325 Cherry Street	Erie	16508	Erie City
Erie Insurance	Economic	Economic	100 Erie Insurance Place	Erie	16530	Erie City
Erie International Airport Police Department	Emergency Services - Police	Critical	4411 West 12th Street	Erie	16505	Erie City



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
Erie Rise Leadership Academy Charter School	Education	Vulnerable	2501 Plum Street	Erie	16502	Erie City
Erie School District Police Department	Emergency Services - Police	Critical	3325 Cherry Street	Erie	16508	Erie City
Erie Trust Company Building	Historic	Historic	1001 State Street	Erie	16501	Erie City
Federal Row	Historic	Historic	146-162 East 5 <sup>th</sup> Street & 424-430 Holland Street	Erie	16507	Erie City
Gannon University	Education	Vulnerable	109 University Square	Erie	16501	Erie City
Gannon University Police Department	Emergency Services - Police	Critical	210 West 6th Street	Erie	16541	Erie City
Golden Living Center	Nursing Facility	Vulnerable	2686 Peach Street	Erie	16508	Erie City
Grover Cleveland Elementary School	Education	Vulnerable	1540 West 38th Street	Erie	16508	Erie City
Harding Elementary School	Education	Vulnerable	820 Lincoln Avenue	Erie	16505	Erie City
Health South Rehab Hospital of Erie	Hospital	Critical	143 East 2nd Street	Erie	16507	Erie City
Holy Family School	Education	Vulnerable	1153 East 59th Street	Erie	16503	Erie City
Jefferson Elementary School	Education	Vulnerable	230 East 38th Street	Erie	16504	Erie City
Joanna Connell Elementary School	Education	Vulnerable	1820 East 38th Street	Erie	16510	Erie City
John Hill House	Historic	Historic	230 W 6 <sup>th</sup> Street	Erie	16507	Erie City
Lecom at Presque Isle Rehab & Nursing Center	Nursing Facility	Vulnerable	4114 Schaper Avenue	Erie	16508	Erie City
Lincoln Elementary School	Education	Vulnerable	831 East 31st Street	Erie	16504	Erie City
Lovell Manufacturing Company	Historic	Historic	1301 French Street	Erie	16501	Erie City
Luther Memorial Academy	Education	Vulnerable	220 West 11th Street	Erie	16501	Erie City
Main Library	Historic	Historic	3 South Perry Street	Erie	16504	Erie City
McKinley Elementary School	Education	Vulnerable	933 East 22nd Street	Erie	16503	Erie City
Mercyhurst Preparatory School	Education	Vulnerable	538 East Grandview Boulevard	Erie	16504	Erie City





Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
Mercyhurst University	Education	Vulnerable	501 East 38th Street	Erie	16546	Erie City
Mercyhurst University Police Department	Emergency Services - Police	Critical	501 East 38th Street	Erie	16546	Erie City
Modern Tool Company	Historic	Historic	State Street & 4 <sup>th</sup> Street	Erie	16507	Erie City
Northwest Pennsylvania Collegiate Academy	Education	Vulnerable	2825 State Street	Erie	16508	Erie City
Old Customs House	Historic	Historic	409 State Street	Erie	16501	Erie City
Pennsylvania's Soldiers and Sailors Home	Nursing Facility	Vulnerable	560 East 3rd Street	Erie	16512	Erie City
Perry Elementary School	Education	Vulnerable	955 West 29 <sup>th</sup> Street	Erie	16508	Erie City
Perseus House Charter School of Excellence	Education	Vulnerable	1511 Peach Street	Erie	16501	Erie City
Pfeiffer-Burleigh Elementary School	Education	Vulnerable	235 East 11 <sup>th</sup> Street	Erie	16503	Erie City
Pierre S.V. Hamot House	Historic	Historic	302 French Street	Erie	16507	Erie City
Progressive Care Center - St. Vincent Health	Nursing Facility	Vulnerable	232 West 25th Street	Erie	16544	Erie City
Qhandlery Corner	Historic	Historic	1 & 3 E 4 <sup>th</sup> Street & 401-403 & 405 State Street	Erie	16507	Erie City
Robert Benjamin Wiley Community Charter School	Education	Vulnerable	1446 East Lake Road	Erie	16507	Erie City
Sarah A. Reed Retirement Center	Assisted Living	Vulnerable	227 West 22nd Street	Erie	16504	Erie City
Select Special Hospital	Hospital	Critical	252 West 11th Street	Erie	16501	Erie City
Shriners Hospital for Children	Hospital	Critical	1645 West 8th Street	Erie	16505	Erie City
St. James School	Education	Vulnerable	2602 Buffalo Road	Erie	16510	Erie City
St. John - Holy Rosary School	Education	Vulnerable	504 East 27th Street	Erie	16504	Erie City
St. Luke Elementary School	Education	Vulnerable	425 East 38th Street	Erie	16504	Erie City
St. Mary's East	Nursing Facility	Vulnerable	607 East 26 <sup>th</sup> Street	Erie	16504	Erie City
St. Vincent Hospital	Hospital	Critical	232 West 25th Street	Erie	16544	Erie City



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
Strong Vincent High School	Education	Vulnerable	1330 West 8th Street	Erie	16502	Erie City
Thayer-Thompson House	Historic	Historic	605 W 8th Street	Erie	16502	Erie City
Unites States Post Office	Post Office	Special Considerations	1401 State Street	Erie	16501	Erie City
Unites States Post Office	Post Office	Special Considerations	2108 East 38th Street	Erie	16515	Erie City
Unites States Post Office	Post Office	Special Considerations	2711 Legion Road	Erie	16506	Erie City
Unites States Post Office	Post Office	Special Considerations	3607 Poplar Street	Erie	16508	Erie City
UPMC - Hamot	Hospital	Critical	201 State Street	Erie	16550	Erie City
U.S.S. Niagara	Historic	Historic	State Street	Erie	16507	Erie City
VA Medical Center	Hospital	Critical	135 East 38th Street	Erie	16504	Erie City
Veterans Affairs Police Department	Emergency Services - Police	Critical	135 East 38th Street	Erie	16501	Erie City
Vila Maria Academy	Historic	Historic	819 West 8th Street	Erie	16502	Erie City
Village at Luther Square	Nursing Facility	Vulnerable	149 West 22nd Street	Erie	16502	Erie City
Voices for Independence	Economic	Economic	1107 Payne Avenue	Erie	16503	Erie City
Warner Theater	Historic	Historic	811 State Street	Erie	16501	Erie City
Watson-Curtze Mansion	Historic	Historic	356 W 6th Street	Erie	16507	Erie City
Wayne Elementary School	Education	Vulnerable	650 East Avenue	Erie	16503	Erie City
West Park Place	Historic	Historic	N Park Row, Peach Street, 5th Street, and State Street	Erie	16507	Erie City
West Sixth Street Historic District	Historic	Historic	West 6th Street from Poplar Street to Peach Street	Erie	16507	Erie City
Woodrow Wilson Middle School	Education	Vulnerable	718 East 28th Street	Erie	16504	Erie City
FAIRVIEW TOWNSHIP						
Begin Anew Christian Academy	Education	Vulnerable	7195 West Ridge Road	Fairview	16508	Fairview Township
Fairview Elementary School	Education	Vulnerable	5145 Avonia Road	Fairview	16415	Fairview Township



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
Fairview Fire Department	Emergency Services - Fire	Critical	7190 West Ridge Road	Fairview	16415	Fairview Township
Fairview Fire Department	Emergency Services - Fire	Critical	7040 West Lake Road	Fairview	16415	Fairview Township
Fairview High School	Education	Vulnerable	7460 McCray Road	Fairview	16415	Fairview Township
Fairview Manor	Nursing Facility	Vulnerable	900 Manchester Road	Fairview	16415	Fairview Township
Fairview Middle School	Education	Vulnerable	4967 Avonia Road	Fairview	16415	Fairview Township
Fairview Township Offices	Government Building	Critical	7471 McCray Road	Fairview	16415	Fairview Township
Manchester Commons of Presbyterian Lodge	Nursing Facility	Vulnerable	6351 West Lake Road	Fairview	16508	Fairview Township
St. Stevens Nursery School	Education	Vulnerable	1070 Dutch Road	Fairview	16415	Fairview Township
Sturgeon House	Historic	Historic	4302 Avonia Road	Fairview	16415	Fairview Township
U.S. Border Patrol - Erie Station	Emergency Services - Police	Critical	7851 Traut Drive	Fairview	16415	Fairview Township
Unites States Post Office	Post Office	Special Considerations	3856 Avonia Road	Fairview	16415	Fairview Township
<b>FRANKLIN TOWNSHIP</b>						
Franklin Township Fire Department	Emergency Services - Fire	Critical	7455 Route 98	Edinboro	16412	Franklin Township
Franklin Township Offices	Government Building	Critical	10411 Route 98	Edinboro	16412	Franklin Township
<b>GIRARD BOROUGH</b>						
A.F. Dobler Hose & Ladder Co.	Emergency Services - Fire	Critical	37 Walnut Street	Girard	16417	Girard Borough
Girard Alliance Christ Academy	Education	Vulnerable	229 Rive Avenue	Girard	16417	Girard Borough
Girard Borough Offices / Police Department	Government Building Emergency Services - Police	Critical	34 West Main Street	Girard	16417	Girard Borough
Girard Borough STP	Utility - Wastewater	Critical	N/A			Girard Borough
Girard Fire Department	Emergency Services - Fire	Critical	12 Mechanic Street	Girard	16417	Girard Borough
Girard High School	Education	Vulnerable	1135 Lake Street	Girard	16417	Girard Borough
Rice Avenue Middle School	Education	Vulnerable	110 Rice Avenue	Girard	16417	Girard Borough



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
St. John Evangelist School	Education	Vulnerable	101 Olin Avenue	Girard	16417	Girard Borough
Unites States Post Office	Post Office	Special Considerations	113 Main Street East	Girard	16417	Girard Borough
<b>GIRARD TOWNSHIP</b>						
Girard Township Offices	Government Building	Critical	10140 Ridge Road	Girard	16417	Girard Township
Girard Township STP	Utility - Wastewater	Critical	N/A			Girard Township
Pennsylvania State Police - Girard	Emergency Services - Police	Critical	5950 Meadville Road	Girard	16417	Girard Township
Pleasant Ridge Manor West	Nursing Facility	Vulnerable	8300 West Ridge Road	Girard	16417	Girard Township
<b>GREENE TOWNSHIP</b>						
Greene Township Offices	Government Building	Critical	9333 Tate Road	Erie	16509	Greene Township
Kuhl Hose Company Barton Road Station	Emergency Services - Fire	Critical	10859 Barton Road	Waterford	16441	Greene Township
Kuhl Hose Company Station 68	Emergency Services - Fire	Critical	3132 Rescue Lane	Erie	16509	Greene Township
Kuhl Hose Company Station 69	Emergency Services - Fire	Critical	8820 Kuhl Road	Erie	16510	Greene Township
Seneca High School	Education	Vulnerable	10770 Wattsburg Road	Erie	16509	Greene Township
St. Boniface School	Education	Vulnerable	9363 Wattsburg Road	Erie	16509	Greene Township
Wattsburg Area Elementary School	Education	Vulnerable	10780 Wattsburg Road	Erie	16509	Greene Township
Wattsburg Area Middle School	Education	Vulnerable	10774 Wattsburg Road	Erie	16509	Greene Township
<b>GREENFIELD TOWNSHIP</b>						
Greenfield Township Fire Department	Emergency Services - Fire	Critical	10160 Station Road	North East	16428	Greenfield Township
Greenfield Township	Government Building	Critical	11184 Rich Hill Road	North East	16428	Greenfield Township
<b>HARBORCREEK TOWNSHIP</b>						
Ball Pavilion	Nursing Facility	Vulnerable	5416 East Lake Road	Erie	16511	Harborcreek Township
Brookside Fire Department	Emergency Services - Fire	Critical	3560 Athens Street	Erie	16510	Harborcreek Township



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
Clark Elementary School	Education	Vulnerable	3650 Depot road	Erie	16510	Harborcreek Township
Fairfield Hose company	Emergency Services - Fire	Critical	4896 East Lake Road	Erie	16511	Harborcreek Township
Harbor Creek Junior High School	Education	Vulnerable	6375 Buffalo Road	Harborcreek	16421	Harborcreek Township
Harbor Creek Senior high School	Education	Vulnerable	6375 Buffalo Road	Harborcreek	16421	Harborcreek Township
Harborcreek Christian School	Education	Vulnerable	4719 Buffalo Road	Erie	16510	Harborcreek Township
Harborcreek Fire Department	Emergency Services - Fire	Critical	8024 East Lake Road	Erie	16511	Harborcreek Township
Harborcreek Fire Department	Emergency Services - Fire	Critical	7275 Buffalo Road	Harborcreek	16421	Harborcreek Township
Harborcreek Township Offices	Government Building	Critical	5610 Buffalo Road	Harborcreek	16421	Harborcreek Township
Klein Elementary School	Education	Vulnerable	5325 East Lake Road	Erie	16511	Harborcreek Township
Penn State Behrend Police Department	Emergency Services - Police	Critical	4651 College Drive	Erie	16563	Harborcreek Township
Penn State Erie, Behrend College (Main Campus)	Education	Vulnerable	4701 College Drive	Erie	16563	Harborcreek Township
Rolling Ridge Elementary School	Education	Vulnerable	3700 Ridge Road	Harborcreek	16510	Harborcreek Township
Unites States Post Office	Post Office	Special Considerations	7175 Buffalo Road	Harborcreek	16421	Harborcreek Township
Vineyard Christian Kindergarten	Education	Vulnerable	7895 Buffalo Road	Harborcreek	16421	Harborcreek Township
Wal-Mart	Economic	Economic	5741 Buffalo Road	Harborcreek	16421	Harborcreek Township
LAKE CITY BOROUGH						
Elk Valley Elementary School	Education	Vulnerable	2556 Maple Avenue	Lake City	16423	Lake City Borough
Lake City Borough Police Department	Emergency Services - Police	Critical	2352 Main Street	Lake City	16423	Lake City Borough
Lake City Borough Offices	Government Building	Critical	2350 Main Street	Lake City	16423	Lake City Borough
Lake City Fire Company	Emergency Services - Fire	Critical	2232 Rice Avenue	Lake City	16423	Lake City Borough
Lake City Fire Company	Emergency Services - Fire	Critical	10157 West Lake Road	Lake City	16423	Lake City Borough



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
Lake City Municipal STP	Utility - Wastewater	Critical	1150 Maple Avenue	Lake City	16423	Lake City Borough
<b>LAWRENCE PARK TOWNSHIP</b>						
General Electric	Economic	Economic	42-5 2901 East Lake Road	Lawrence Park Township	16511	Lawrence Park Township
Iroquois Elementary School	Education	Vulnerable	4231 Morse Street	Lawrence Park Township	16511	Lawrence Park Township
Iroquois Jr./Sr. High School	Educations	Vulnerable	4301 Main Street	Lawrence Park Township	16211	Lawrence Park Township
Lawrence Park Township Offices	Government Building	Critical	4230 Iroquois Avenue	Erie	16211	Lawrence Park Township
Manorcare Health Services	Nursing Facility	Vulnerable	3805 Field Street	Lawrence Park Township	16511	Lawrence Park Township
Park Dinor	Historic	Historic	4019 Main Street	Lawrence Park Township		Lawrence Park Township
<b>LEBOEUF TOWNSHIP</b>						
LeBoeuf Township Offices	Government Building	Critical	14270 Flatts Road	Waterford	16441	LeBoeuf Township
<b>MCKEAN BOROUGH</b>						
McKean Borough Offices	Government Building	Critical	8952 Main Street	McKean	16426	McKean Borough
McKean Elementary School	Education	Vulnerable	5120 West Road	McKean	16426	McKean Borough
McKean Hose Company	Emergency Services - Fire	Critical	5011 School Street	McKean	16426	McKean Borough
Middleboro STP	Utility - Wastewater	Critical	N/A			McKean Borough
Unites States Post Office	Post Office	Special Considerations	8988 Main Street	McKean	16426	McKean Borough
<b>MCKEAN TOWNSHIP</b>						
Colonial Village Subdivision Treatment	Utility - Wastewater	Critical	N/A			McKean Township
Georgetown Heights Subdivision Treatment	Utility - Wastewater	Critical	N/A			McKean Township
McKean Township Offices	Government Building	Critical	9231 Edinboro Road	McKean	16426	McKean Township
McKean Township STP	Utility - Wastewater	Critical	N/A			McKean Township



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
<b>MILL VILLAGE BOROUGH</b>						
Mill Village Borough Offices	Government Building	Critical	14350 North Main Street	Mill Village	16427	Mill Village Borough
Mill Village Elementary School	Education	Vulnerable	2757 East Center Street	Mill Village	16427	Mill Village Borough
Mill Village Fire Company	Emergency Services - Fire	Critical	14505 South Main Street	Mill Village	16427	Mill Village Borough
United States Post Office	Post Office	Special Considerations	14525 South Main Street	Mill Village	16427	Mill Village Borough
<b>MILL CREEK TOWNSHIP</b>						
Asbury Elementary School	Education	Vulnerable	5875 Sterrattania Road	Millcreek	16515	Millcreek Township
Belle Valley Elementary School	Education	Vulnerable	5300 Henderson Road	Millcreek	16510	Millcreek Township
Belle Valley Hose Company	Emergency Services - Fire	Critical	1514 Norcross Road	Millcreek	16504	Millcreek Township
Chestnut Hill Elementary School	Education	Vulnerable	5800 Zuck Road	Millcreek	16506	Millcreek Township
Community Country Day School	Education	Vulnerable	5800 Old Zuck Road	Millcreek	16506	Millcreek Township
Erie International Airport (Tom ridge Field)	Transportation	Critical	4411 West 12th Street	Millcreek	16505	Millcreek Township
Forestview	Nursing Facility	Vulnerable	2301 Edinboro Road	Millcreek	16509	Millcreek Township
Grandview Elementary School	Education	Vulnerable	4301 Lancaster Road	Millcreek	16506	Millcreek Township
James S Wilson Middle School	Education	Vulnerable	9001 West 54 <sup>th</sup> Street	Millcreek	16509	Millcreek Township
Kearsarge Fire Department	Emergency Services - Fire	Critical	4928 West Street	Millcreek	16509	Millcreek Township
Lakeshore Fire Department	Emergency Services - Fire	Critical	5310 West Lake Road	Millcreek	16505	Millcreek Township
McDowell High School	Education	Vulnerable	3580 West 38 <sup>th</sup> Street	Millcreek	16506	Millcreek Township
McDowell Intermediate School	Education	Vulnerable	3320 Caughey Road	Millcreek	16506	Millcreek Township
Millcreek Township Offices / Police Department	Government Building Emergency Services - Police	Critical	3608 West 26th Street	Millcreek	16506	Millcreek Township
Millcreek Community Hospital	Hospital	Critical	5515 Peach Street	Millcreek	16509	Millcreek Township
Millcreek Community Hospital Trans Care Unit	Nursing Facility	Vulnerable	5515 Peach Street	Millcreek	16509	Millcreek Township



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
Millcreek Manor	Nursing Facility	Vulnerable	5535 Peach Street	Millcreek	16509	Millcreek Township
Nicholson House and Inn	Historic	Historic	4838 W Ridge Road	Millcreek	16509	Millcreek Township
Plastek Industries	Economic	Economic	2310 Pittsburgh Avenue	Millcreek	16502	Millcreek Township
Plastek Industries	Economic	Economic	2315 West 23 <sup>rd</sup> Street	Millcreek	16506	Millcreek Township
Plastek Industries	Economic	Economic	2425 West 23 <sup>rd</sup> Street	Millcreek	16506	Millcreek Township
Plastek Industries	Economic	Economic	3001 West 15 <sup>th</sup> Street	Millcreek	16505	Millcreek Township
Pleasant Ridge Manor East	Nursing Facility	Vulnerable	4728 Lake Pleasant Road	Millcreek	16504	Millcreek Township
Porreco College	Education	Vulnerable	2951 West 38th Street	Millcreek	16506	Millcreek Township
Sommerheim Park Archeological District	Historic	Historic	Address Restricted	Millcreek	16506	Millcreek Township
St. Mary's at Asbury Ridge	Nursing Facility	Vulnerable	4885 West Ridge Road	Millcreek	16506	Millcreek Township
South Hills Child Development	Education	Vulnerable	3808 Caughey Road	Millcreek	16506	Millcreek Township
Tracey Elementary School	Education	Vulnerable	2624 West 6 <sup>th</sup> Street	Millcreek	16505	Millcreek Township
Wal-Mart	Economic	Economic	5350 West Ridge Road	Millcreek	16506	Millcreek Township
Walnut Creek Healthcare and Rehabilitation Center	Nursing Facility	Vulnerable	8450 Zuck Road	Millcreek	16506	Millcreek Township
Walnut Creek Middle School	Education	Vulnerable	5901 Sterrattania Road	Millcreek	16505	Millcreek Township
West Lake Fire Department	Emergency Services - Fire	Critical	2942 West 12th Street	Millcreek	16505	Millcreek Township
West Lake Fire Department	Emergency Services - Fire	Critical	3770 West Lake Road	Millcreek	16505	Millcreek Township
West Lake Middle School	Education	Vulnerable	4330 Wet Lake Road	Millcreek	16505	Millcreek Township
West Ridge Hose Company	Emergency Services - Fire	Critical	3142 West 26th Street	Millcreek	16506	Millcreek Township
West Ridge Hose Company	Emergency Services - Fire	Critical	4775 Sterrattania Road	Millcreek	16506	Millcreek Township
Western Reserve Healthcare and Rehabilitation Center	Nursing Facility	Vulnerable	1521 W 54th Street	Millcreek	16509	Millcreek Township
<b>NORTH EAST BOROUGH</b>						





Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
Creekside Christian School	Education	Vulnerable	43 South Lake Street	North East	16428	North East Borough
Crescent Hose Company	Emergency Services - Fire	Critical	36 East Main Street	North East	16428	North East Borough
Earle C. Davis Elementary School	Education	Vulnerable	50 East Division Street	North East	16428	North East Borough
Fuller Hose Company	Emergency Services - Fire	Critical	66 South Pearl Street	North East	16428	North East Borough
North East Borough Offices	Government Building	Critical	31 West Main Street	North East	16428	North East Borough
North East Borough Police Department	Emergency Services - Police	Critical	58 East Main Street	North East	16428	North East Borough
North East Historic District	Historic	Historic	Division Street	North East	16428	North East Borough
North East Intermediate Elementary School	Education	Vulnerable	50 East Division Street	North East	16428	North East Borough
St. Gregory School	Education	Vulnerable	140 West Main Street	North East	16428	North East Borough
Unites States Post Office	Post Office	Special Considerations	38 South Lake East	North East	16428	North East Borough
NORTH EAST TOWNSHIP						
Mercyhurst University, North East Campus	Education	Vulnerable	16 West Division Street	North East	16428	North East Township
North East Christian Academy	Education	Vulnerable	5335 Station Road	North East	16428	North East Township
North East High School	Education	Vulnerable	1901 Freeport Road	North East	16428	North East Township
North East Middle School	Education	Vulnerable	1903 Freeport Road	North East	16428	North East Township
North East Sanitation Authority STP	Utility - Wastewater	Critical	N/A			North East Township
North East Township Offices	Government Building	Critical	10300 West Main Road	North East	16428	North East Township
Penn State Erie, Behrend, Center for Grape Research	Education	Vulnerable	662 North Cemetery Road	North East	16428	North East Township
Short's Hotel	Historic	Historic	90 S Pearl Street	North East	16428	North East Township
PLATEA BOROUGH						
Platea Borough Offices	Government Building	Critical	9957 Maiden Lane	Girard	16417	Platea Borough
Platea Fire Company	Emergency Services - Fire	Critical	10012 Maple Avenue	Girard	16417	Platea Borough



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
<b>SPRINGFIELD TOWNSHIP</b>						
Springfield Elementary School	Education	Vulnerable	11911 Bond Street	East Springfield	16411	Springfield Township
Springfield Fire Department	Emergency Services - Fire	Critical	11959 Main Street	East Springfield	16411	Springfield Township
Springfield Township Offices	Government Building	Critical	13300 Ridge Road	East Springfield	16411	Springfield Township
Unites States Post Office	Post Office	Special Considerations	11932 Main Street	East Springfield	16411	Springfield Township
<b>SUMMIT TOWNSHIP</b>						
Abington Crest Nursing & Rehab Center	Nursing Facility	Vulnerable	1237 South Hill Road	Erie	16509	Summit Township
Erie County 911 Center and EOC	Emergency Services - 911	Critical	2880 Flower Road	Erie	16509	Summit Township
Erie City Water Tower	Utility – Water	Critical	7901 Cherry Street	Erie	16509	Summit Township
First Assembly Christian Academy	Education	Vulnerable	88150 Oliver Road	Erie	16509	Summit Township
Lord Corporation	Economic	Economic	2455 West Robinson Road	Erie	16509	Summit Township
Montessori in the Woods	Education	Vulnerable	1390 West Townhall Road	Erie	16509	Summit Township
Penn Dot District 1-0 Garage	Transportation	Critical	9031 Peach Street	Erie	16509	Summit Township
Perry Hi-Way Hose Company	Emergency Services - Fire	Critical	8281 Oliver Road	Erie	16509	Summit Township
Perry Hi-Way Hose Company	Emergency Services - Fire	Critical	501 East Robinson Road	Erie	16509	Summit Township
Presque Isle Downs & Casino	Economic	Economic	8199 Perry Highway	Erie	16509	Summit Township
Robinson Elementary School	Education	Vulnerable	1651 Robinson Road West	Erie	16509	Summit Township
Shopping Area	Economic	Economic	Peach Street	Erie	16509	Summit Township
Summit Sewer Authority	Utility – Wastewater	Critical	8890 Old French Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	1763 West Townhall Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	1263 West Townhall Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	2850 Flower Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	3195 Flower Road	Erie	16509	Summit Township



Table 2.5.A

ASSET INVENTORY						
Asset Name	Type	Category	Address	City	Zip	Municipality
Summit Sewer Lift Station	Utility – Wastewater	Critical	8010 Old Oliver Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	8131 Hawthorne Drive	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	8400 Oliver Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	8900 Peach Street	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	9384 Peach Street	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	2300 New Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	8052 Perry Highway	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	7092 Edinboro Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	7440 Footmill Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	730 Johnson Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	1435 South Hill Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	995 South Hill Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	1265 South Hill Road	Erie	16509	Summit Township
Summit Sewer Lift Station	Utility – Wastewater	Critical	7150 Cherry Street	Erie	16509	Summit Township
Summit Township Offices	Government Building	Critical	1230 Townhall Road	Wattsburg	16442	Summit Township
Summit Water Tower	Utility – Water	Critical	8360 Waterview Lane	Erie	16509	Summit Township
Summit Water Tower	Utility – Water	Critical	1050 East Robinson Road	Erie	16509	Summit Township
Summit Water Tower	Utility – Water	Critical	9714 Peach Street	Erie	16509	Summit Township
Wal-Mart	Economic	Economic	1825 Downs Drive	Erie	16509	Summit Township
UNION TOWNSHIP						
Union City STP	Utility - Wastewater	Critical	N/A			Union Township
Union Township Offices	Government Building	Critical	16300 Route 8	Union City	16438	Union Township
UNION CITY BOROUGH						
Calvary Baptist Christ School	Education	Vulnerable	83 South Street	Union City	16438	Union City Borough



Table 2.5.A

<b>ASSET INVENTORY</b>						
<b>Asset Name</b>	<b>Type</b>	<b>Category</b>	<b>Address</b>	<b>City</b>	<b>Zip</b>	<b>Municipality</b>
Union City Area Elementary School	Education	Vulnerable	91 Miles Street	Union City	16438	Union City Borough
Union City Borough Offices	Government Building	Critical	13 South Main Street	Union City	16438	Union City Borough
Union City Fire Department	Emergency Services - Fire	Critical	50 2nd Avenue	Union City	16438	Union City Borough
Union City Historic District	Historic	Historic	Main Street Area	Union City	16438	Union City Borough
Union City Middle & High School	Education	Vulnerable	105 Concord Street	Union City	16438	Union City Borough
Union City Police Department	Emergency Services - Police	Critical	13 South Main Street	Union City	16438	Union City Borough
Unites States Post Office	Post Office	Special Considerations	90 North Main Street	Union City	16438	Union City Borough
<b>VENANGO TOWNSHIP</b>						
Venango Township Offices	Government Building	Critical	9141 Townhall Road	Wattsburg	16442	Venango Township
Wattsburg Hose Company	Emergency Services - Fire	Critical	11590 Hill Road	Wattsburg	16442	Venango Township
Open Door Christian Academy	Education	Vulnerable	11238 Route 8	Wattsburg	16442	Venango Township
<b>WASHINGTON TOWNSHIP</b>						
Edinboro Elementary School	Education	Vulnerable	5390 Route 6N	Edinboro	16412	Washington Township
General McLane High School	Education	Vulnerable	11761 Edinboro Road	Edinboro	16412	Washington Township
James W Parker Middle School	Education	Vulnerable	11781 Edinboro Road	Edinboro	16412	Washington Township
Wal-Mart	Economic	Economic	108 Washington Towne Blvd	Edinboro	16412	Washington Township
Washington Township Offices	Government Building	Critical	11800 Edinboro Road	Edinboro	16412	Washington Township
Washington Township STP	Utility - Wastewater	Critical	N/A			Washington Township
<b>WATERFORD BOROUGH</b>						
Fort LeBoeuf High School	Education	Vulnerable	931 High Street	Waterford	16441	Waterford Borough
Fort LeBoeuf Middle School	Education	Vulnerable	865 Cherry Street	Waterford	16441	Waterford Borough
Unites States Post Office	Post Office	Special Considerations	101 High Street	Waterford	16441	Waterford Borough
Waterford Elementary School	Education	Vulnerable	323 Cherry Street	Waterford	16441	Waterford Borough



Table 2.5.A

<b>ASSET INVENTORY</b>						
<b>Asset Name</b>	<b>Type</b>	<b>Category</b>	<b>Address</b>	<b>City</b>	<b>Zip</b>	<b>Municipality</b>
<b>WATERFORD TOWNSHIP</b>						
Eagle Hotel	Historic	Historic	32 High Street	Waterford	16441	Waterford Township
Waterford Borough STP	Utility - Wastewater	Critical		Waterford	16441	Waterford Township
Waterford Covered Bridge	Historic	Historic	Niemeyer Road	Waterford	16441	Waterford Township
<b>WATTSBURG BOROUGH</b>						
Unites States Post Office	Post Office	Special Considerations	14410 Main Street	Wattsburg	16442	Wattsburg Borough
Wattsburg Area Elementary Center and Middle School	Education	Vulnerable	10780 Wattsburg Road	Wattsburg	16442	Wattsburg Borough
Wattsburg Borough Offices	Government Building	Critical	14431 Main Street	Wattsburg	16442	Wattsburg Borough
Wattsburg Hose Company	Emergency Services - Fire	Critical	14415 Main Street	Wattsburg	16442	Wattsburg Borough
<b>WAYNE TOWNSHIP</b>						
Elgin-Beaverdam Hose Company	Emergency Services - Fire	Critical	17277 Sciota Road	Corry	16407	Wayne Township
Pennsylvania State Police - Corry	Emergency Services - Police	Critical	11088 Route 6	Corry	16438	Wayne Township
Conelway Elementary School	Education	Vulnerable	18700 Conelway Road	Corry	16407	Wayne Township
Wayne Township Offices	Government Building	Critical	17395 Sciota Road	Corry	16407	Wayne Township
<b>WESLEYVILLE BOROUGH</b>						
Wesleyville Borough Offices / Police Department / Fire Department	Government Building Emergency Services - Police Emergency Services - Fire	Critical	3421 Buffalo Road	Erie	16510	Wesleyville Borough



## 2.6 CLIMATE CHANGE

Many natural hazards are climatic, such as droughts, severe weather, and floods. There is an important distinction between weather and climate. Weather refers to the atmospheric conditions of a geographical region over a short period of time (i.e., days or weeks). Climate refers to atmospheric conditions of a geographical area over long periods of time, such as years or decades (Keller & Devecchio, 2015).

According to the U.S. Global Change Research Program (2016), there are several weather and climate changes that have already been observed in the United States. Some of these include the following.

- Since recordkeeping began in 1895, the average U.S. temperature has increased by 1.3°F to 1.9°F, with most of the increase happening since 1970. In addition, the first decade of the 2000s was the warmest on record.
- The average precipitation across the U.S. has been increasing since 1900. As a result, heavy downpours are increasing, especially over the last 30-50 years.
- Drought events have increased in the west. Changes in precipitation and runoff, combined with changes in consumption and withdrawal, have reduced surface and groundwater supplies in many areas.
- Some types of severe weather events have experienced changes; heat waves are more frequent and intense, and cold waves have become less frequent and intense overall.
- The intensity, frequency, and duration of North Atlantic hurricanes have increased since the early 1980s.

Climate change can have a significant impact on human health and the environment. The impacts mentioned above can affect the environment by leading to changes in land-use, ecosystems, infrastructure conditions, geography and agricultural production. Extreme heat, poor air quality, reduced food and water supply and quality and changes in infectious agents. Population displacement resulting from changes in food/water supplies can lead to public health concerns such as heat-related and cardio-pulmonary illnesses; food, water and vector-borne diseases; and have consequences on mental health and stress (USGCRP, 2016).

The climate significantly impacts agriculture. Crops are affected by fluctuating temperatures and precipitation, which can reduce local yields. For example, drought and heavy precipitation can both damage crops. Heat stress on cows causes a reduction of milk production. Extreme heat reduces fruit production in vineyards and raises stream



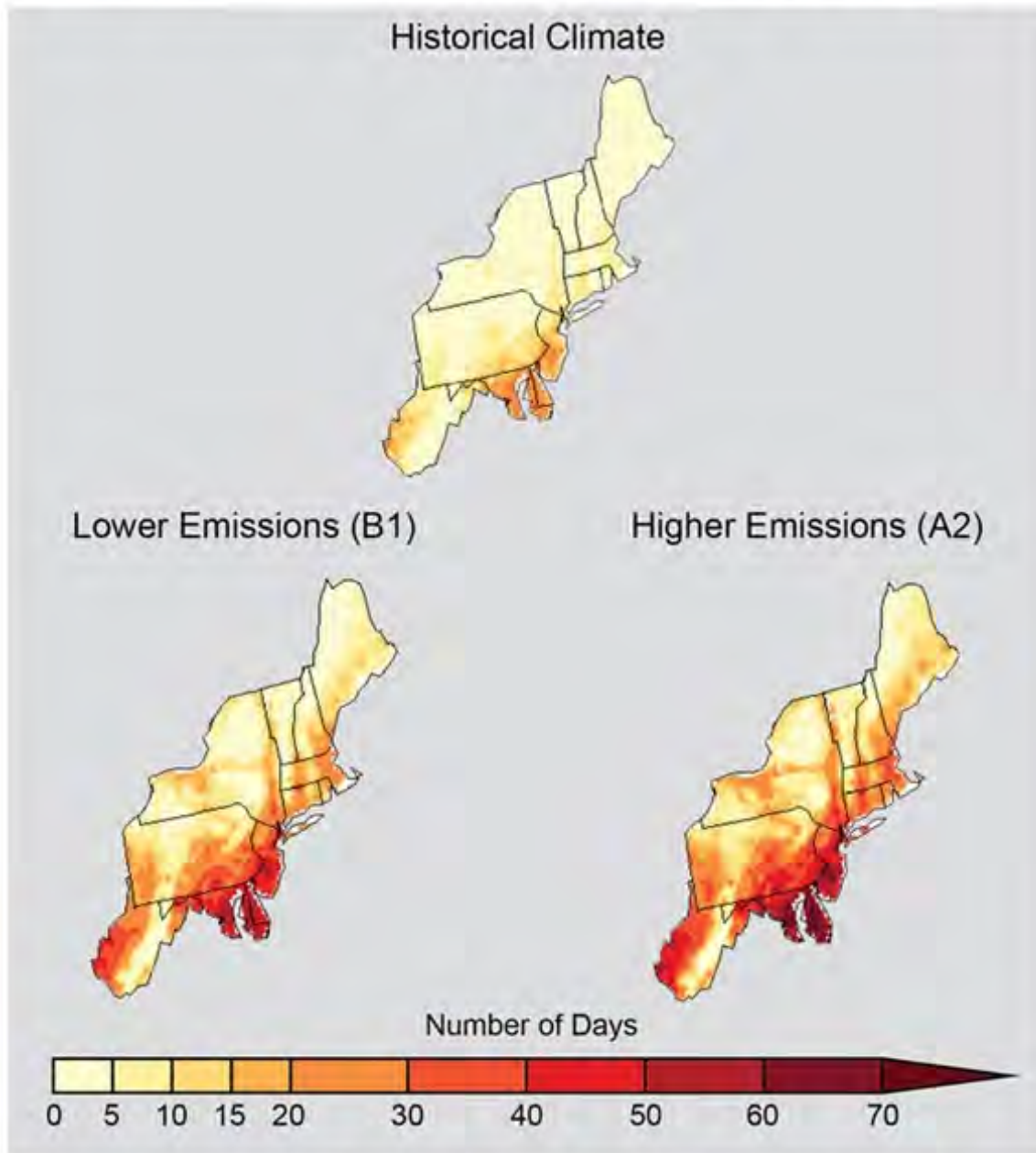
temperatures stressing fish species. Climate change can even alter the flow of streams, reducing water sources for livestock (Sea Grant, 2016).

The climate can also impact Erie County's tourism industry. Extreme changes to lake water levels, higher temperatures, excessive precipitation, and drought conditions alter shoreline and stream habitats. Rising stream temperatures threaten cold water species of fish, such as trout, and extinction of these species is becoming more likely. A reduction in area wetlands can cause birds to migrate to other areas, causing a loss in hunting and bird watching opportunities. Rising temperatures means fewer opportunities for winter activities such as skiing and ice skating resulting in the potential loss of the skiing industry (Sea Grant, 2016).

Infrastructure is being compromised by extreme weather events and rising sea levels. Power outages as well as road, bridge, and dam damage have all occurred during extreme events. Essential infrastructure systems, such as water, energy supply, and transportation may increasingly be compromised by climate change (NSTC, 2016). Water supply and sewer services are vulnerable to both extreme drought and precipitation (Sea Grant, 2016). The impact on infrastructure has the potential to effect the economy and security (NSTC, 2016).

The climate is now warming so rapidly that some effects can be seen within a human lifetime. Scientists report that primarily the burning of fossil fuels as contributory. Gases such as water vapor, ozone and carbon dioxide (greenhouse gases) regulate the earth's climate; however, these gases can persist in the atmosphere for decades. Accumulation of these gases can cause abrupt climate change (Environment Erie).

## Projected Increases in the Number of Days over 90°F



The annual number of days above 90°F is projected to increase, especially for southern portions of the Northeast region. This figure shows the average number of days with a maximum temperature of at least 90°F historically (1971-2000) and under two potential future scenarios (one with reduced greenhouse gas emissions [B1], and one with increases in emissions [A2]). Source: USGCRP (2014)[1]



## 2.7 DATA SOURCES AND LIMITATIONS

The risk assessment, action items, etc. contained in this hazard mitigation plan rely on various sources of data. Erie County recognizes that some data may be inaccurate or be rendered inaccurate by environmental changes throughout the county that occur over time. Further, as research continues on hazard resilience, new articles may reveal deficiencies in previous scholarly efforts. This section acknowledges these limitations generally.

In order to assess risk and vulnerability, the county's consultant gathered data on past occurrences of damaging hazard events. For many historic natural hazard events, the National Centers for Environmental Information (NECI) (formerly the National Climatic Data Center), provided information. NCEI is a division of the U.S. Department of Commerce's National Oceanic and Atmospheric Administrations (NOAA). NCEI compiles information on hazard events from data gathered by the National Weather Service (NWS), another division of NOAA, and presents it on their website. The data used for this plan came from the 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, 2017). It is important to understand that historical event data are not the best predictors of future vulnerability due to the impact of unforeseen or improbable events (Taleb, 2010). Additionally, in some cases, the NWS utilizes first-hand accounts from local officials (e.g., emergency management directors), which may be influenced by physical and social environmental factors beyond the core weather event.

Various government agency and non-government agency sources provided additional information used to complete the risk assessment for this plan. The following narrative cites those sources where appropriate with a full reference list included in Appendix 5. The county's consultant obtained numerous GIS data sets 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. Pennsylvania State University developed PASDA as a service to the citizens, governments, and businesses of the Commonwealth. It is a cooperative project of the Governor's Office of Administration, Office of Information Technology, Geospatial Technologies Office, and the Penn State Institute of Energy and the Environment of the Pennsylvania State University. Flood hazard area data used in this plan were taken from the FEMA Flood Insurance Risk Map released on June 7, 2017. The Erie County Department of Planning provided GIS datasets including parcel data, structure data, transportation layers, jurisdictional boundaries, waterways, and



watershed boundaries. Other GIS datasets were retrieved from the U.S. Census Bureau (<https://www.census.gov/geo/maps-data/data/tiger.html>).

HAZUS-MH is a risk assessment tool for analyzing potential losses from floods, hurricane winds, and earthquakes. In HAZUS-MH, current scientific and engineering knowledge is coupled with the GIS technology to produce estimates of hazard-related damage before, or after, a disaster occurs. Losses were estimated for earthquakes using the HAZUS software.



### 3.0 DOCUMENTATION OF THE PLANNING PROCESS

§201.6(b) and 201.6(c)(1)

An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Erie County developed this plan in accordance with Part 201.6 of Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000. Several resources assisted in the development of the plan, including the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) *Local Mitigation Planning Handbook* (USDHS, 2013), the *Commonwealth of Pennsylvania's All-Hazard Mitigation Planning Standard Operating Guide* (PEMA, 2013), the governing regulations in the Code of Federal Regulations (CFR), etc.

This narrative describes the update process, to include the composition of the planning committee, external participants in the process, an overview of planning meetings, and the process used to engage the public.

#### 3.1 UPDATE PROCESS AND PARTICIPATION SUMMARY

As noted in 1.0 Introduction, the Erie County Department of Public Safety and the Erie County Department of Planning served as the coordinating agencies for this update. Public safety largely coordinated outreach to participating jurisdictions and headed interactions with the county's consultant, while the department of planning participated in the process and ensured that other countywide planning efforts were accurately represented (and properly integrated) into the mitigation plan. The



department of planning also provided access to subject matter expertise in the county (e.g., Pennsylvania Department of Environmental Protection Coastal Resources Management, geographic information system [GIS] data and capabilities, stormwater management planning history, etc.).

This update formally began in August of 2016 with the procurement of JH Consulting, LLC, from Buckhannon, West Virginia, as the consultant to support the planning process. The consultant's role was to coordinate data collection and analysis, interface regularly with participating jurisdictions, lead planning meetings and public outreach, and document the planning process.

The Erie County Department of Public Safety as well as the consultant remained in contact with municipal representatives through email and telephone. Public safety provided initial municipal contact information and, along with the consultant, continually updated the list to ensure correct points of contact received notices of upcoming meetings as well as surveys and forms to complete. Section 3.2 provides a table of committee members and the jurisdiction they represented.

All individual municipal jurisdictions (i.e., two cities, 14 boroughs and 22 townships) participated in the update. Representatives from jurisdictions that were unable to attend meetings provided input via communication with the department of public safety and consultant. Table 3.1.A shows a summary of municipal participation.



Table: 3.1.A

MUNICIPAL INVOLVEMENT								
Municipality	October 27, 2016, Committee Meeting	May 2, 2017, Committee Meeting	June 2016 Meetings with Consultant	Capability Survey	Misc. Contact (Phone/Email) with Consultant	Asset Lists Updated	Project Information Provided	Public Participation from Jurisdiction
Albion Borough	X	X	X	X	X	X	X	X
Amity Township	X	X		X	X	X	X	X
Concord Township	X	X		X	X	X	X	X
Conneaut Township	X	X	X		X	X	X	
Corry City				X	X	X	X	X
Cranesville Borough	X	X	X	X	X	X	X	X
Edinboro Borough	X	X	X	X	X		X	X
Elgin Borough	X	X		X	X	X	X	X
Elk Creek Township	X	X	X		X	X	X	
Erie City		X		X	X	X	X	X
Fairview Township			X	X	X	X	X	X
Franklin Township	X	X	X	X	X	X	X	X
Girard Borough	X	X	X	X	X	X	X	X
Girard Township	X	X	X	X	X	X	X	X
Greene Township				X	X	X	X	X
Greenfield Township	X	X		X	X	X	X	X
Harborcreek Township				X	X	X	X	X
Lake City Borough					X	X	X	X
Lawrence Park Township					X	X	X	X
LeBoeuf Township					X	X	X	X
McKean Borough	X	X	X		X	X	X	X
McKean Township	X	X	X		X	X	X	X
Mill Village Borough					X	X	X	X
Millcreek Township	X			X	X	X	X	X
North East Borough	X	X		X	X	X	X	X
North East Township	X			X	X	X	X	X
Platea Borough	X	X	X	X	X	X	X	X
Springfield Township	X	X	X	X	X	X	X	X
Summit Township	X		X	X	X	X	X	X
Union City Borough					X	X	X	X
Union Township	X	X		X	X	X	X	X
Venango Township				X	X	X	X	X
Washington Township	X	X	X		X	X	X	X
Waterford Borough					X	X	X	X
Waterford Township					X	X	X	X
Wattsburg Borough					X	X	X	
Wayne Township	X	X		X	X	X	X	
Wesleyville Borough				X	X	X	X	



This update serves as the latest in the evolution of Erie County’s mitigation planning efforts. It builds on the 2006 and 2012 versions. The “Erie County hazard mitigation planning team” was first formed in 2004 in order to complete the original version of this document. The Erie County Department of Public Safety, in cooperation with the Erie County Department of Planning, headed this entity composed of county representatives. The original plan was completed and approved in 2006. Municipal representatives provided additional information through hazard vulnerability questionnaires and suggesting mitigation opportunities, which were prioritized by the Erie County Planning Commission.

In February 2011, Erie County Department of Public Safety and the Erie County Department of Planning coordinated a formal update to the original document. Municipal representatives, as well as adjacent county representatives and other stakeholders from state and local agencies, non-profits and advocacy organizations participated in the first update. Municipal representatives and stakeholders attended several meetings and provided forms and surveys to validate participation.

### 3.2 THE PLANNING TEAM

As a multi-jurisdictional plan, the 2017 update included significant municipal participation. Table 3.2.A identifies the formal planning committee that oversaw this update. It includes representation from the Erie County Department of Public Safety, Erie County Department of Planning, and each participating municipality.

Table 3.2.A		
<b>JURISDICTIONAL REPRESENTATIVES</b>		
Jurisdiction	Representative(s)	Position
Erie County Department of Public Safety	John Grappy Dale Robinson Brian Mesaros John Kelly	Director of Public Safety Emergency Management Coordinator Emergency Management Assistant Coordinator Emergency Management Specialist
Erie County Department of Planning	Kathy Wyrosdick John McGranor Amy Murdock Mike Baker	Director Program Administrator Program Administrator GIS Planner
Albion Borough	Gary Wells Andrew Jarvi Bill Felege	Borough Manager West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Amity Township	Cynthia Miller Lyn Witmer	Secretary Conelway Regional Emergency Management Agency Coordinator



Table 3.2.A

JURISDICTIONAL REPRESENTATIVES		
Jurisdiction	Representative(s)	Position
Concord Township	Gary Blakeslee Janice Ohl Lyn Witmer	Supervisor Secretary Conelway Regional Emergency Management Agency Coordinator
Conneaut Township	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Corry City	Jason Biondi Lyn Witmer	City Manager Conelway Regional Emergency Management Agency Coordinator
Cranesville Borough	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Edinboro Borough	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Elgin Borough	Richard Patterson Jill Gibson Lyn Witmer	Mayor Secretary/Treasurer Conelway Regional Emergency Management Agency Coordinator
Elk Creek Township	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Erie City	Bruce Eicher	Emergency Management Agency Coordinator
Fairview Township	Larry Biggie	Emergency Management Junior Deputy Coordinator
Franklin Township	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Girard Borough	Robert "Doc" Orr Andrew Jarvi Bill Felege	Councilman West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Girard Township	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Greene Township	Don Erbin Jr.	Emergency Management Coordinator
Greenfield Township	Kevin Bartlett	Supervisor
Harborcreek Township	Brian Benovic	Emergency Management Coordinator
Lake City Borough	Andrew Graves	Mayor
Lawrence Park Township	Shaun Miller	Emergency Management Coordinator
Lebeouf Township	Edward Falconer	Emergency Management Coordinator
McKean Borough	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
McKean Township	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Mill Village Borough	Edward Falconer	Emergency Management Coordinator
Millcreek Township	Matt Exley	Emergency Management Coordinator
North East Borough	Will Rogers Terry Thomson Scott Connors	Borough Manager North East Area Emergency Management Agency Coordinator North East Area Emergency Management Agency
North East Township	Terry Thomson Scott Connors	North East Area Emergency Management Agency Coordinator North East Area Emergency Management Agency
Platea Borough	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Springfield Township	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Summit Township	Jack Lee Nancy Agostine	Supervisor Supervisor
Union City Borough	Dustin Kolaja	Councilman
Union Township	Earl Brown	Secretary/Treasurer



Table 3.2.A

<b>JURISDICTIONAL REPRESENTATIVES</b>		
Jurisdiction	Representative(s)	Position
Venango Township	Lyn Witmer	Conelway Regional Emergency Management Agency Coordinator
Washington Township	Andrew Jarvi Bill Felege	West Erie County Emergency Management Agency Coordinator West Erie County Emergency Management Agency President
Waterford Borough	Harry Latta	Councilman/Emergency Management Coordinator
Waterford Township	Ron Jagta	Emergency Management Coordinator
Wattsburg Borough	James Pencille	Mayor
Wayne Township	Erin Bisbee Lyn Witmer	Zoning Officer Conelway Regional Emergency Management Agency Coordinator
Wesleyville Borough	Guy Lombarozzi	Councilman

In addition to county and municipal representatives, adjacent jurisdictions, non-profit organizations, federal, state, and county agencies also provided input. These stakeholders did not serve on the planning committee because they did not represent agencies that would ultimately adopt the plan as a requirement for mitigation funding eligibility. However, they provided key information that contributed to the success of the update.

### **3.3 MEETINGS AND DOCUMENTATION**

Public safety and the department of planning sponsored the following meetings during the update process. All agendas, sign-in sheets, and minutes are included in Appendix 1.

On August 10, 2016, the contractor met with the Erie County Department of Public Safety and the Erie County Department of Planning to kick-off the project. Attendees discussed municipal, stakeholder, and public involvement as well as the overall planning process and timeline.

The planning committee met for the first time on October 27, 2016, at the Erie County Department of Public Safety. For the convenience of committee members, this meeting included two sessions, one at 10:00 a.m. and the second at 6:00 p.m. The consultant guided the discussions, which included a brief overview of purpose of a hazard mitigation plan, an overview of the update and review processes, municipal responsibilities, hazards in the 2012 plan and changes to the hazards list for the update. Committee members discussed hazard probability and severity and completed a risk assessment matrix. The contractor sent an email to committee members on November 10, 2016, with copies of the asset list and projects from the 2012 plan. Committee members were given the opportunity to contact the contractor





with any questions or comments and were given detailed instructions on how to review and update the lists.

On February 27, 2017, the department of public safety and the department of planning met with the contractor to discuss upcoming opportunities for municipal involvement. Participants also discussed public engagement through meetings and online surveys.

The second formal committee meeting took place on May 2, 2017. Committee members again attended one of two sessions, the first 9:00 a.m. or the second at 6:00 p.m. The meeting included an update on the planning process, discussion on providing statuses for existing projects, and an explanation of mitigation goals followed by the creation of a mitigation goal to organize the projects included in this update. Committee members discussed potential new projects and how they aligned with the mitigation goals.

The capability survey was sent to each municipal representative on May 12, 2017, via email. The consultant developed and hosted the survey on the Survey Monkey platform ([www.surveymonkey.com](http://www.surveymonkey.com)). The representatives were advised to contact the consultant with any questions, comments, or concerns. Between June 6 and June 8, 2017, the consultant visited municipalities and was available to answer questions and assist municipal representatives with the asset list, project updates, and/or capability survey. Several municipalities took the opportunity to meet with the consultant.

On July 20, 2017, the Erie County Conservation District hosted the “Erie County Resiliency Workshop” sponsored by FEMA Region III and PEMA. Government agencies, private stakeholders, and the public were all invited. The workshop included segments on floodplain mapping, available RiskMAP products, mitigation implementation ideas and a presentation on the update to the Erie County hazard mitigation plan.

On August 2, 2017, the Department of Public Safety and the Department of Planning had a virtual meeting using the [www.gotomeeting.com](http://www.gotomeeting.com) platform. The discussion focused on the projects for the 2017 update and plan integration.

### **3.4 PUBLIC AND STAKEHOLDER PARTICIPATION**

In addition to the planning team (which included relevant county organizations and municipalities), adjacent jurisdictions, non-profit organizations,



federal, state, and county agencies also provided input. These stakeholders did not serve on the planning committee because they did not represent agencies that would ultimately adopt the plan as a requirement for mitigation funding eligibility. However, they provided key information that contributed to the success of the update.

Table 3.4.A	
<b>STAKEHOLDER PARTICIPATION</b>	
Organization	How Involved
<b><u>Local and County Government</u></b>	
Ashtabula County Emergency Management Agency (Neighboring Jurisdiction)	<ul style="list-style-type: none"> <li>Erie County DPS submitted a letter via email requesting a review of the plan as posted on the county's website.</li> </ul>
Chautauqua County Emergency Services (Neighboring Jurisdiction)	<ul style="list-style-type: none"> <li>Erie County DPS submitted a letter via email requesting a review of the plan as posted on the county's website.</li> </ul>
Conelway Regional Emergency Management Agency	<ul style="list-style-type: none"> <li>Invited to planning meetings.</li> <li>Included on email requests to individual jurisdictions regarding assets and projects.</li> <li>Attended planning meetings representing local jurisdictions in its area.</li> </ul>
Crawford County Department of Public Safety (Neighboring Jurisdiction)	<ul style="list-style-type: none"> <li>Erie County DPS submitted a letter via email requesting a review of the plan as posted on the county's website.</li> <li>Crawford County submitted a response; see Appendix 1.</li> </ul>
Erie City Mayor's Roundtable on Disability Issues, Emergency Services Subcommittee	<ul style="list-style-type: none"> <li>Consultant submitted email requests for data on anticipated impacts to functional and access needs populations.</li> <li>Consultant visited office location to request same.</li> </ul>
Erie County Department of Health	<ul style="list-style-type: none"> <li>Consultant submitted email requests for data on potential public health impacts.</li> </ul>
Forest County Emergency Management (Neighboring Jurisdiction)	<ul style="list-style-type: none"> <li>Erie County DPS submitted a letter via email requesting a review of the plan as posted on the county's website.</li> </ul>
North East Area Emergency Management	<ul style="list-style-type: none"> <li>Invited to planning meetings.</li> <li>Included on email requests to individual jurisdictions regarding assets and projects.</li> <li>Attended planning meetings representing local jurisdictions in its area.</li> </ul>
Warren County Emergency Management Department (Neighboring Jurisdiction)	<ul style="list-style-type: none"> <li>Erie County DPS submitted a letter via email requesting a review of the plan as posted on the county's website.</li> </ul>
West Erie County Emergency Management Agency	<ul style="list-style-type: none"> <li>Invited to planning meetings.</li> <li>Included on email requests to individual jurisdictions regarding assets and projects.</li> <li>Attended planning meetings representing local jurisdictions in its area.</li> </ul>
<b><u>State Government</u></b>	
Pennsylvania Department of Community and Economic Development	<ul style="list-style-type: none"> <li>Attended the Erie County Resiliency Workshop and provided input.</li> </ul>
Pennsylvania Department of Conservation and Natural Resources	<ul style="list-style-type: none"> <li>Consultant submitted email requests for data regarding various lake hazards.</li> </ul>
Pennsylvania Department of Environmental Protection Coastal Resources Management Program	<ul style="list-style-type: none"> <li>Maintained regular email contact with consultant and Erie County Planning.</li> <li>Provided relevant plans and studies to assist with profiling various lake hazards.</li> </ul>
Pennsylvania Department of Transportation	<ul style="list-style-type: none"> <li>Consultant submitted several emails to request information on incidents of land subsidence in the county.</li> <li>Consultant visited local location to request same.</li> </ul>



Table 3.4.A <b>STAKEHOLDER PARTICIPATION</b>	
Organization	How Involved
Pennsylvania Emergency Management Agency	<ul style="list-style-type: none"> <li>• Attended a planning meeting with Erie County DPS and consultant to discuss planning while in progress.</li> <li>• Attended the Erie County Resiliency Workshop and provided input.</li> <li>• Erie County DPS submitted copy of completed plan for review.</li> </ul>
<b><u>Federal Government</u></b>	
Federal Emergency Management Agency, Region III	<ul style="list-style-type: none"> <li>• Attended the Erie County Resiliency Workshop and provided input.</li> <li>• Consultant submitted email request for information regarding NFIP-suspended communities; FEMA response provided.</li> <li>• Erie County DPS submitted copy of completed plan (via PEMA) for review.</li> </ul>
U.S. Army Corps of Engineers, Buffalo District	<ul style="list-style-type: none"> <li>• Consultant submitted email requests for data relative to dams, levees, and impoundments.</li> </ul>
<b><u>Non-Profit Organizations</u></b>	
Erie County Conservation District	<ul style="list-style-type: none"> <li>• Attended the Erie County Resiliency Workshop and provided input.</li> </ul>
Erie County Multicultural Community Resource Center	<ul style="list-style-type: none"> <li>• Consultant submitted email requests for data on anticipated impacts to immigrant populations.</li> <li>• Consultant visited office location to request same.</li> </ul>
Northwest PA Green Economy Task Force	<ul style="list-style-type: none"> <li>• Attended the Erie County Resiliency Workshop and provided input.</li> </ul>
Resilience Action Partners	<ul style="list-style-type: none"> <li>• Attended the Erie County Resiliency Workshop and provided input.</li> </ul>
Visit Erie	<ul style="list-style-type: none"> <li>• Consultant submitted email requests for data on segments of the local economy.</li> <li>• Provided information on local economy (particularly related to tourism) via email (and via website).</li> </ul>
<b><u>Higher Education</u></b>	
Edinboro University	<ul style="list-style-type: none"> <li>• Erie County DPS submitted email request for demographic information and perspectives on various hazards (university provided its HMP which was used as a resource in this plan).</li> </ul>
Gannon University	<ul style="list-style-type: none"> <li>• Erie County DPS submitted email request for demographic information and perspectives on various hazards.</li> </ul>
Lake Erie College of Osteopathic Medicine	<ul style="list-style-type: none"> <li>• Erie County DPS submitted email request for demographic information and perspectives on various hazards.</li> </ul>
Mercyhurst University	<ul style="list-style-type: none"> <li>• Erie County DPS submitted email request for demographic information and perspectives on various hazards.</li> </ul>
Penn State Erie, The Behrend College	<ul style="list-style-type: none"> <li>• Erie County DPS submitted email request for demographic information and perspectives on various hazards.</li> </ul>
Pennsylvania Sea Grant	<ul style="list-style-type: none"> <li>• Erie County DPS submitted email request for demographic information and perspectives on various hazards.</li> </ul>
Pennsylvania State University	<ul style="list-style-type: none"> <li>• Erie County DPS submitted email request for demographic information and perspectives on various hazards.</li> </ul>
<b><u>Private Sector</u></b>	
Dewberry	<ul style="list-style-type: none"> <li>• Attended the Erie County Resiliency Workshop and provided input.</li> </ul>
JH Consulting, LLC	<ul style="list-style-type: none"> <li>• Served as county's consultant and worked collaboratively with Erie County DPS and Erie County Planning throughout.</li> </ul>
Michael Baker, Jr., Inc.	<ul style="list-style-type: none"> <li>• Attended the Erie County Resiliency Workshop and provided input.</li> </ul>

Erie County coordinated several opportunities for the public to participate in the planning process. The department of public safety and the consultant held open public meetings on June 21, 2017, and July 20, 2017. Both meetings took place at



the public safety office on Flower Road at 6:00 p.m. Public safety advertised the meetings via conventional media and social media; attendance at both meetings was minimal. Significantly, the July 20<sup>th</sup> resiliency workshop also provided an opportunity for public participation.

In an attempt to further public participation in the planning process, the department of public safety and the department of planning directed the consultant to develop and administer two online surveys for residents. The consultant hosted the surveys on the Survey Monkey platform ([www.surveymonkey.com](http://www.surveymonkey.com)); public safety and the department of planning distributed them through county and municipal websites and social media. The first survey launched on October 17, 2016, and sought information from residents on their perceptions of hazards and vulnerabilities. Public participation with the first survey was significant; 326 residents submitted responses.

The second survey began on June 21, 2017, and targeted comment on potential mitigation actions. Survey 2 had fewer responses; 26 residents responded. This survey had residents answer questions about funding sources, prioritizing hazards to be addressed via mitigation projects, and allowed the public to suggest potential mitigation projects. Survey 2 asked questions about actions with which the general public may not be familiar or otherwise feel it should have an active role in determining, which could explain the significantly smaller response. In total, however, even with minimal public meeting attendance, 352 residents participated in the update process. Appendix 2 contains the raw data for both surveys.

### **3.5 MULTI-JURISDICTIONAL PLANNING**

Erie County updated this plan using a multi-jurisdictional approach. The county and stakeholders provided information that may not have been available through the municipalities. However, municipal participation was critical to the success of the process. Municipalities provided information on hazard events and mitigation projects specific to their jurisdictions. Municipal involvement is documented in Table 3.1.A above. All 38 municipalities in Erie County participated in the planning process; thus, this plan serves as their official hazard mitigation plan for funding eligibility (per completion of the approval and adoption processes).



### **3.6 EXISITNG PLANNING MECHANISMS**

There are numerous existing regulatory and planning mechanisms in place at the state, county, and municipal level of government which support hazard mitigation planning efforts. Table 3.6.A lists the plans used during this update.



Table 3.6.A

EXISTING PLANNING MECHANISMS		
Document Type	Document	How Incorporated into Plan
Plan	Comprehensive Plans for the Following Municipalities: <ul style="list-style-type: none"> <li>• Corry 2020 (update of CorryVision plan),</li> <li>• Conneaut Township Comprehensive Plan (1999),</li> <li>• Erie Refocused Comprehensive Plan (Emerge 2040),</li> <li>• Fairview Area Comprehensive Plan (2012),</li> <li>• Harborcreek Township Comprehensive Plan (2010), and</li> <li>• Millcreek Township Comprehensive Plan (2002)</li> </ul>	Reviewed for areas where mitigation may be feasibly integrated into local efforts
Plan	County of Erie Emergency Operations Plan (EOP) (2014)	Reviewed for evidence of capabilities relative to response and recovery from hazard events
Plan	Edinboro University Hazard Mitigation Plan (2015)	Resource for examining risk at a more granular level in the area of campus
Plan	Erie County Land Use Plan (2003)	Resource for "Land Use and Development" subsection of the community profile; general cross reference to quickly review hazard vulnerability at areas targeted for future residential, commercial, and/or industrial development
Plan	Erie County Comprehensive Plan (2003) – Housing Section (2008)	Resource for "Land Use and Development" subsection of the community profile; general cross reference to quickly review hazard vulnerability at areas targeted for future residential development; used as a resource when discussing projects to increase resiliency within the residential sector
Plan	Erie County Comprehensive Plan (2003) – Transportation Section (2012)	Resource for "Land Use and Development" subsection of the community profile; general cross reference to quickly review hazard vulnerability of the transportation component of critical infrastructure; used as a resource when discussing projects to increase resiliency of the transportation network
Plan	Erie County Natural and Historical Resources Plan	Identification of historical assets
Plan	Erie County Act 167 County-Wide Stormwater Management Plan (2010)	Inclusion of stormwater "problem areas" into the flooding profile; integrated mitigation-consistent projects from this document into the mitigation list
Plan	Erie County 2042 Long Range Transportation Plan (2017)	Integrated mitigation-consistent projects from this document into the mitigation list
Plan	Lake Erie Watershed Cooperative Weed Management Area 5 Year Plan (2013-2018)	Referenced for invasive species risk discussions; provides specific geographic areas of interest for mitigation projects
Plan	Pennsylvania State Hazard Mitigation Plan (2013)	A reference document as well as historical hazard occurrences
Regulation	Erie County Subdivision and Land Development Ordinance (2010)	Referenced in discussion about resilient land use and risk reduction
Regulation	Municipalities Planning Code (MPC) Act 247	Referenced in capabilities assessment to integrate the role of planning commissions into mitigation planning by explaining their potential role in adding a hazard discussion to community plans
Regulation	Uniform Construction Code (UCC), Act 45 of 1999, as implemented by the Commonwealth of Pennsylvania (2003)	Referenced in discussion about resilient construction and risk reduction
Regulation	Zoning Ordinances for All Erie County Municipalities <u>except</u> the following: <ul style="list-style-type: none"> <li>• Conneaut Twp.,</li> <li>• Elk Creek Twp., and</li> <li>• Platea Borough</li> </ul>	Referenced in discussion about resilient land use and risk avoidance; included in discussions regarding projects



Report	Erie County Commodity Flow Study (CSX and NSRR – 2015)	Hazard research for the hazardous materials profile
Report	PADCNR Earthquake Hazard in Pennsylvania	Hazard research for the earthquake profile
Report	FEMA Community Rating Systems (Communities and Classifications) – Online	Determining presence of CRS participating communities
Report	FEMA Community Status Book	Determining NFIP-compliant communities
Report	USACE National Inventory of Dams (2016)	Hazard research for the infrastructure decay profile
Report	USDHS FEMA Disaster Declarations for Pennsylvania Online (2017)	Contextualize hazards of priority based on historical occurrences and damages
Technical Information	Commonwealth of Pennsylvania's All Hazard Mitigation Planning Standard Operating Guide (2013)	Resource for the organization of the update; general methodological guidance
Technical Information	Pennsylvania Coastal Resources Management Program – Vegetative Best Management Practices: A Manual for Pennsylvania/Lake Erie Bluff Landowners	Hazard research for the lake hazards profile; general guidance for project ideas related to lake hazards
Technical Information	PADEP Bluff Recession: A Lake Erie Coastal Hazard (Fact Sheet)	Hazard research for the flooding and lake hazards profiles
Technical Information	PADEP Municipal Reference Document: Guidance for the Implementation of the Chapter 85 Bluff Recession and Setback Regulations 394-2000-001	Hazard research for the flooding and lake hazards profiles
Technical Information	FEMA Local Mitigation Planning Handbook (2013)	General methodological guidance
Technical Information	FEMA Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials (2013)	General methodological guidance, particularly as examples for integrating existing planning mechanisms into the hazard mitigation plan
Technical Information	FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (2013)	Guidance for creation of a one-page (two-sided) resource for participating jurisdictions (i.e., creation of a customized list of potential mitigation actions for jurisdictional consideration)

These mechanisms were discussed at community meetings and are described in more detail in Section 5.2.

Information from several of these documents has been incorporated into this plan and mitigation actions have been developed to further integrate these planning mechanisms into the hazard mitigation planning process. In particular, information on identified development constraints and potential future growth areas was incorporated from the *Erie County Comprehensive Plan* and various municipal comprehensive plans so that vulnerability pertaining to future development could be established. The 2012 mitigation plan provided extensive information on past occurrences, vulnerability, and risk in the last five years, including anecdotal information. Floodplain management ordinance information was used to aid in the establishment of local capabilities in addition to participation in the NFIP.



## 4.0 RISK ASSESSMENT

§201.6(c)(2)(i)	[The risk assessment shall include a] description of the type...of all natural hazards that can affect the jurisdiction.
§201.6(c)(2)(i)	[The risk assessment shall include a] description of the...location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

### 4.1 UPDATE PROCESS SUMMARY

The major change in the risk assessment is the organization per the updated hazard list (see below). Other changes for 2017 include the addition of historical occurrences from the previous five years, scholarly research, updated loss estimates, risk calculations, and updated risk maps (i.e., 2017 FEMA flood risk maps). This section also now includes social vulnerability considerations and public health concerns.

### 4.2 HAZARD IDENTIFICATION

Erie County and its municipalities are vulnerable to a number of hazards that can disrupt lives and damage or destroy property. The county, with input from the Pennsylvania Emergency Management Agency (PEMA), has identified 16 hazards that can or have occurred. Hazard labels were taken from Appendix 7 of the *Commonwealth of Pennsylvania's All-Hazard Mitigation Planning Standard Operating Guide* (PEMA, 2013).

#### 4.2.1 Disaster Declarations

Erie County has been included in ten Presidential Disaster and Emergency Declarations. These declarations are issued to make assistance available to state and local governments in response to a disaster.

Table 4.2.1.A

PRESIDENTIAL DISASTER AND EMERGENCY DECLARATIONS IN ERIE COUNTY		
Declaration	Date of Declaration	Event
3356	10/29/2012	Hurricane Sandy
3235	9/10/2005	Hurricane Katrina
1555	9/19/2004	Tropical Depression Frances
1497	9/26/2003	Tropical Storms Henri and Isabel
1294	9/18/1999	Hurricane Floyd
1093	1/21/1996	Flooding (Individual Assistance only)
3105	3/16/93	Severe Snowfall/Winter Storm
737	6/3/1985	Tornadoes
340	6/23/1972	Tropical Storm Agnes
58	5/21/1956	Severe Storm





Erie County has also been included in 30 Gubernatorial Proclamations of Emergency.

Table 4.2.1.B

ERIE COUNTY GUBERNATORIAL PROCLAMATIONS OF EMERGENCY	
Date of Declaration	Event
March 2017	Severe Winter Weather
October 2016	Flooding
January 2016	Severe Winter Weather
June 2015	Storms
January 2015	Severe Winter Weather
September 2014	State Trooper Emergency
February 2014	Severe Winter Weather
February 2014	Waiver of Regulations
January 2014	Extended Prolonged Cold
July 2013	June Storms
October 2012	Hurricane Sandy
April 2012	Spring Winter Storm
August 2011	Severe Storms and Flooding (Lee/Irene)
January 2011	Severe Winter Storm
February 2010	Severe Winter Storm
April 2007	Severe Storm
February 2007	Severe Winter Storm
February 2007	Waiver of Regulations
April 2007	Severe Winter Storm
September 2006	Tropical Depression Ernesto
September 2005	Hurricane Katrina
December 1998	Drought
January 1978	Heavy Snow
February 1978	Blizzard
March 1976	Heavy Rain/Ice
February 1974	Truckers Strike
July 1974	Flood
February 1972	Heavy Snow
January 1966	Heavy Snow
September 1963	Drought

Declarations and proclamations are commonly issued in the event of a natural disaster directly effecting the areas included. However, in September 2005, President G.W. Bush declared a state of emergency for all counties in Pennsylvania to make federal resources available as the Commonwealth received evacuees in the aftermath of Hurricane Katrina. Another notable event is the September 18, 2014, statewide Gubernatorial Proclamation in wake of the ambush of a Pennsylvania State Trooper outside the Blooming Grove Barracks. This proclamation enacted an Emergency Management Assistance Compact (EMAC) into law and made all state resources available to provide for the safety of the residents.



## 4.2.2 Summary of Hazards

During the first committee meeting, members reviewed hazards profiled in the 2012 version of the plan and then discussed eliminating, adding, or combining any of those hazards. The committee added “war and criminal activity” (particularly to address acts of violence) as a hazard. The committee also discussed combining dam failure and utility interruption to “infrastructure decay.” However, per guidance from PEMA, the committee elected to leave these hazards separate, but add a hazard labeled “transportation infrastructure decay” under a miscellaneous category (after removing “transportation accidents” as its own hazard). Harmful algal blooms was added to “invasive species.” High lake levels were added and seiche waves were moved from the former flooding profile and discussed under the broad heading of “lake hazards.” The committee changed “nuclear incident” to “radioactive incident” to be a more accurate label. Table 4.2.2.A summarizes the changes to the hazard list.

HAZARD UPDATES		
Erie County Hazard Mitigation Plan 2012	Erie County Hazard Mitigation Plan 2017	Reason for Change (where appropriate)
4.3.1 Coastal Erosion	4.3.1 Coastal Erosion	N/A
4.3.2 Drought	4.3.2 Drought	N/A
4.3.3 Earthquake	4.3.3 Earthquake	N/A
4.3.4 Flood, Flashflood, Ice jams	4.3.4 Flood, Flashflood, Ice jams	N/A
4.3.5 Invasive Species	4.3.5 Invasive Species	N/A (Though revised to include invasive species on Lake Erie)
4.3.6 Landslides	4.3.6 Landslide	N/A
4.3.7 Tornado and Windstorm	4.3.7 Tornado and Windstorm	N/A
4.3.8 Winter Storms	4.3.8 Winter Storm	N/A
4.3.9 Dam Failure	4.3.9 Dam Failure	N/A
4.3.10 Environmental Hazards	4.3.10 Environmental Hazards	N/A
4.3.11 Nuclear Incident	4.3.11 Radiological Incident	The primary hazard is the Perry Nuclear Power Plant and shipments along I-79; the term radioactive better describes the risk
4.3.12 Transportation Accident	Removed	Committee members noted that transportation accidents, even large ones, rarely have widespread impacts on the county as a whole. Further, hazard definitions were generally taken from the PEMA HMP SOG document; the impacts listed under “transportation accidents” did not include the committee’s primary interests when considering transportation infrastructure risks
4.3.13 Urban Fire and Explosion	4.3.12 Urban Fire and Explosion	N/A
4.3.14 Utility Interruption	4.3.13 Utility Interruption	N/A
N/A	4.3.14 War and Criminal Activity	Added because hazard appears to be increasingly in probability across the country and some historical precedence in Erie County (particularly with respect to acts of violence)



Table 4.2.2.A

HAZARD UPDATES		
Erie County Hazard Mitigation Plan 2012	Erie County Hazard Mitigation Plan 2017	Reason for Change (where appropriate)
N/A	4.3.15 Lake Hazards	Added to better depict risks and vulnerability associated with Lake Erie (focusing on high lake levels and seiche waves)
N/A	4.3.16 Transportation Infrastructure Decay	Added to address committee concerns about aging bridges and roadway resources. See also discussion for "transportation accidents" above.

The risk assessment identified numerous other hazards that are not applicable to Erie County, including avalanche, hurricanes, infestation, tsunami, and volcano. The wildfire hazard was removed from the plan since more research was needed to adequately collect credible information and form a more plausible vulnerability assessment.



### 4.2.3 Hazard Snapshots

Table 4.2.3.A contains a summary of the hazards considered by the risk assessment, presented in alphabetical order. Data within the table includes the following.

- **Description:** Definition of the hazard.
- **Period of Occurrence:** The typical time of the year events of this type can occur.
- **Number of Years:** Actual number of years data is available based on the 'record years'.
- **Number of Events:** The times that event has occurred within the timeframe of the 'number of years' according to the sources.
- **Probability:** The calculation of occurrence of a certain event based on number of years and number of events, as described above (ranging from 0.0 to 7.0, based on the highest probability calculated in this table; probability can be higher if more events take place).
- **Severity:** Based on historical impacts.
- **Risk:** Low, medium or high based on the risk assessment matrix.
- **Warning Time:** The amount of time that passes from when the event is detected to when it occurs.
- **Total Damages to Date:** Amount in dollars of damages to property or cost of repair.
- **Vulnerable Populations:** Lists the type of populations that may be vulnerable to the specific hazard.
- **Impacts:** To include public health, social, economic, environmental and infrastructure impacts of the hazard on the community.
- **Cascading Effects:** Primary hazards can have secondary effects; one hazard could give way to other consequences.

For more complete information, refer to each hazard profile for detailed descriptions, historical occurrences, methods of loss and damage estimation as well as the probability and severity calculation, and risk area maps.



Table 4.2.3.A

Hazard	Description	Period of Occurrence	# of Years	# of Events	Probability	Severity	Risk	Warning Time	Total Damages to Date	Vulnerable Populations
4.3.1 Coastal Erosion	“Coastal erosion is a natural coastal process in which sediment outflow exceeds sediment inflow at a particular location” (FEMA, 1997).	Ongoing	N/A	N/A	Frequent	Marginal	Moderate	None to Years	N/A	<ul style="list-style-type: none"> <li>Residents living along the coast</li> </ul>
	Public Health Impacts: Injury Social Impacts: Displacement of population, disruption of normal activities, evacuation Economic Impacts: Loss or damage to homes and businesses, disruption to businesses and income Environmental Impacts: Erosion, change in topography, change of natural habitats Infrastructure Impacts: Loss or damage to structures and transportation infrastructure (roads, bridges, rails)									<u>Cascading Effects:</u> Mass movements Structural damage
4.3.2 Drought	“Extended period of unusually low precipitation that produces a temporary shortage of water for people, animals, and plants (Keller & Devecchio, 2015).	Summer months or periods of low precipitation	21	5	Remote	Marginal	Moderate	Weeks Months	\$0	<ul style="list-style-type: none"> <li>Agricultural workers</li> </ul>
	Public Health Impacts: Illness (water-borne), insect infestations, compromised food, standing water Social Impacts: Disruption of recreational activities Economic Impacts: Loss of crops and livestock Environmental Impacts: Erosion, water quality, change in topography, change in natural habitat, air quality Infrastructure Impacts: Power outages									<u>Cascading Effects:</u> Extreme temperatures Mass movements



Table 4.2.3.A

Hazard	Description	Period of Occurrence	# of Years	# of Events	Probability	Severity	Risk	Warning Time	Total Damages to Date	Vulnerable Populations
4.3.3 Earthquake	"Sudden, rapid shaking of the earth's crust caused by the breaking and shifting of tectonic plates beneath the earth's surface" (Haddow, Bullock, & Coppola, 2014, pg.34).	At any time throughout the year	205	28	Improbable	Catastrophic	Moderate	None	\$0	<ul style="list-style-type: none"> <li>Entire county population</li> </ul>
	Public Health Impacts: Social Impacts: Economic Impacts: Environmental Impacts: Infrastructure Impacts:	Death, injury, PTSD, Exacerbation of chronic illnesses Displacement of population, disruption of normal activities, hysteria Loss or damage to homes and businesses, disruption of business and income, cost of clean-up Erosion, air quality, water quality, change in natural habitat Power and water outages, loss or damage to structures and transportation infrastructure (roads, bridges, rails)								<u>Cascading Effects:</u> Mass movements Hazmat Radiological
4.3.4 Flood, Flash Flood, Ice Jam	"An overabundance of water that engulfs land and other property that is normally dry" (Haddow, Bullock, & Coppola, 2014, pg.32.)	At any time throughout the year	21	66	Frequent	Marginal	Moderate	Hours Days	\$29,101,500	<ul style="list-style-type: none"> <li>Homeless</li> <li>Poor</li> <li>Children</li> <li>Elderly Adults</li> <li>People living within the risk area</li> <li>People who cannot evacuate</li> </ul>
	Public Health Impacts: Social Impacts: Economic Impacts: Environmental Impacts: Infrastructure Impacts:	Death, injury, illness (water-borne), standing water, exacerbation of chronic illnesses Displacement of population, disruption of normal activities, hysteria, evacuation Loss or damage to homes and businesses, disruption of business and income, cost of clean-up Erosion, water quality, air quality, change in natural habitats Power and water outages, loss or damage to structures and transportation infrastructure (roads, bridges, rails)								<u>Cascading Effects:</u> Dam failure Mass movements



Table 4.2.3.A

Hazard	Description	Period of Occurrence	# of Years	# of Events	Probability	Severity	Risk	Warning Time	Total Damages to Date	Vulnerable Populations
4.3.5 Invasive Species	"Invasive species are plants, animals, or pathogens that are non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause harm." (Executive Order 13112, 2006)	At any time	N/A	N/A	Probable	Marginal	Moderate	None to Years	N/A	<ul style="list-style-type: none"> <li>• Farmers</li> <li>• Fisherman</li> <li>• Foresters</li> <li>• Wildland Firefighters</li> <li>• Landscapers</li> </ul>
	Public Health Impacts: Death, illness, compromised food, compromised drinking water Social Impacts: Disruption of normal and recreational activities Economic Impacts: Disruption to industry, loss of income, cost of clean-up Environmental Impacts: Air quality, water quality, change in natural habitats Infrastructure Impacts: Damage to water infrastructure									<u>Cascading Effects:</u> Water infrastructure damage
4.3.6 Landslide	"Sinking, settling, or other lowering of parts of the crust of the Earth" (Keller & Devecchio, 2015).	Increased chance following long periods of heavy rain, snowmelt, or near construction activity	10	0	Improbable	Marginal	Low	Days Weeks Months	\$0	<ul style="list-style-type: none"> <li>• People living within the risk area</li> <li>• People who cannot evacuate</li> </ul>
	Public Health Impacts: Death, injury Social Impacts: Displacement of population, disruption of normal activities, evacuation Economic Impacts: Loss or damage to homes and businesses, disruption to businesses and income, cost of clean-up Environmental Impacts: Erosion, change in topography, change of natural habitats Infrastructure Impacts: Loss or damage to structures and transportation infrastructure (roads, bridges, rails)									<u>Cascading Effects:</u> Infrastructure damage



Table 4.2.3.A

Hazard	Description	Period of Occurrence	# of Years	# of Events	Probability	Severity	Risk	Warning Time	Total Damages to Date	Vulnerable Populations
4.3.7 Tornado & Windstorm	"A tornado is a rapidly rotating vortex or funnel of air extending groundward from cumulonimbus cloud, exhibiting wind speeds of up to 300 mph" (Haddow, Bullock, & Coppola, 2014).	Summer months	67	422	Frequent	Catastrophic	High	Minutes to Days	\$43,194,000	<ul style="list-style-type: none"> <li>• Children</li> <li>• Elderly adults</li> <li>• Poor</li> <li>• Homeless</li> </ul>
	Public Health Impacts: Exacerbation of chronic illnesses Social Impacts: Disruption of normal and recreational activities, evacuation Economic Impacts: Loss or damage to homes and businesses, disruption to businesses and income, cost of clean-up Environmental Impacts: Air quality, water quality, change of natural habitats, erosion Infrastructure Impacts: Power and water outages, loss or damage to structures and transportation infrastructure (roads, bridges, rails)									<u>Cascading Effects:</u> Flood Drought Infrastructure damage
4.3.8 Winter Storm	"Winter storms occur when extremely cold atmospheric conditions coincide with high airborne moisture content, resulting in rapid and heavy precipitation of snow and/or ice" (Haddow, Bullock, & Coppola, 2014).	Winter months	21	133	Frequent	Critical	High	Days / Weeks	\$41,675,000	<ul style="list-style-type: none"> <li>• Elderly population</li> <li>• Infants</li> <li>• Homeless</li> </ul>
	Public Health Impacts: Exacerbation of chronic illnesses Social Impacts: Disruption of normal activities Economic Impacts: Damage to homes and businesses, Disruption to business and income Environmental Impacts: Erosion Infrastructure Impacts: Loss or damage to structures and/or critical infrastructure									<u>Cascading Effects:</u> Flood Landslides Infrastructure damage





Table 4.2.3.A

Hazard	Description	Period of Occurrence	# of Years	# of Events	Probability	Severity	Risk	Warning Time	Total Damages to Date	Vulnerable Populations
4.3.9 Dam Failure	"A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Failure of these structures results in an uncontrolled release of impounded water" (PEMA, 2013).	At any time	N/A	N/A	Remote	Critical	Moderate	None to Years	N/A	<ul style="list-style-type: none"> <li>• People living within risk area</li> <li>• People who cannot evacuate</li> </ul>
	Public Health Impacts: Death, injury, illness (water-borne), standing water, exacerbation of chronic illnesses Social Impacts: Displacement of population, disruption of normal activities, evacuation Economic Impacts: Loss or damage to homes and businesses, disruption of business and income, cost of clean-up Environmental Impacts: Erosion, water quality, change in topography, change in natural habitat Infrastructure Impacts: Power outages, loss or damage to structures and transportation infrastructure (roads, bridges, rail)									<u>Cascading Effects:</u> Flood
4.3.10 Environmental Hazards	"Environmental hazards are hazards that pose threats to the natural environment, the building environment, and public safety through the diffusion of harmful substances, materials, or products" (PEMA, 2013).	At any time throughout the year	7	198	Frequent	Critical	High	None	\$135K	<ul style="list-style-type: none"> <li>• Everyone surrounding the incident</li> </ul>
	Public Health Impacts: Death, injury, illness, PTSD, compromised food Social Impacts: Displacement of population, disruption of normal activities, hysteria, evacuation Economic Impacts: Loss or damage to homes, businesses and crops, disruption to businesses and income, cost of clean-up Environmental Impacts: Air quality, water quality, change of natural habitats Infrastructure Impacts: Loss or damage to structures and transportation infrastructure (roads, bridges, rails)									<u>Cascading Effects:</u> Radiological Infrastructure damage Fire or explosion



Table 4.2.3.A

Hazard	Description	Period of Occurrence	# of Years	# of Events	Probability	Severity	Risk	Warning Time	Total Damages to Date	Vulnerable Populations
4.3.11 Radiological Incident	“Radiation is energy that travels through space or matter. Radiation from many radioactive isotopes contains enough energy to change the physical state of the material through which it passes. A radiological emergency is an incident that poses an actual or potential hazard to public health or safety or loss of property” (FEMA, n.d.).	At any time throughout the year	N/A	N/A	Remote	Critical	Moderate	Hours Days Weeks	\$0	<ul style="list-style-type: none"> <li>Everyone</li> <li>People who cannot evacuate</li> </ul>
	Public Health Impacts: Death, illness, injury (burns), cancer, compromised food Social Impacts: Displacement of population, disruption of normal activities, hysteria, evacuation Economic Impacts: Loss or damage to homes and businesses, disruption to businesses and income, cost of clean-up Environmental Impacts: Air quality, water quality, change of natural habitats Infrastructure Impacts: Power and water outages, loss or damage to structures and transportation infrastructure (roads, bridges, rails)	Cascading Effects: Hazmat Infrastructure damage								



Table 4.2.3.A

Hazard	Description	Period of Occurrence	# of Years	# of Events	Probability	Severity	Risk	Warning Time	Total Damages to Date	Vulnerable Populations
4.3.12 Urban Fire & 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" (PEMA, 2013).	Anytime	N/A	N/A	Frequent	Critical	High	None	Unknown	<ul style="list-style-type: none"> <li>• Children</li> <li>• Elderly adults</li> <li>• People with disabilities</li> </ul>
	Public Health Impacts: Exacerbation of chronic illnesses, respiratory illnesses, injury, death Social Impacts: Disruption to normal or recreational activities, evacuation Economic Impacts: Loss or damage to homes and businesses, disruption to business and income, cost of clean-up Environmental Impacts: Air quality, water quality Infrastructure Impacts: Loss or damage to structures and/or critical infrastructure									<u>Cascading Effects:</u> Infrastructure damage Hazmat
4.3.13 Utility Interruption	"Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works, and information network sectors" (PEMA, 2013)	At any time	N/A	N/A	Frequent	Marginal	Moderate	Years	N/A	<ul style="list-style-type: none"> <li>• Entire county population</li> </ul>
	Public Health Impacts: Illness, compromised drinking water Social Impacts: Disruption of normal activities, evacuation Economic Impacts: Loss or damage to homes, disruption to businesses and income, cost of repair Environmental Impacts: Air quality, water quality Infrastructure Impacts: Short-term and/or long-term or permanent loss of critical infrastructure									<u>Cascading Effects:</u> Hazmat



Table 4.2.3.A

Hazard	Description	Period of Occurrence	# of Years	# of Events	Probability	Severity	Risk	Warning Time	Total Damages to Date	Vulnerable Populations
4.3.14 War & Criminal Activity	"An intentional use of force or power, against oneself, another person, or against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation" (WHO, n.d.).	At any time throughout the year	N/A	N/A <sup>1</sup>	Remote	Critical	Moderate	None Days Weeks	N/A	<ul style="list-style-type: none"> <li>Everyone surrounding the incident</li> <li>Targeted populations (varies)</li> </ul>
	Public Health Impacts: Social Impacts: Economic Impacts: Environmental Impacts: Infrastructure Impacts:	Death, injury, illness (depending on type of attack), PTSD, exacerbation of chronic illnesses Distrust of groups of people, displacement of population, disruption of normal activities, hysteria Loss or damage to homes and businesses, disruption of business and income, cost of clean-up Water quality (depending on type of attack), air quality (depending on type of attack) Power outages, loss or damage to structures and transportation infrastructure (roads, bridges, rails)								<u>Cascading Effects:</u> Dam failure Hazmat Radiological Fires Infrastructure damage

<sup>1</sup> Research in local media archives yields numerous instances of bomb threats, certain criminal acts, etc. that could qualify as "acts of violence." However, condensing that research into a credible figure for inclusion into this table was not possible. See 4.3.14 for additional information.



Table 4.2.3.A

Hazard	Description	Period of Occurrence	# of Years	# of Events	Probability	Severity	Risk	Warning Time	Total Damages to Date	Vulnerable Populations
4.3.15 Lake Hazards	"Coastal hazards are those natural hazards that occur at the interface between the lake and the shoreline, inclusive of the uplands that impact the lake throughout the coastal watershed" (Great Lakes Coastal Resilience, 2013).	At any time	N/A	N/A	Remote	Critical	Moderate	None to years	N/A	<ul style="list-style-type: none"> <li>• Elderly</li> <li>• Children</li> <li>• Pregnant Women</li> </ul>
	Public Health Impacts: Death, injury, illness, compromised drinking water Social Impacts: Disruption of normal and recreational activities, evacuation Economic Impacts: Cost of clean-up, loss or damage to homes and businesses Environmental Impacts: Water quality, change in natural habitats Infrastructure Impacts: Loss or damage to water infrastructure									<u>Cascading Effects:</u> Water infrastructure damage Flood



Table 4.2.3.A

<i>Hazard</i>	<i>Description</i>	<i>Period of Occurrence</i>	<i># of Years</i>	<i># of Events</i>	<i>Probability</i>	<i>Severity</i>	<i>Risk</i>	<i>Warning Time</i>	<i>Total Damages to Date</i>	<i>Vulnerable Populations</i>
4.3.16 Transportation Infrastructure Decay	“Deteriorating infrastructure, long known to be a public safety issue, has a cascading impact on our nation’s economy, impacting business productivity, gross domestic product, employment, personal income, and international competitiveness” (ASCE, 2016). This profile focuses on the deterioration of the transportation infrastructure (i.e., roadways and bridges).	At any time	N/A	N/A	Frequent	Negligible	Moderate	Years	N/A	<ul style="list-style-type: none"> <li>• Businesses throughout the county and region</li> <li>• People who cannot evacuate</li> </ul>
	Public Health Impacts: Social Impacts: Economic Impacts: Environmental Impacts: Infrastructure Impacts:	Death, injury, illness Disruption of normal activities Disruption to businesses and income, cost of repair Air quality, water quality Short-term and/or long-term or permanent loss of critical infrastructure								<u>Cascading Effects:</u> Hazmat Radiological



## 4.3 PROFILE HAZARDS

§201.6(c)(2)(i) [The risk assessment shall include a] description of the...location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

### Section Overview

Several natural and human-caused hazards affect Erie County, as noted above. This section contains a profile of each hazard considered by this plan, which provides details on how the hazard impacts the area. Within each profile, research and historical data informs the following elements.

- **Hazard Overview:** Defines the hazard.
- **Possible Causes:** Describes a variety of causes that can contribute to the occurrence of a hazard.
- **Public Health & Social Vulnerability:** Describes impacts on different topics such as health, the environment, or infrastructure that may result from the hazard as well as specific populations that may be vulnerable.
- **Historical Occurrences:** Summarizes significant past events related to the hazard.
- **Location & Extent:** Identifies the physical places in the county or region that are vulnerable to the hazard and the severity of a hazard in a given location.
- **Loss Estimate:** Outlines the methods used for losses (of deaths, injury and/or property damage depending on information available) and estimates them based on historical information and vulnerable populations, structures, and infrastructure.
- **Probability & Severity Calculations:** Detailed methods of calculating probability and severity of each hazard.
- **Risk Map:** Graphically shows the geographic locations in the county that are vulnerable to each hazard.

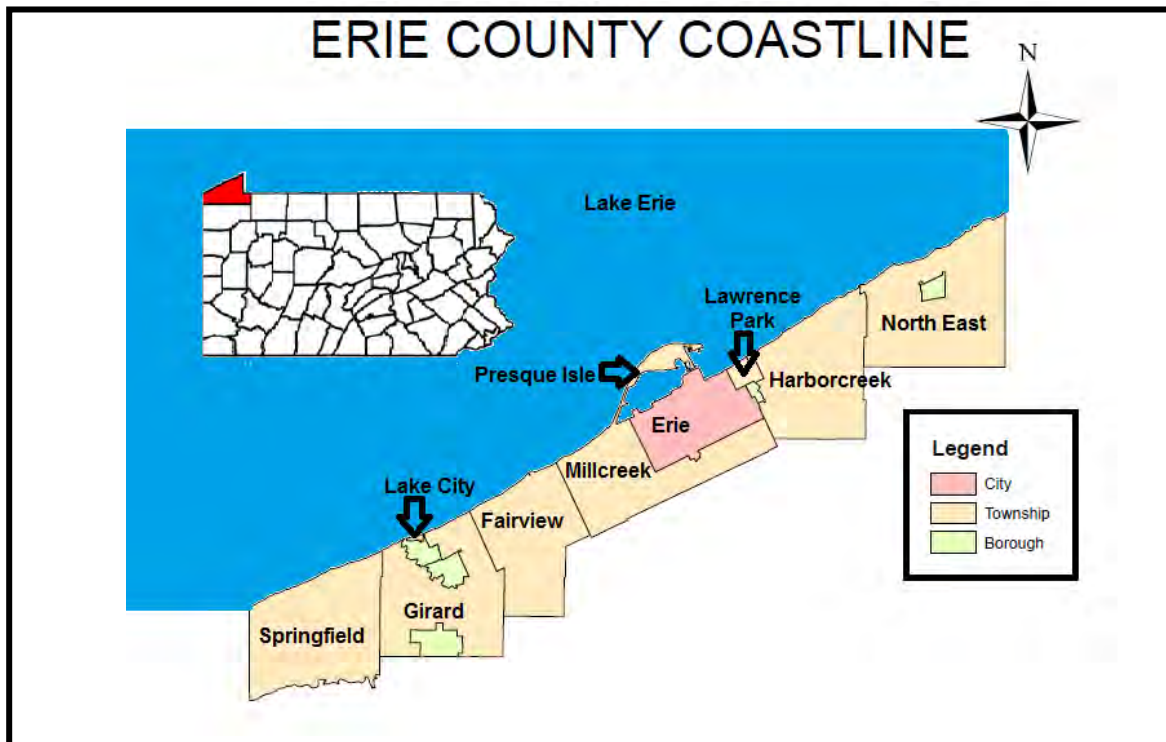
### 4.3.1 Coastal Erosion

“Coastal erosion is a natural coastal process in which sediment outflow exceeds sediment inflow at a particular location” (FEMA, 1997).

<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
Ongoing natural processes	None to Years	MODERATE

#### 4.3.1.1 Location and Extent

Coastal erosion and bluff recession are the most significant Lake Erie coastal hazards (FEMA, 2013). Erie County has 76.2 miles of coast line along Lake Erie. Erosion depends greatly on fluctuating lake levels and the amount of beach material along the shoreline. Lake Erie, with maximum depth of 210 feet, is the shallowest of the Great Lakes. Because the lake is shallow, the effects of storm-driven waves are amplified. They can inundate natural protective beaches and allow water and damaging waves to reach the back beach area where residences are located. It is during these times beach material can be moved offshore.

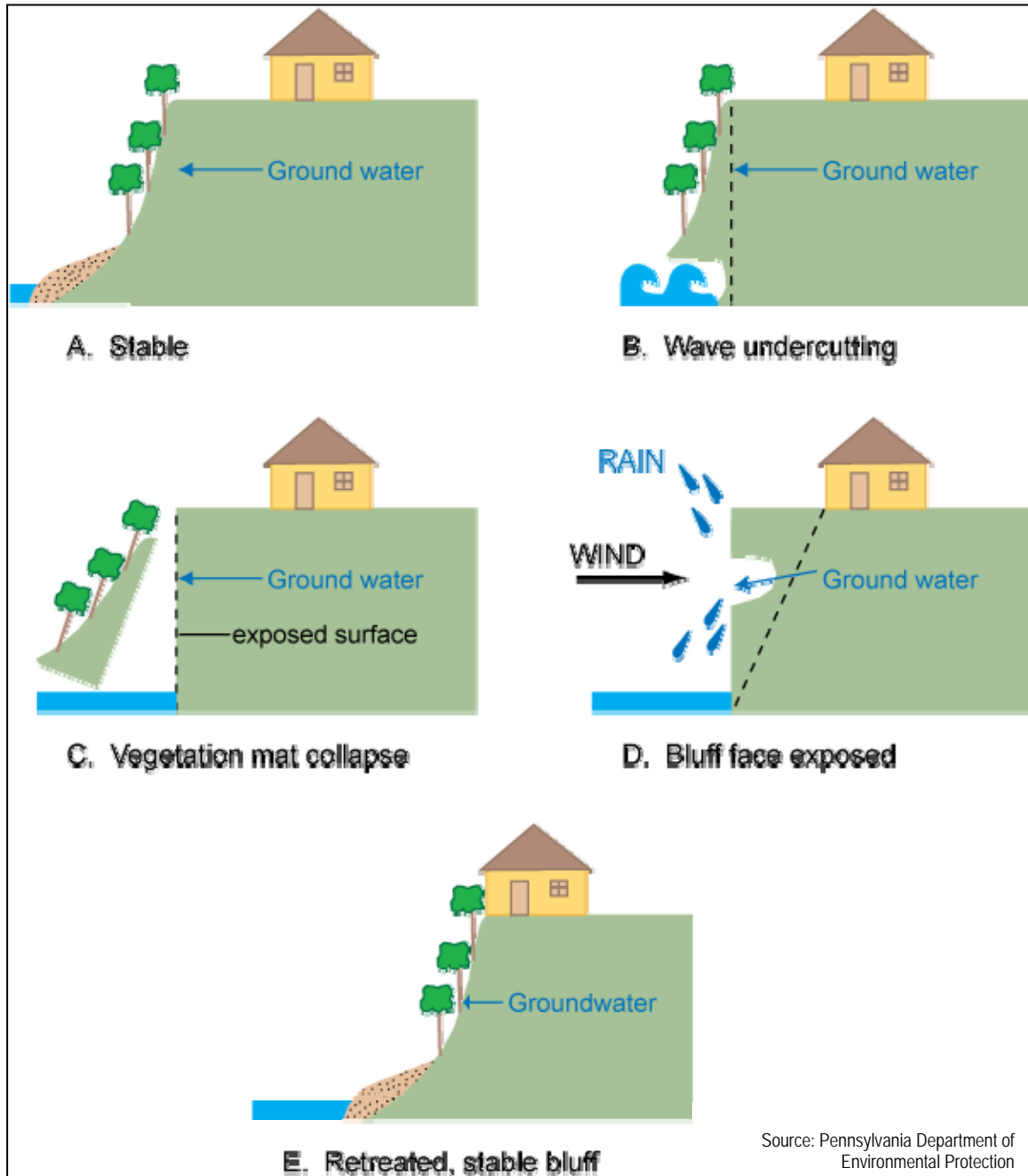


Erie County has coastal cliffs overlooking the lake called bluffs that range in height from a few feet to nearly 200 feet above lake level. Approximately 20% of the bluffs have a shale bedrock exposure while most have only an unconsolidated soil





face. The unconsolidated soil is highly erodible when exposed to direct wave contact, groundwater flows, surface water runoff, wind and rain. The below diagram shows stages of bluff retreat.



Bluff recession is caused by waves, groundwater seepage, surface water runoff, and human activity. One of these forces along may or may not significantly



weaken a bluff, but a combination of these forces will likely start the process of recession in motion.

- **Wave contact** with the bluffs is especially damaging when combined with high lake levels. High lake levels in Lake Erie are primarily caused by increased precipitation in the upper Great Lakes Watershed. During periods of storm events and high lake levels, waves break farther inshore and make contact with the base of the bluff, an erosion process known as undercutting. Once the base area is eroded, upper bluff soils and vegetation lose their support and collapse downward causing the bluff to recede landward.
- **Groundwater seepage** is the flow of underground water through the bluff face. As the water flows out of the bluff, it pulls soil particles with it, causing erosion. This action leads to slumping, which is a type of landslide. Groundwater comes from natural inland water sources and from human-induced water sources such as sprinkler systems, downspouts and leaking swimming pools and septic systems.
- **Surface water runoff** is the result of natural and human induced water flows over the bluff face. Flows are an erosive force, causing sediment to be dislodged and carried to the base of the bluff. Over time, flows across an unprotected bluff produce deep gullies. Surface water includes rain, snow melt and stormwater.
- **Human activity**, such as construction of roads and walking paths, increases the possibility of erosion and bluff instability. Also, dumping trash and yard waste on the bluff accelerates recession by discouraging vegetation growth and putting added weight on the bluff face.

The Pennsylvania Department of Environmental Protection Coastal Zone Management Program (CZM) has defined and identified Bluff Recession Hazard Areas (BRHAs). These BRHAs are “an area or zone where the rate of progressive bluff recession creates a substantial threat to the safety or stability of nearby or future structures or utility facilities.” There are nine municipalities along the Lake Erie coast that have designated BRHAs. CZM uses control point monuments, global position system technology, physical inspections, low-level overflights, aerial photography, and laser mapping to monitor bluff recession rates (Pennsylvania Sea Grant, 2000).



Table 4.3.1.1.A

Municipalities with Designated Bluff Recession Hazard Area		
Erie, City of	Fairview Township	Girard Township
Harborcreek Township	Lake City Borough	Lawrence Park Township
Millcreek Township	North East Township	Springfield Township

Average bluff recession for the coastal municipalities of Erie County range from 0.24 to 1.27 feet of land lost per year. However, averages do not paint a clear picture of the bluff recession hazard. Some areas are stable and have recession rates of zero while other sections in the same community may lose large pieces of land in a single collapse. Recent erosion estimates state over 417,000 cubic yards of sediment are eroded on Erie County’s shoreline each year (PACZM, 2007).

Much of Lake Erie and its beaches and bluffs are frozen during the winter, inhibiting the formation of storm waves and reducing erosion. However, during ice formation in early winter and the spring thaw, erosion and recession are accelerated. Spring rains, snowmelt and low evaporation rates cause Lake Erie’s average water levels in June to be 30 centimeters above January levels. Several years of above-normal precipitation can cause Lake Erie’s water level to rise above its long term average, increasing the likelihood of erosion.

4.3.1.2 Range of Magnitude

Erie County has just over 76 miles of shoreline along Lake Erie. The average rate of bluff recession in Pennsylvania is one foot per year; however, losses of up to 20 feet in a single year have been recorded along the lake (PSU, 2000). It is important to understand that in some areas the shoreline is stable and in others, large areas of land can collapse taking several feet of shoreline at one time.

The geological processes along the shoreline are continuous. Lake levels, land use, storm impact, and the physical structures of the bluffs and shoreline affect rates of change. The sand, gravel, and clay that make up the glacial sediment covering most of the Erie County shoreline are exceptionally vulnerable to erosion ([www.presqueisle.org](http://www.presqueisle.org)). This erosion is sped up by high lake levels and seiche waves.



Table 4.3.1.2.A

SHORELINE COVERAGE (USACE, 2012)							
Total Shoreline (miles)	Bluff (2'-10') (miles)	Coastal Wetland (miles)	Dune (2'-10') (miles)	Flat Coast (miles)	High Bluff (>10') (miles)	High Dune (>10') (miles)	Other (miles)
76.2	3.6	9.3	0.5	26.4	33.3	0.6	2.5

## PUBLIC HEALTH

The likely public health effects from coastal erosion are minimal. However, erosion generally promotes critical losses of water, nutrients, soil organic matter and soil biota, thereby harming natural ecosystems. It increases the amount of dust carried by wind, which not only acts as an abrasive and air pollutant, but also carries about 20 human infectious disease organisms, including anthrax and tuberculosis (Cornell University, 2006).

## SOCIAL VULNERABILITY

Residents and businesses living along the coast are susceptible to loss through coastal erosion and bluff recession. These losses include actual loss of land (acreage) as well as building or infrastructure damage or destruction during a bluff collapse.

Those who rely on the tourism industry are also at risk. Coastal erosion can impact the economies of communities that rely on recreational tourism. There is a potential for tens of billions in lost revenue with millions more spent on monitoring and response.

### 4.3.1.3 Past Occurrence

Shoreline erosion and bluff recession events are often dependent on water levels on Lake Erie. Changes in precipitation (i.e. rain and snow) are a main cause of lake level fluctuation; however, other factors affecting lake levels include evaporation, wind (i.e. seiche events), crustal (i.e. glacial) rebound, dredging, diversions, flood control, and power generation. However, human effects on lake levels are slight. For instance, construction of the Welland Canal, which bypasses Niagara Falls, dropped the level of Lake Erie by approximately four inches. Most fluctuation is due to changes in input from the upper Great Lakes watershed, which



contributes almost 90% of the total input into Lake Erie. Additional water inputs come from sources including tributaries, groundwater, and precipitation.

Various studies, notably those developed by the U.S. Army Corps of Engineers (Buffalo District) and the Pennsylvania Coastal Resources Management Program, have assessed shoreline damage statistics and the costs of protection. Shore structure inventories have also been prepared in recent years, some of which are ongoing. These documents provide useful information for measuring losses and recording efforts made to mitigate damage. However, studies more recent than the 1987 damage assessment are not currently available. The long-term average historical recession rate based on 130 fixed control point monuments for the Pennsylvania Lake Erie Coastal Zone is 1.0 ft/yr.

A study performed by the U.S. Geological Survey in cooperation with the Pennsylvania Coastal Resources Management Program divided the Pennsylvania Lake Erie shoreline into two areas along which recession rates were calculated (Hapke et al., 2009). Using data from 1938-2006, the study area extending southwest of Presque Isle had an average rate of recession of 0.98 +/- 0.33 ft/yr. Using data from 1938-1998, the study area extending northeast of Presque Isle had an average rate of recession of 0.66 +/- 0.33 ft/yr. A maximum rate of 3.28 +/- 0.33 ft/yr. was measured in each study area, both occurring in predominantly agricultural areas. Due to excessive precipitation in the spring of 2011, several lakefront properties experienced significant bluff recession. One of the properties affected by this event receded approximately 100 ft. (ECDPS, 2011). Historical recession data is valuable for long-term planning purposes. However, historical rates are spatially variable and temporally episodic. During the past two decades of monitoring, losses of up to twenty feet in a single year have been observed (Hapke *et al.*, 2009). In addition, low retreat rates have been measured at certain control points, while rates in immediately adjacent areas are much higher. Therefore, the limitations of historical rates must be recognized and data must be used appropriately for purposes of evaluating risk.

### **Presque Isle**

Due to the lack of ice cover during the winter of 2015-2016, significant erosion occurred along the entire length of Presque Isle. It is estimated that 38,000

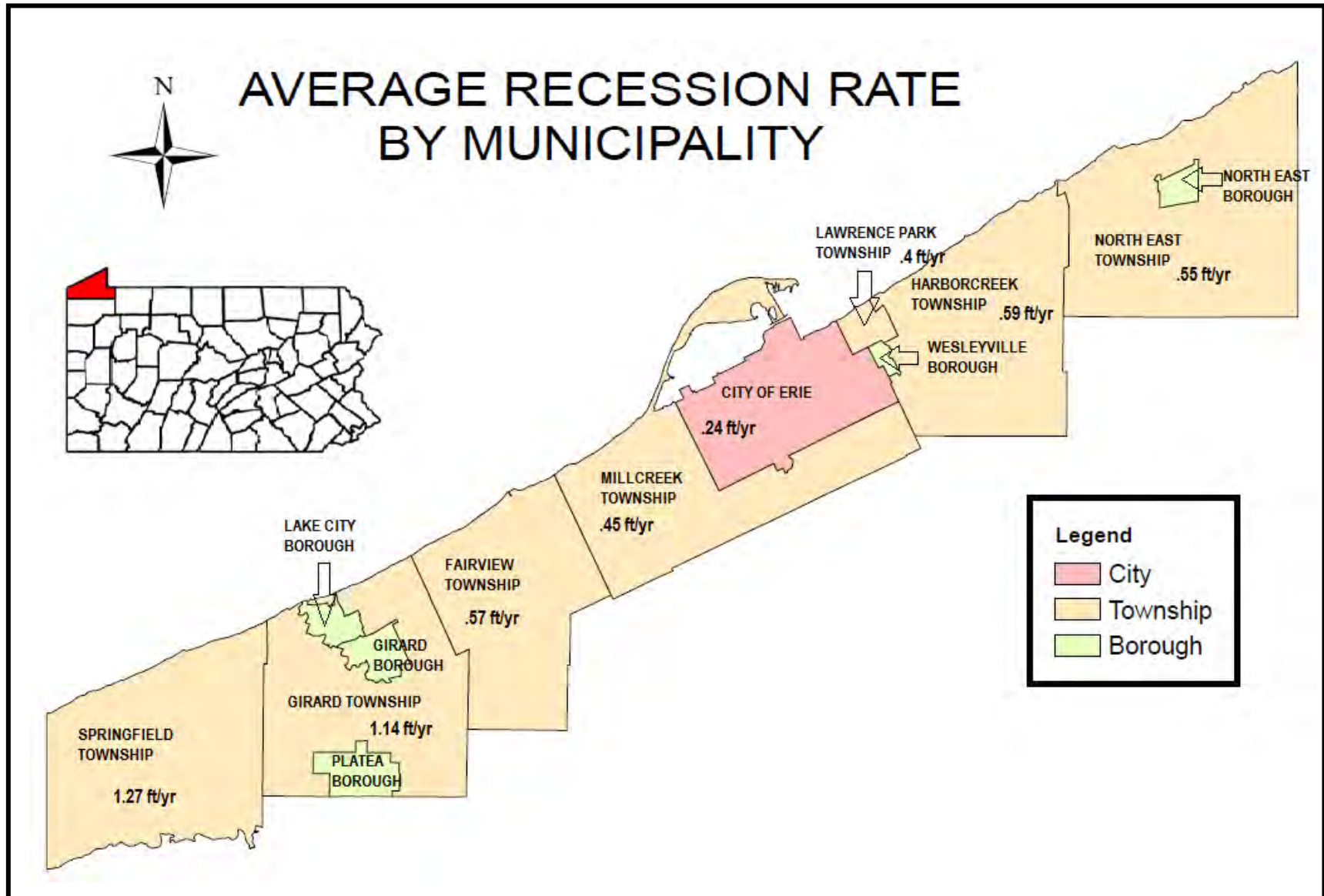


cubic yards of sand is used annually to offset the impact of erosion. Federal funds were cut, leaving only \$500,000 for sand replenishment.

4.3.1.4 Future Occurrence

Bluff erosion and recession are a result of a natural process and are essential to the ecological health of Lake Erie. The eroded materials nourish the near shore environments with nutrients and organic matter. However, human activities have the potential to accelerate the recession to unnatural rates (PADEP, 2013).





4.3.1.5 Vulnerability Assessment

TABLE 4.3.1.5.A COASTAL EROSION VULNERABILITY ASSESSMENT				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
<b>FREQUENT</b>		<b>MARGINAL</b>		<b>MODERATE</b>
Coastal erosion and bluff recession are reoccurring events	+	There is potential for structural damage and injury	=	A combination of frequent occurrence and marginal level of severity puts this hazard at moderate risk to Erie County





### 4.3.2 Drought

"Extended period of unusually low precipitation that produces a temporary shortage of water for people, animals, and plants (Keller & Devecchio, 2015).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
Summer months or periods of low precipitation	Weeks / Months	MODERATE

#### 4.3.2.1 Location and Extent

According to the National Centers for Environmental Information (NCEI), a drought is a complex event that is difficult to either monitor or clearly define. The National Drought Mitigation Center (NDMC), based at the University of Nebraska – Lincoln, defines four types of droughts based on the work of Wilhite and Glantz. **Meteorological Droughts** are typically defined “on the basis of the degree of dryness in comparison to some ‘normal’ or average amount and the duration of the dry period.” A **Hydrological Drought** is associated with the effects of periods of precipitation shortfall on the water supply of a region, both surface and subterranean. The definition of an **Agricultural Drought** links various characteristics of meteorological or hydrological droughts to agricultural impacts by focusing on precipitation shortfalls, soil water deficits, ground water levels, etc. Finally, a **Socioeconomic Drought** associates the supply and demand of some economic goods with elements of the other three drought types. “A socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply” (NDMC, 2016).

The NDMC classifies drought conditions using five categories: D0 – D4. These levels align with the Palmer Drought Severity Index (PDSI). Level D0, described as **Abnormally Dry**, corresponds with the PDSI of -1.0 to -1.9. Possible impacts include “short-term dryness slowing planting, growth of crops or pastures” (NDMC, 2016). **Moderate**

**Drought**, Level D1, corresponds to a PDSI of -2.0 to -2.9. These conditions can

Table 4.3.2.1.A

PALMER DROUGHT SEVERITY SCALE		
	< -4.0	Extreme Drought
	-3.99 to -3.0	Severe Drought
	-2.99 to -2.0	Moderate drought
	-1.99 to -1.0	Mild Drought
	-0.99 to -0.5	Incipient Drought
	-0.49 to 0.49	Near Normal
	0.50 to 0.99	Incipient Moist Spell
	1.0 to 1.99	Moist Spell
	2.0 to 2.99	Unusual Moist Spell
	3.0 to 3.99	Very Moist Spell
	> 4.0	Extreme Moist Spell



cause some damage to crops and pastures and can result in water shortages (NDMC, 2016). The D2 level, known as a **Severe Drought**, is a condition where crop or pasture losses are likely and water shortages will be common (NDMC, 2016). This correlates with a PDSI of -3.0 to -3.9. The D3 level (PDSI of -4.0 to -4.9), or **Extreme Drought**, includes impacts such as major crop and pasture losses as well as widespread water shortages and restrictions (NDMC, 2016). The most severe drought category, D4, **Exceptional Drought**, with a PDSI of -5.0 or more, will cause exceptional and widespread crop/pasture loss and will lead to water emergencies as reservoirs, streams and wells are short of water (NDMC, 2016).

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

- **Drought Watch:** A period to alert government agencies, public water suppliers, water users, and the public regarding the potential for future drought-related problems. The focus is on increased monitoring, awareness, and preparation for response if conditions worsen. A request for voluntary water conservation is made. The objective of voluntary water conservation measures during a drought watch is to reduce water uses by five percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may ask 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 usage by 10 to 15 percent in affected areas. Due to varying conditions, individual water suppliers or municipalities may ask 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, avoid depletion of water sources, assure at least minimum water supplies to protect public health and safety, support essential and high priority water uses, and avoid unnecessary economic dislocations. It is possible during this phase to impose mandatory restrictions on non-essential

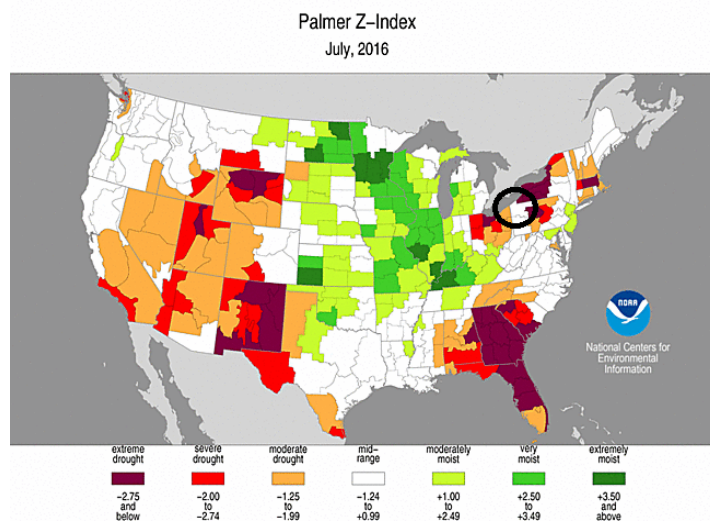


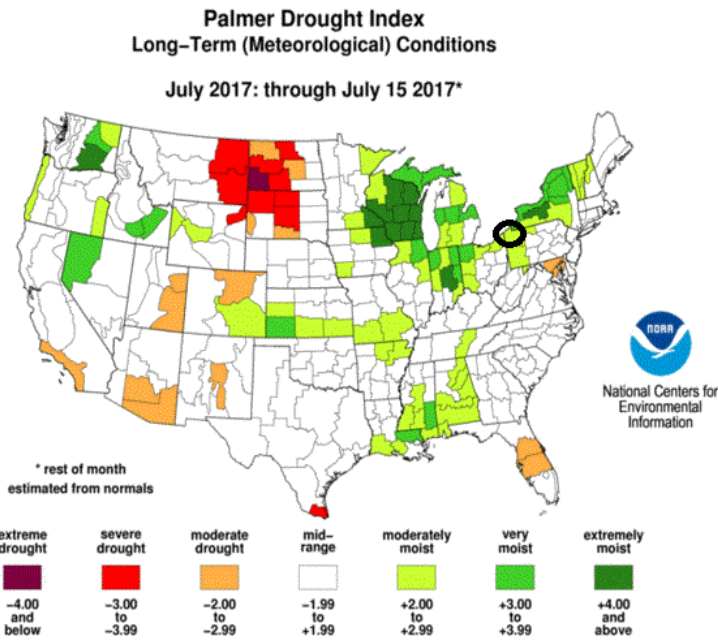
water uses that are provided in the Pennsylvania Code (Chapter 119), if deemed necessary and if ordered by the Governor. The objective of water use restrictions (mandatory or voluntary) and other conservation measures during this phase is to reduce consumptive water use in the affected area by 15 percent, and to reduce total use to the extent necessary to preserve public water system supplies, to avoid or mitigate local or area shortages, and to assure equitable sharing of limited supplies.

- **Local Watering Rationing:** Although not a drought phase, local municipalities may, with the approval of the Pennsylvania Emergency Management Council, implement local water rationing to conserve a rapidly dwindling or severely depleted water supply in designated service areas. These individual water rationing plans, authorized through provisions of the Pennsylvania Code (Chapter 120), 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.

#### 4.3.2.2 Range of Magnitude

Generally, Erie County does not see widespread drought conditions on a regular basis. The map at right, shows the PDSI for the month of July 2016, generally one of the hottest months of every year. While parts of Pennsylvania, as well as neighboring counties in New York and Ohio, are shown to be between moderate drought and extreme drought, Erie County is mid-range. This is not to say that droughts cannot occur in Erie County. Droughts that have occurred generally encompassed multiple counties and/or states. The Palmer Index map for July 2017, shows Erie County to be in the





moderately moist category. The surrounding counties are also in the moderately moist and the very moist categories.

Droughts can, and have, caused significant economic loss across Pennsylvania and the country. According to the U.S. Department of Agriculture’s (USDA) Census of Agriculture, there were 1,422 farms in Erie County, encompassing over 168,000 acres of land. In total, the county produced over \$70 million of agriculture products (based on market prices at the time). A drought that reaches the **Moderate** or **Severe** level can cause significant damage to the agricultural sector of Erie County’s economy.

Northeast Erie County is part of the Lake Erie Wine Country, a 50 mile stretch between Silver Creek, NY and Harborcreek, PA. The availability of water has an effect on vegetative growth, fruit composition and hardiness. Both water abundance and water stress caused by drought can have negative effects on crops. While moderate water stress at the right time helps achieve fruit yield and quality, severe stress can delay ripening, reduce bud fruitfulness and hardiness, and result in vine collapse (Martinson & Lakso, 2016).

Water stress in young plants can compromise the root system and overall vine growth. Mature vines that are showing signs of water stress should be thinned to reduce demand for water and avoid the growth of weeds which compete for water (Centinari, 2016).



## PUBLIC HEALTH

The public health effects of drought include compromised quality and quantity of potable water, increased recreational risks, effects on air quality, diminished living conditions, compromised food and nutrition, and increased incidence of illness and disease. Prolonged drought conditions can cause increased particulates suspended in the air and increase risk of disease transmitted through aerosolization of spores in soil such as coccidioidomycosis.

Decreased rainfall can lead to water polluted with a variety of contaminants. Incidences of vector-borne diseases can become more frequent as the size of water bodies diminish and become stagnant. As visible surface water becomes less, mosquitos are forced to breed in areas with swamp-like ecosystems home to many birds and other animals. The cohabitation of mosquitos and avian hosts can lead to outbreaks of diseases including encephalitis and West Nile Virus (Kalis, Miller, & Wilson, 2009).

## SOCIAL VULNERABILITY

The CDC lists individuals with chronic medical conditions, low income persons, children and the elderly as vulnerable populations in its Drought Communication Toolkit. Chronic medical conditions such as cardiovascular disease, respiratory disease, and mental illnesses including anxiety and depression make individuals more vulnerable to the effects of a drought (CDC, 2017). Increased particulate matter from droughts is associated with systematic inflammation, compromised heart function, pulmonary embolism and blood vessel dysfunction leading to those with cardiovascular and respiratory disease to have complications and increased incidences of hospital admissions (National Institute of Environmental Health Sciences, 2016). The USDA recognizes farmers and those who work in agriculture to be socially vulnerable to droughts. The USDA has multiple programs and grants to assist these individuals with lost revenue from crop loss. (Stubbs, 2016).

Erie County residents that use private domestic wells are more vulnerable to droughts because their wells can dry up. There are over 7,900 of these wells in Erie County. The table below shows the number of domestic wells per municipality as collected by the Pennsylvania Groundwater Information System (PaGWIS)



compared to the total population of each municipality. It is important to note, however, that the well data collected by PaGWIS relies on voluntary submissions of data by well drillers; therefore, it is not a complete database of all domestic wells in the county.

Table 4.3.2.2.A

**NUMBER OF DOMESTIC WELLS PER MUNICIPALITY (PaGWIS, 2010)**

Municipality	Domestic Wells	Total Population	Municipality	Domestic Wells	Total Population
Albion Borough	38	1,468	Le Boeuf Twp.	246	1,698
Amity Twp.	88	1,073	McKean Borough	223	383
Concord Twp.	87	1,344	McKean Twp.	507	4,409
Conneaut Twp.	208	4,290	Mill Village Borough	23	392
Corry City	15	6,420	Millcreek Twp.	726	53,515
Cranesville Borough	13	614	North East Borough	185	4,294
Edinboro Borough	65	6,335	North East Twp.	169	6,315
Elgin Borough	18	214	Platea Borough	58	411
Elk Creek Twp.	255	1,798	Springfield Twp.	94	3,425
Erie City	59	99,475	Summit Twp.	495	6,603
Fairview Twp.	614	10,102	Union City Borough	26	3,217
Franklin Twp.	328	1,633	Union Twp.	142	1,655
Girard Borough	7	3,104	Venango Twp.	243	2,297
Girard Twp.	447	5,102	Washington twp.	658	4,432
Greene Twp.	664	4,706	Waterford Borough	220	1,538
Greenfield Twp.	181	1,933	Waterford Twp.	282	3,920,
Harborcreek Twp.	260	17,234	Wattsburg Borough	31	403
Lake City Borough	9	2,965	Wayne Twp.	261	1,659
Lawrence Park Twp.	2	3,982	Wesleyville Borough	0	3,226

#### 4.3.2.3 Past Occurrence

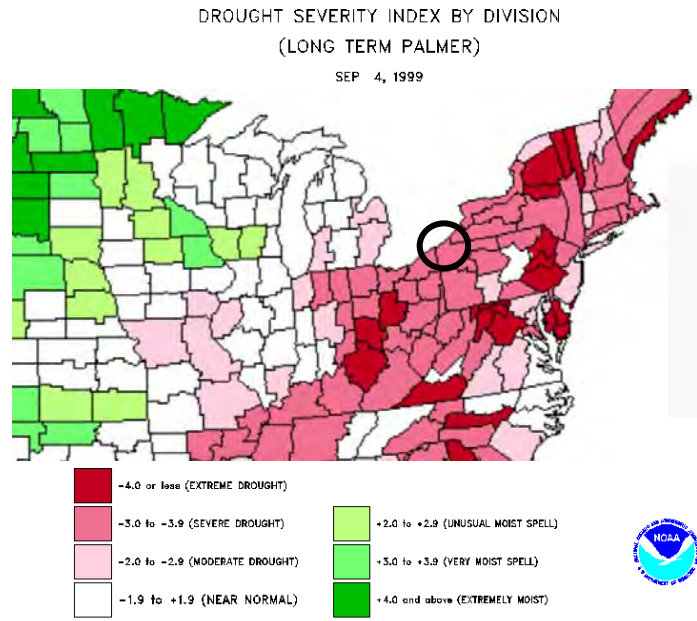
##### **Pennsylvania**

In June 1996, Governor Ridge announced that the U.S. Department of Agriculture had declared all 67 counties in Pennsylvania a primary disaster area based upon agricultural losses from a drought during the 1995 growing season. The declaration made farmers in all counties eligible for low interest loans to cover losses.



**Erie County, PA**

From May to mid-June 1999, Erie County had only three inches of rainfall. Due to the below average rainfall and drought conditions, crop yields were reduced. Dry conditions continued until the end September 1999, when heavy rains fell. This rain did little to help crop conditions or monetary losses from reduced crop yields.



CLIMATE PREDICTION CENTER, NOAA

The history of declared drought status for Erie County from 1980 to 2016 is shown in the table below. The Department of Environmental Protection is the agency responsible for collecting drought information. Data for all counties in the Commonwealth is available for the years 1980 through 2016.

Table 4.3.2.3.A

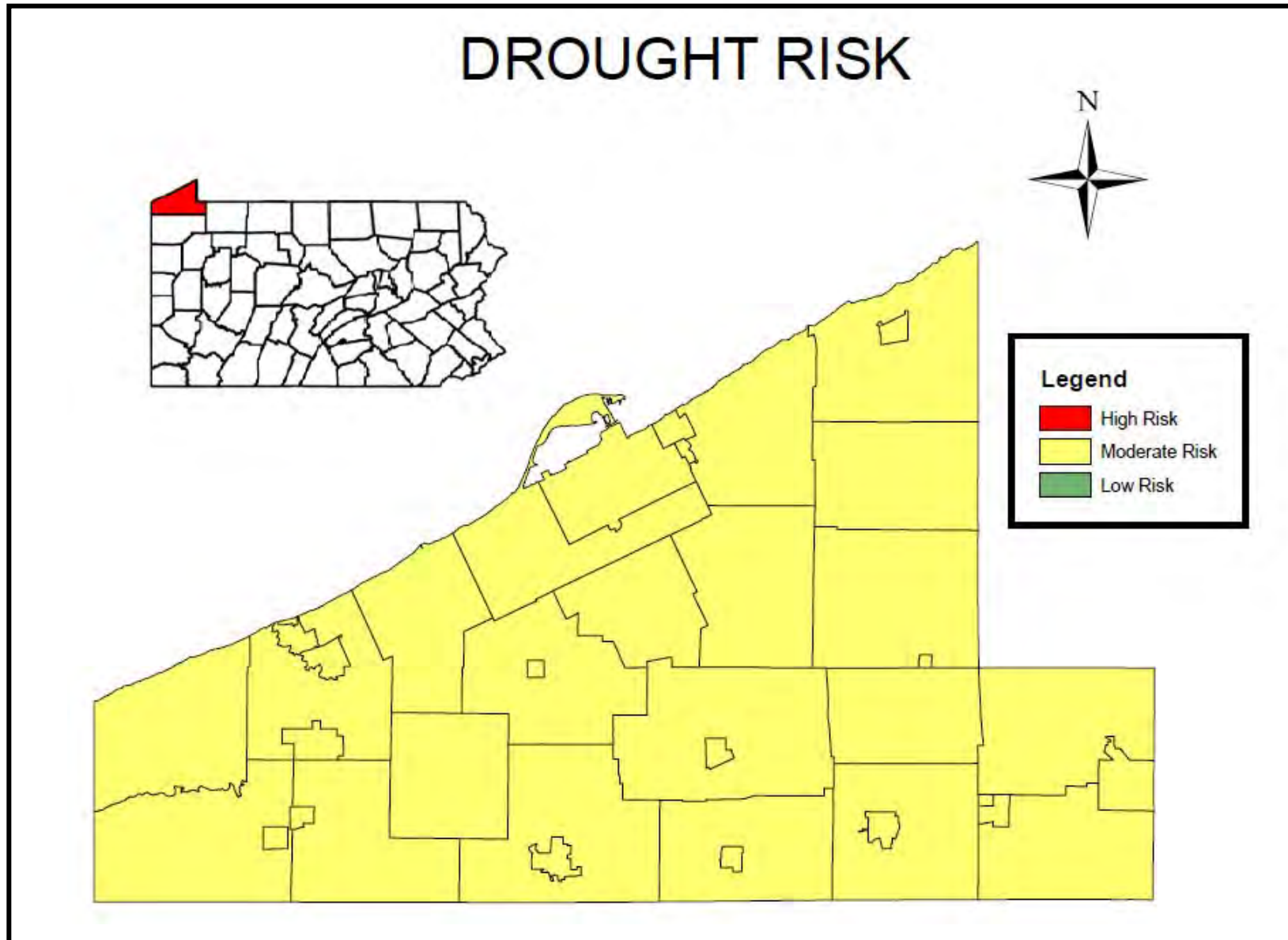
**ERIE COUNTY DECLARED DROUGHT STATUS FROM 1980 TO 2016 (PADEP, 2017)**

Date	Drought Status	Date	Drought Status
July 7, 1988 – August 24, 1988	Watch	March 15, 1999- July 20, 1999	Watch
August 24, 1988 – December 12, 1988	Warning	July 20, 1999 – September 30, 1999	Emergency
June 28, 1991 – July 24, 1991	Watch	September 30, 1999 – February 25, 2000	Warning
July 24, 1991 – August 16, 1991	Warning	February 25, 2000-May 5, 2000	Watch
August 16, 1991 – April 20, 1992	Emergency	August 24, 2001 – May 13, 2002	Watch
April 20, 1992 – June 23, 1992	Warning	September 5, 2002 – June 18, 2003	Watch
June 23, 1992 – September 11, 1992	Watch	April 11, 2006 – June 30, 2006	Watch
September 1, 1995 – December 18, 1995	Watch	August 8, 2007 – January 26, 2009	Watch
December 3, 1998 – January 15, 1999	Warning	September 16, 2010 – December 17, 2010	Watch
January 15, 1999 – March 15, 1999	Emergency	August 5, 2011 – September 2, 2011	Watch
July 19, 2012 – August 31, 2012	Watch		

4.3.2.4 Future Occurrence

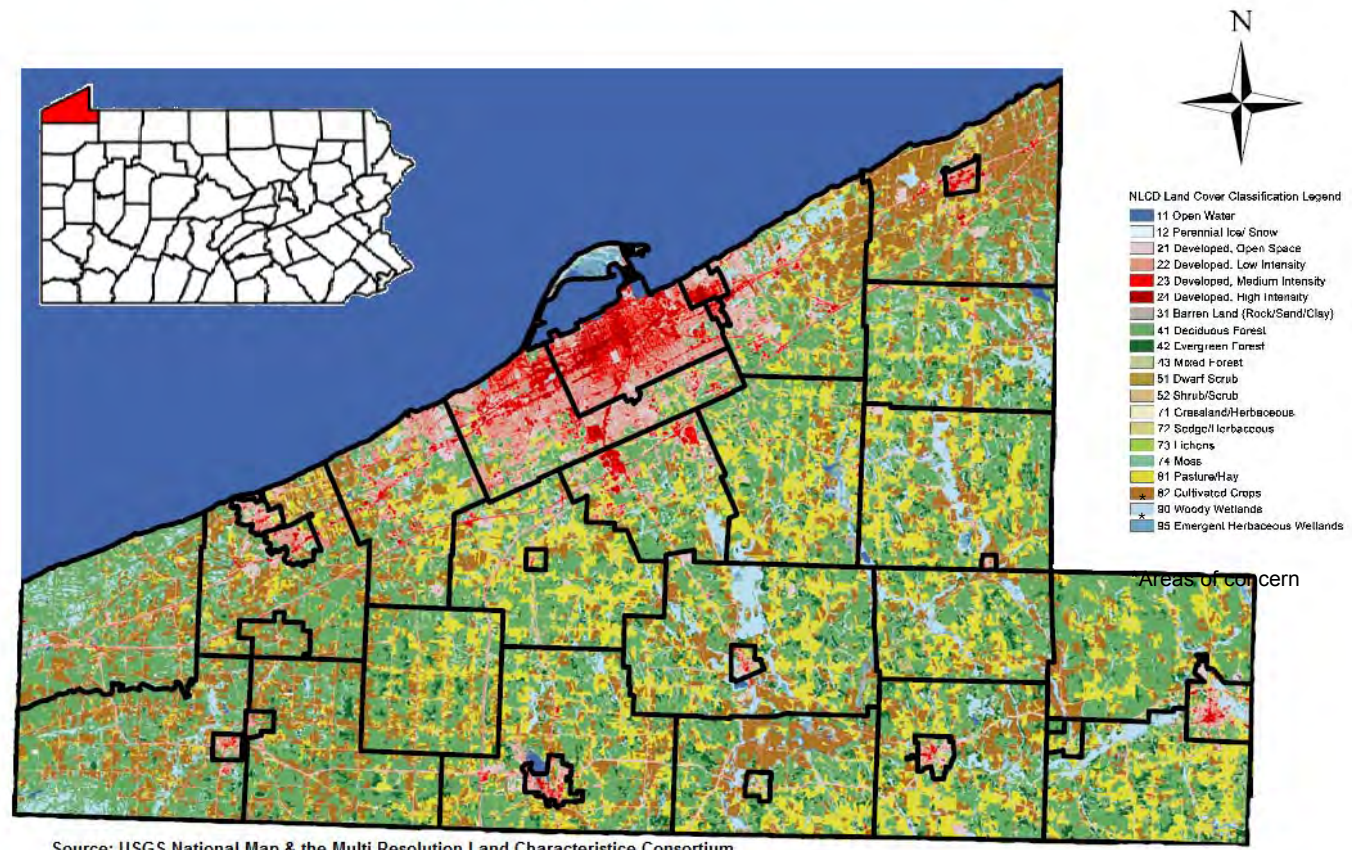
The risk maps below graphically depict areas potentially susceptible to drought conditions. The first map notes the moderate countywide risk. On the second map, those areas in yellow and brown would likely be more impacted by drought conditions.







# ERIE COUNTY LAND COVER MAP



Source: USGS National Map & the Multi-Resolution Land Characteristic Consortium



4.3.2.5 Vulnerability Assessment

TABLE 4.3.2.5.A DROUGHT VULNERABILITY ASSESSMENT					
<i>Probability</i>			<i>Severity</i>		<i>Risk</i>
REMOTE			MARGINAL		MODERATE
Events	21	+	A drought event could impact the agriculture industry of Erie County including the loss of crops and potentially tourism at the vineyards	=	A combination of remote occurrence and marginal level of severity puts this hazard at a moderate risk to Erie County
Years	36				
Since 1980 there have been 21 events that would cause for the conservation of water					



### 4.3.3 Earthquake

"Sudden, rapid shaking of the earth's crust cause by the breaking and shifting of tectonic plates beneath the earth's surface" (Haddow, Bullock, & Coppola, 2014, pg.34).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
At any time throughout the year	None	MODERATE

#### 4.3.3.1 Location and Extent

Earthquakes, both natural and man-made, generally manifest as ground displacement or shaking. The Richter scale and the Modified Mercalli intensity scale measure earthquakes. The Richter scale measures the magnitude, or strength, of an earthquake. While the scale runs from 0-10, measurable events will register as a 2.0. Generally, earthquakes will not be felt until they reach a Richter scale measure in the high 2.0s. Earthquakes with a magnitude above 3.0 can cause some damage, while those over 5.0 can cause serious damage. The effects of an earthquake can be felt far beyond the immediate area of the event, depending on the magnitude and local geology.

The U.S. Geological Survey (USGS) estimates that there are 1.3 million earthquakes annually that have a magnitude between

Modified Mercalli Scale		Richter Magnitude Scale
I	Detected only by sensitive instruments	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibration like passing truck	2.5
IV	Felt indoors by many, outdoors by few, at night some may awaken; dishes, windows, doors disturbed; autos rock noticeably	3
V	Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects	3.5
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small	4
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of autos	4.5
VIII	Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of autos disturbed	5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken	5.5
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides	6
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent	6.5
XII	Damage total; waves seen on ground surface, lines of sight and level distorted, objects thrown up in air	7



2.0 and 2.9 while there is, on average, one earthquake of a magnitude 8.0 or higher annually (2015). Thus, the frequency and severity have an inverse relationship. The strongest earthquakes are likely to happen the least.

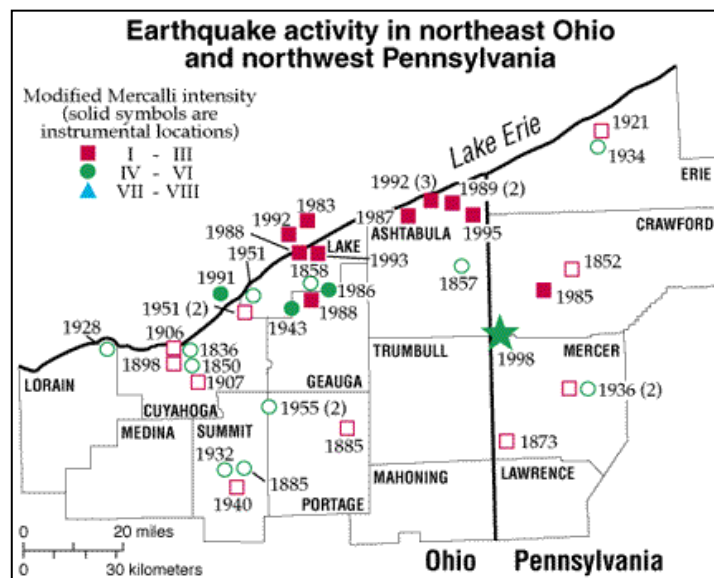
The Modified Mercalli scale is a measure of earthquake intensity at the surface level by observing its effect on people and the environment. As such, the scale is not considered particularly scientific as the experiences and recollection of witnesses may vary and not reflect an earthquake's strength. It should also be noted that the Modified Mercalli scale is only useful for measuring earthquakes in inhabited areas. This scale uses roman numerals to denote detection and damage levels associated with an earthquake. This scale allows for different measurements to be recorded depending on the distance from the epicenter unlike the Richter scale that affixes a single measurement to the event that is recorded at the epicenter.

4.3.3.2 Range of Magnitude

Generally, Pennsylvania is not considered an active state for earthquakes though it has been subject to earthquakes with both an epicenter in its boundaries and those located outside its borders. However, Pennsylvania does experience a low level of earthquake activity compared to active states including California and Alaska.

There are also cascading effects of earthquakes including landslides, seiche waves, fires, power outages, loss of sewer services, and source water contamination (EDEN, 2015). Due to parts of the county being in the 50-mile ingestion zone, an earthquake affecting Perry Nuclear Power Plant could cause a radiological release reaching Erie County as an airborne inhalation hazard and contaminated water.

Seismic risk in the eastern United States is difficult to evaluate due to earthquakes being infrequent in comparison to plate-margin areas such as



California. The origins of earthquakes in the northeast are poorly understood. Most earthquakes in the region are assumed to be associated with weakness zones in the Earth's crust formed about a billion years ago. Faults, which are deeply buried and mostly unknown, cause earthquakes through periodic release of strain that is constantly building up in the continental plate (ODNR).

According to the *Earthquake Hazard in Pennsylvania* report (PADCNR, 2007), if an earthquake occurred on the western extension of the St. Lawrence Seismic Zone having a 6.0 or greater magnitude, moderate damage might be expected in one or more of the "northern tier" counties in Pennsylvania.

## PUBLIC HEALTH

Fatalities from an earthquake can be broken into three categories: instantaneous, rapid, and delayed. Instantaneous fatalities are usually due to head and chest injuries or internal and external bleeding. Rapid deaths occur within hours and include hypovolemic shock, asphyxia, chest compression or environmental exposure such as hypothermia. Delayed fatalities occur within a few days due to wound infections, dehydration, sepsis, environmental exposure or crush syndrome (Naghii, 2005). A large number of hospitalized patients after an earthquake require non-surgical acute care. These individuals experience myocardial infarctions, exacerbation of chronic illness (i.e., diabetes, hypertension, anxiety, etc.), and respiratory injuries from exposure to building debris including asbestos. Dust from building damage or collapse causes eye injuries and respiratory-tract irritation (Naghii, 2005).

Another concern is damage to chemical storage tanks that may begin to leak. Damaged infrastructure such as drinking water and sewer pipes can lead to the spread of disease and death. Delivery of electricity and natural gas can be disrupted causing individuals to succumb to environmental exposure. Damage to nuclear power plants can lead to widespread contamination of radioactive materials (Naghii, 2005).

## SOCIAL VULNERABILITY

The elderly, children, chronically ill and disabled individuals seem to be at an elevated risk for injury or death following an earthquake. Mobility impairment, inability to compensate for trauma, and underlying disease contribute to the vulnerability of



these groups. (Naghii, 2005). Low income populations are also at an elevated risk. They often live in the most vulnerable housing such as older homes and low or moderate income apartments that are not subject to disaster resistant building practices. They may also lack the resources to undertake mitigation or evacuation measures. Those living in rental units are dependent on landlords for structural loss prevention (Insurance Institute for Business & Home Safety, 2017).

## FRACKING EFFECTS

The growth of the practice of hydraulic fracturing, more commonly known as fracking, in the oil industry has led to the occurrences of earthquakes in Ohio according to a study by a Miami University of Ohio graduate student. Skoumal, Brudzinski and Currie found that a well in Mahoning County, in eastern Ohio, was located near an unknown fault line and the fracking activity triggered “scores of small earthquakes in March 2014, including on large enough to be felt in nearby towns” (2015). A similar event occurred near Youngstown in 2011, but was related to wastewater injection rather than hydraulic fracturing (Skoumal, Brudzinski, & Currie, 2015).

According to the USGS, wastewater disposal, rather than fracking, is the cause of the recent increase in earthquakes in central United States (2016). Additionally, the USGS states that “wastewater is produced at all oil wells, not just fracturing sites,” so these incidents can occur anywhere that the injection of wastewater is occurring (2016). While there have been no proven incidents of either fracking or wastewater injection causing earthquakes in Erie County, the county is home to over 3,200 active oil and gas wells on file according to the Pennsylvania Department of Natural Resources and Conservation.

The county is also home to an aging gas distribution line system. Earthquakes cause ground displacement that can damage this system directly. It consists of buried piping and limited above-ground facilities for monitoring and controlling gas flow. To withstand the effects of ground displacement, the buried pipelines must be flexible to move with the ground or strong enough to force the earth around the pipe. Older pipelines are much more susceptible to damage due to weakness from corrosion, outdated construction methods, and less sturdy construction.



4.3.3.3 Past Occurrence

**Jamestown, PA**

The largest magnitude earthquake in Pennsylvania occurred on September 25, 1998. Tremors were reported in Erie County from this 5.2 magnitude earthquake. This occurrence caused significant effects to the local ground water system.

**Erie County**

On December 31, 2011, around 3:00 p.m. the USGS reported a 4.0 magnitude earthquake with an epicenter near Youngstown, Ohio. Residents in Erie County reported feeling the earthquake; some reported minor damage in residences such as broken lamps. There was no structural damage reported in the county.

The table below lists earthquakes which have occurred both within and outside Erie County that have been recorded as having an effect in the county.

Table 4.3.3.3.A

EARTHQUAKES REPORTEDLY FELT IN ERIE COUNTY	
Date	Occurrence
January 23, 1812 – January 27 1812	3 earthquakes, New Madrid, MO
October 23, 1857	Buffalo, NY
July 6, 1873	Canada
August 10, 1884	New York, NY
August 12, 1929	Attica, NY
October 29, 1934	Erie
December 20, 1934	Lake Ossipee, NH
November 1, 1935	Ontario, Canada
March 8, 1943	Buffalo, NY
January 1, 1966	Western NY State
October 7, 1983	Blue Mt. Lake, NY
January 1, 1986	Lake Erie, near Perry, Ohio
January 31, 1986	Southern Lake County
December 17, 1990	Between Erie and Ashtabula, OH
March 15, 1992	Fairport Harbor, OH
February 23, 1995	Ashtabula, OH
September 25, 1998	Mercer County
January 25, 2001	Ashtabula, OH
June 3, 2001	Ashtabula, OH
June 30, 2003	Perry, OH
July 16, 2003	Ashtabula, OH
June 20, 2006	Lake County, OH
January 3, 2007	Meadville, PA
March 12, 2007	Aurora, OH
September 28, 2007	Conneaut, OH
December 10, 2010	Conneaut, PA

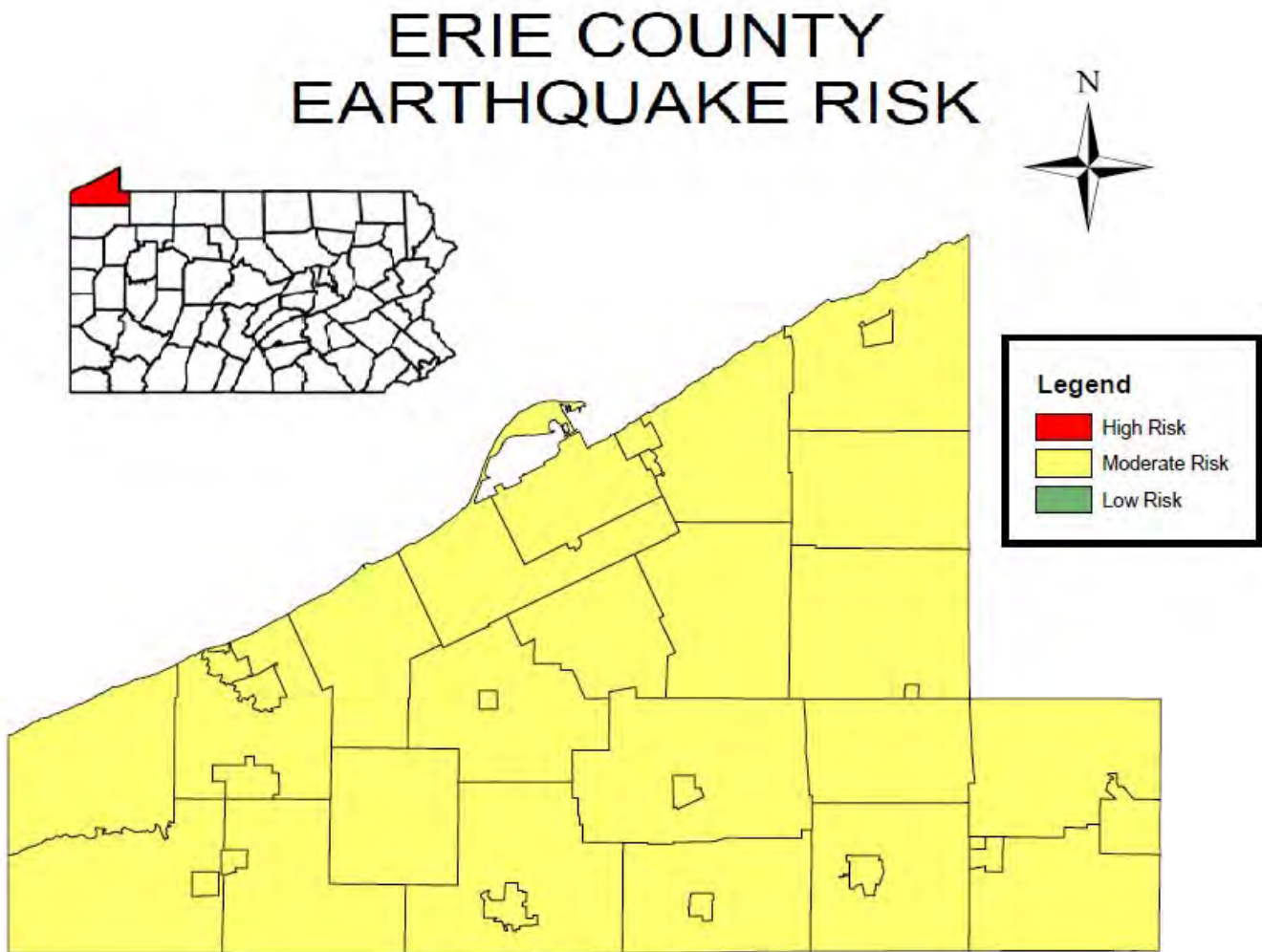


Table 4.3.3.3.A

EARTHQUAKES REPORTEDLY FELT IN ERIE COUNTY	
Date	Occurrence
February 9, 2014	Greenville, PA
April 18, 2016	Titusville, PA

4.3.3.4 Future Occurrence

The risk map below graphically depicts areas potentially susceptible to earthquakes.





4.3.3.5 Vulnerability Assessment

TABLE 4.3.3.5.A EARTHQUAKE VULNERABILITY ASSESSMENT					
<i>Probability</i>			<i>Severity</i>		<i>Risk</i>
IMPROBABLE			CATSTROPHIC		MODERATE
Events	28	+	According to HAZUS data structure losses total over \$2 billion.	=	A combination of improbable occurrence and catastrophic level of severity puts this hazard at moderate risk to Erie County.
Years	205				
Due to the lack of historical events in Erie County the probability of an earthquake is low.					



#### 4.3.4 Flood, Flash Flood, and Ice Jam

Flooding is “an overabundance of water that engulfs land and other property that is normally dry” (Haddow, Bullock, & Coppola, 2014, p.32).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
At any time throughout the year	Hours / Days	MODERATE

##### 4.3.4.1 Location and Extent

Flooding is the most universally experienced natural hazard and has killed more than 10,000 people since 1900 (Keller & Devecchio, 2015). Flooding is a natural process that will continue to impact counties as long as people live and work within flood prone areas (Keller & Devecchio, 2015). Flooding can be caused by a number of factors, many of which occur concurrently during an event. Generally, floods will result from large-scale weather systems that generate prolonged rainfall or onshore winds, but may also result from locally-intense rainfall, dam failure, or snow melt (Haddow, Bullock, & Coppola, 2014). The National Centers for Environmental Information (NCEI) places floods into two categories: floods and flash floods. The primary difference between the two is the speed with which the event develops. Generalized flooding will develop over time. Flash floods usually result from intense storms dropping large amounts of rain in a brief time period, can occur with little in the way of warning, and can reach full peak in a matter of minutes (Haddow, Bullock & Coppola, 2014).

The NOAA lists the following possible causes for flooding.

- **Excessive Rainfall:** This is the most common cause of flooding. Water accumulates quicker than the soil can absorb and stormwater systems can manage, resulting in flooding.
- **Snowmelt:** It occurs when the major source of water involved is caused by melting snow. Unlike rainfall that can reach the soil almost immediately, the snowpack can store water for an extended amount of time until temperatures rise above freezing and the snow melts.
- **Ice or Debris Jams:** These are common during the winter and spring along rivers, streams and creeks. As ice or debris moves downstream, it may get caught on any sort of obstruction to the water flow. When this occurs, water can be held back, causing upstream flooding. When the jam finally breaks, flash flooding can occur downstream.



- **Dam Breaks or Levee Failures:** Dams can overtop, have excessive seepage or have structural failure. For more information on see Section 4.3.9 Dam Failure.

Several types of flooding can occur. Table 4.3.4.1.A, from the National Severe Storms Laboratory (NSSL) presents them as succinctly as possible.

Table 4.3.4.1.A

TYPES OF FLOODING		
Type	Definition	Associated Risks
Riverine Flood	Occurs when water levels rise over the top of river banks due to excessive rain from tropical systems making landfall, persistent thunderstorms over the same area for extended periods of time, combined rainfall and snowmelt, or an ice jam.	Inundation of and damage to properties in floodplains, washouts and erosion, vehicles and other items swept away in floodwater currents, waterborne and vector-borne diseases.
Coastal Flood	Inundation of land areas along the coast, caused by higher than average high tide and worsened by heavy rainfall and onshore winds.	Inundation of and damage to properties along coasts and in coastal areas, coastal erosion, damage to flora and fauna in the area.
Storm Surge	An abnormal rise in water level in coastal areas, over and above the regular astronomical tide, caused by forces generated from a severe storm's wind, waves, and low atmospheric pressure.	Inundation of and damage to properties along coasts and in coastal areas, coastal erosion, damage to flora and fauna in the area, assets swept away during quick recession of surge waters.
Inland Flooding (also known as Urban Flooding, Nuisance Flooding, or Stormwater Flooding)	Occurs when moderate precipitation accumulates over several days, intense precipitation falls over a short period, or a river overflows because of an ice or debris jam or dam or levee failure.	Inundation of and damage to properties in floodplains, washouts and erosion, vehicles and other items swept away in floodwater currents, waterborne and vector-borne diseases, ponding and pooling of excess stormwater.
Flash Flood	Caused by heavy or excessive rainfall in a short period of time, generally less than six hours.	Inundation of and damage to properties in the path of floodwaters, excess waters may seek to fill floodplain areas, washouts and erosion, vehicles and other items swept away in floodwater currents.

Source: <http://www.nssl.noaa.gov/education/svrwx101/floods/types/>

Flooding resulting from stormwater runoff is particularly problematic. Waters can rise and fall quickly, resulting in structural damage. These floods can also interruption business activities and transportation. Rapid rising and falling often causes washouts, expedites erosion, and may sweep a variety of items away. Further, predicting where these instances will occur is very difficult. Areas often fall outside of risk areas noted on flood maps and, as such, can be difficult for which to obtain mitigation funding. The Erie County Department of Planning maintains the



county’s Act 167 stormwater management plan, which attempts to address these issues (in part). See the MS4 discussion below for additional information.

**4.3.4.2 Range of Magnitude**

Severe flooding can occur along streams, creeks, rivers, and lakes throughout and around Erie County. Additionally flooding can occur due to inadequate storm drain capacity and/or ground saturation. Erie County has multiple creeks, streams, and lakes and is bordered on the north by Lake Erie. Flooding in Erie County can lead to property damage, road closures and public health concerns.

Erie County and its municipalities have 44 repetitive loss properties, 36 residential and eight non-residential. According to the Pennsylvania Repetitive Loss and Severe Repetitive Loss Inventory, Erie County had nine residential and one nonresidential property mitigated.

Table 4.3.4.2.A

**TOTAL & MITIGATED REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES IN ERIE COUNTY (PA RL & SRL Inventory, 2013)**

	Single Family		2-4 Family		ASSMD Condo		Other Resid		Non Resid		Total	
	Total	Mit	Total	Mit	Total	Mit	Total	Mit	Total	Mit	Total	Mit
Repetitive Loss	33	8	1	1	2	0	0	0	8	1	44	10
Severe Repetitive Loss	1	0	0	0	0	0	0	0	0	0	1	0

Floods can have warning time of up to a couple of days if precipitation amounts have been high over a period of days or weeks; flash floods have less warning time. The amount of time that clean-up takes varies from home to home and town to town. The effects of a flood can be felt long after waters have receded.

One of the challenges to flood mitigation is not creating a new flooding issue for other jurisdictions. Government entities need to take care in drafting and administering floodplain regulations and in issuing permits and accepting dedications of stormwater systems which may increase flooding elsewhere (Kusler, 2009). One way Erie County combatted this challenge was by completing an Act 167 county-wide stormwater management plan with all 38 municipalities. The plan identified



significant problem areas, the effects of future land use, the economic impact of stormwater management, and river corridor protection.

Erie County is in two major river basins, the Lake Erie Basin and the Ohio River Basin, as pictured in the map below. The county also contains at least part of eight Act 167 Watersheds. To be compliant with Act 167, the county must adopt a watershed stormwater management plan for each watershed in the county. Those plans must contain such provisions as are reasonably necessary to not adversely affect health, safety, and properties in other municipalities within the watershed and in basins to which the watershed is a tributary.

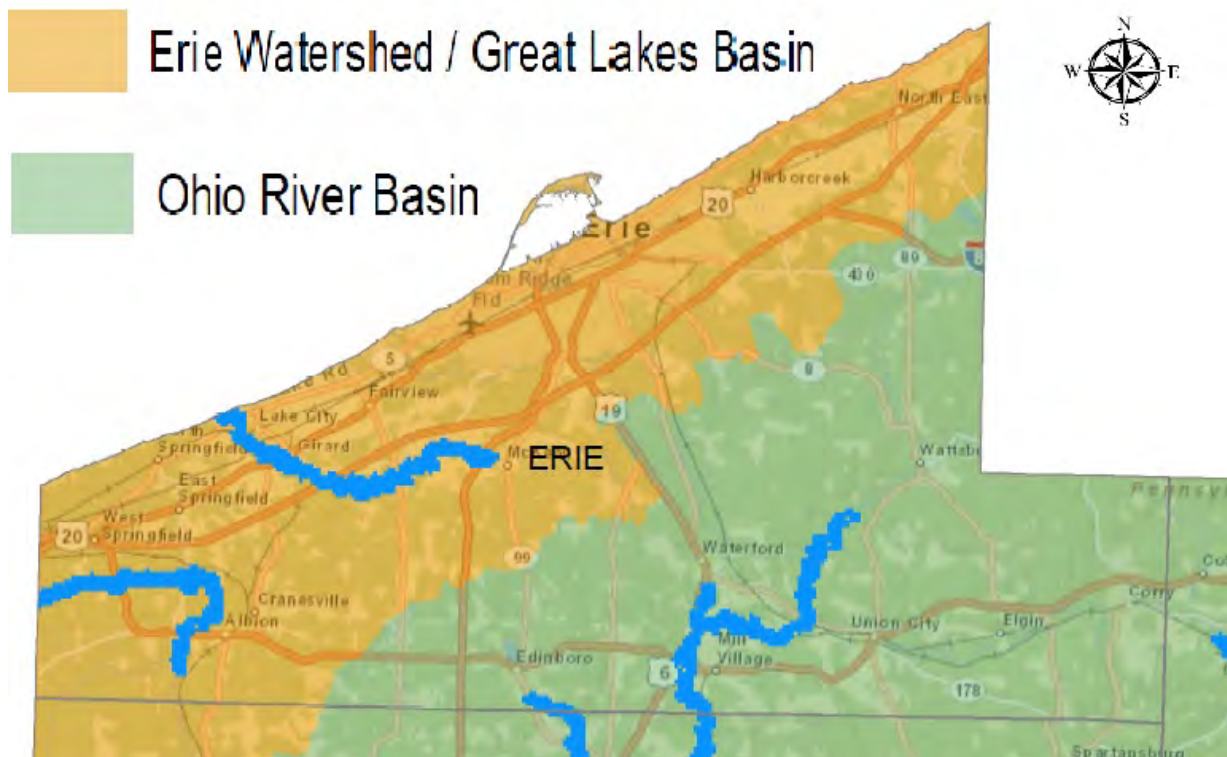
Table 4.3.4.2.B

RIVER BASINS AND WATERSHEDS	
River Basin	Act 167 Watershed
Lake Erie Basin	Ashtabula River
	Conneaut Creek
	Lake Erie / Elk Creek
Ohio River Basin	Brokenstraw Creek
	Cussewago Creek
	French Creek
	Muddy Creek
	Oil Creek

As part of the update process, the public was involved through a survey using Survey Monkey ([www.surveymonkey.com](http://www.surveymonkey.com)). Of the 270 survey respondents that have homeowners or renters insurance, 157 (58.15%) do not have flood insurance and 61 (22.59%) were unsure if their policy included flooding. Numerous (277) respondents answered a question about living in a special flood hazard area (SFHA). Six (6) (2.17%) respondents answered that they have floodplain insurance, 122 (44.04%) do not have floodplain insurance and 132 (47.65) were unsure if they live in a SFHA.



The federal Clean Water Act (CWA) prohibits the discharge of pollutants into waterways without the appropriate permits. Pennsylvania's Stormwater Management Act (Act 167), the Municipal Separate Storm Sewer (MS4) Program, and the National Pollutant Discharge Elimination System (NPDES) Permit associated with construction activities are methods of meeting the runoff-related requirements of the Clean Water Act. Implementation of stormwater management occurs at the community level due to municipalities' responsibilities for adopting zoning ordinances, land development regulations, and other programs to regulate runoff.



MS4 is administered by the Pennsylvania Department of Environmental Protection. Under the MS4 program, permittees are required to incorporate the following minimum control measures into their stormwater management programs.

- Public education and outreach
- Public involvement and participation
- Illicit discharge detection and elimination
- Construction site runoff control
- Post-construction stormwater management in new development and redevelopment

- Pollution prevention and good housekeeping for municipal operations and maintenance

There are currently 11 municipalities and one university with MS4 permits in Erie County. Each community participating in MS4 permitting is assigned an identification number. The participating communities are listed in Table 4.3.4.2.C.

Table 4.3.4.2.C

MS4 COMMUNITIES	
Municipality	NPDES
Erie City	PAG138321
Fairview Township	PAG138332
Girard Borough	PAG138316
Girard Township	PAG138315
Harborcreek Township	PAI138305
Lake City Borough	PAG138313
Lawrence Park Township	PAG138322
McKean Township	PAG138307*
Millcreek Township	PAI138301
Summit Township	PAG138330
Wesleyville Borough	PAG138311
Penn State University Behrend	PAG138319

Thirty-seven of 38 Erie County municipalities participated in an assessment process through a questionnaire that identified significant problem areas as part of Phase II of the *Erie County Act 167 Stormwater Management Plan (2010)*. Table 4.3.4.2.D lists reported stormwater problems areas as noted in that assessment.

Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EO024	Amity Township	Lowe Road	Beaver dams. This is a previous gravel roads project where culvert was installed. Beavers have blocked the channel.
EP116	Conneaut Township	Township wide	No site visit required.
EO017	Corry City	Airport Road Extended	During the field visit, it appeared that the problem was fixed. The culvert appears adequate.
EO018	Corry City	W. Church St	The conveyance system is fully clogged in the Spring St-Euclid St area. Upstream gravel road probably contributes to sediment in pipe network.



Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EO019	Corry City	Highway bridge at ST RT 6	The bridge appears to be in poor condition.
EO020	Corry City	Railroad bridge	Northern drainage area of Hare Creek confluences here. The railroad bridge appears to have adequate capacity but there is noticeable stream bank erosion upstream and downstream of the bridge.
EO021	Corry City	Railroad culvert	A culvert with no hydraulic capacity. Ponding occurs at the culvert inlet. There has been no maintenance for 30 years. Approval for mitigation has been difficult to obtain from the railroad owners.
EO022	Corry City	Corry Middle School	Stream is eroding and depositing in different locations. Culvert appears to have adequate capacity although this depends on maintenance. The upstream source of sediment needs to be determined.
EO023	Corry City	E. Washington St	Problem area unable to be located during field visit.
EP045	Corry City	E. Columbus & Scotia St	Conveyance system appear to have inadequate hydraulic capacity.
EP046	Corry City	W. Main St	Railroad culvert appears to have inadequate hydraulic capacity.
EP047	Corry City	E. Columbus	Channel is eroding and depositing debris onto ST RT 0006. The downstream channel has been cleaned out and widened but the site continues to need regular maintenance.
EP048	Corry City	E. Washington St	The conveyance network along this relatively long, mildly sloped roadway appears to be inadequate.
EP049	Corry City	White St	The conveyance network along this relatively long, mildly sloped roadway appears to be inadequate.
EP050	Corry City	Liberty St	The conveyance network appears to be inadequate.
EP051	Corry City	W. Pleasant St	The conveyance network appears to be inadequate.
EP007	Cranesville Borough	Temple Creek @ John Williams Ave	Culvert appears to have inadequate hydraulic capacity.
EP008	Cranesville Borough	Crosby Circle & John Williams Ave	Inadequate roadside channels overtop and flood along Crosby Cr.
EO028	Edinboro Borough	Water St & Green Oaks	Conveyance system appears to have inadequate hydraulic capacity. The entire surrounding area floods and is likely located in a regulatory floodplain.
EP058	Edinboro Borough	W. Plum & Willow St	Problem is currently being mitigated.





Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EP059	Edinboro Borough	ST RT 99	Flooding occurs near the floodplain, particularly when the level on Edinboro Lake are high.
EP060	Edinboro Borough	Heather Road	Culvert appears to have inadequate hydraulic capacity. Outlet is obstructed by utility line.
EP061	Edinboro Borough	N of Industrial Drive	Beaver dam.
EP062	Edinboro Borough	Peach St (e of lake)	Pollution has been documented coming from upstream waste water treatment plant. The effluent is currently being re-routed and given additional treatment.
EP063	Edinboro Borough	N of Lake	Pollution has been documented coming from upstream waste water treatment plant. The effluent is currently being re-routed and given additional treatment.
EP064	Edinboro Borough	Penn Union Site	Penn-Union had a chemical spill. They have installed a treatment system to prevent future contamination.
EP065	Edinboro Borough	Wipple Creek entrance to Lake	Heavy sediment deposition. Source of sediments needs to be determined.
EP066	Edinboro Borough	Elm St storm sewer into Lake	See P058.
EP067	Edinboro Borough	Conneaut/Shenango Watersheds	Heavy sediment deposition. Source of sediments needs to be determined.
EP068	Edinboro Borough	Minor tributary into Lake	Heavy sediment deposition. Source of sediments needs to be determined. The Borough describes this problem as relatively minor.
EO025	Elgin Borough	S. Main St	This problem area is being mitigated as a bridge replacement project is currently in process.
EP108	Elk Creek Township	Morley Road	Seasonal flooding in low lying wetland/ floodplain area.
EP109	Elk Creek Township	Griffis Road	Culvert appears to have inadequate hydraulic capacity.
EP110	Elk Creek Township	Temple Creek	Bridge occasionally floods but appears to have adequate hydraulic capacity.
EP111	Elk Creek Township	Hickernell Road	Bridge appears in poor condition and may be in need of replacement. Some sediment appears to be depositing downstream.
EP112	Elk Creek Township	Ivoray Road	Bridge appears in poor condition and may be in need of replacement. Some sediment appears to be depositing downstream.
EP113	Elk Creek Township	Fillinger Road	Bridge appears in poor condition and may be in need of replacement. Some sediment appears to be depositing downstream.



Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EP114	Elk Creek Township	N of Carberry Road	Beaver dams.
EP115	Elk Creek Township	Temple Creek @ Reservoir Road	Beaver dams.
EO011	Fairview Township	Trout Run	Low lying area that is heavily vegetated. Properties in this area are in the floodplain. This problem area has been mitigated since the area downstream has been cleared and maintained.
EO012	Fairview Township	Bear Run	Beaver dam. Frequent flooding results.
EP029	Fairview Township	Trout Run	See EO011.
EP030	Fairview Township	Bear Run	See EO012.
EP031	Fairview Township	PennDOT infrastructure	Conveyance system appears to be in need of maintenance. The stream meander appears to be threatening a structure.
EP032	Fairview Township	Subdivision has combined sewers	Problem is currently being mitigated.
EP033	Fairview Township	Entire Township	High coliform at some outfalls. Problem is currently being mitigated.
EP034	Fairview Township	Walnut Creek	Streambank stabilization and stormwater mitigation is needed in several locations along Walnut Creek.
EO015	Franklin Township	Throughout Township	There are 67 deficient culverts and bridges reported.
EP121	Franklin Township	New Road	Culvert appears to have inadequate hydraulic capacity.
EP122	Franklin Township	New Road, Mohawk Road	Culvert appears to have inadequate hydraulic capacity.
EP123	Franklin Township	Carbury Road	Culvert appears to have inadequate hydraulic capacity.
EP124	Franklin Township	Clair Wright Road	Culvert appears to have inadequate hydraulic capacity.
EP125	Franklin Township	Clair Wright Road	Culvert appears to have inadequate hydraulic capacity.
EP126	Franklin Township	West Stancliff Road	Culvert appears to have inadequate hydraulic capacity.
EP127	Franklin Township	Shaddock Road	Culvert appears to have inadequate hydraulic capacity.
EP128	Franklin Township	Shaddock Road	Culvert appears to have inadequate hydraulic capacity.
EP129	Franklin Township	Shaddock Road	Culvert appears to have inadequate hydraulic capacity.
EP130	Franklin Township	West 17th St Area	Conveyance system appears to be full of debris and is need of maintenance. Debris may be coming from Bizzarro's Salvage Yard.



Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EP131	Franklin Township	Sassafras St	Conveyance system on the upper part of Sassafras Road appears to be insufficient. This system appears to discharge to the lower "new" system on Sassafras Road at the Convention Center.
EP132	Franklin Township	West 8th	Conveyance system in the area appears to be insufficient.
EP043	Franklin Township	Entire Township	See EP121 to EP129.
EP018	Girard Borough	Sunset Drive North	This heavily vegetated channel leading to Lake Erie is in need of maintenance. The railroad culvert may have insufficient hydraulic capacity.
EO029	Girard Township	S. Creek Road	Culvert appears to have inadequate hydraulic capacity.
EO030	Girard Township	Cindy Lane & Daggett	Runoff from upstream culverts discharges to the low point along Cindy Ln and Daggett. There is no outlet on the south side of Cindy
EO031	Girard Township	Route 20	The conveyance system along ST RT 20 becomes smaller as it approaches its outfall and appears to have inadequate hydraulic capacity. New development also appears to have impacted the area.
EP073	Girard Township	Gloskey Road Bridge	Bridge appears to have inadequate hydraulic capacity and is in poor overall condition. The relatively small widening leads to very high velocity (>8 ft/s in the 2-year storm event) and subsequent erosion.
EP074	Girard Township	Route 20	Runoff ponds along ST RT 20 in low lying areas. There is no outlet for the runoff.
EP075	Girard Township	Route 20	See EP074.
EO010	Greene Township	May Road @ Gamelands	Area is in wetlands and prone to flooding. May Road is only feet away from the waterbody. It appears the water from the wetlands may back up and flood the properties on the west side of May Road.
EP019	Greene Township	Sampson Road	Property flooding near wetlands.
EP020	Greenfield Township	German Road	Beaver dams. Dams are blocking the dual 48" HDPE culverts. Culverts may provide adequate capacity if dams were removed. The township has removed the dams several times.
EP021	Greenfield Township	Ashton Road	Beaver dams. Dams are blocking the dual 48" HDPE culverts. Culverts may provide adequate capacity if dams were removed.
EP022	Greenfield Township	Wilson Road	Culverts appear to have been recently replaced.



Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EP023	Greenfield Township	Wilson Road	Beaver dams. The bridge appears to provide adequate capacity if the dam would be removed.
EP024	Greenfield Township	New Road	Beaver dams. The culvert appears to provide adequate capacity if the dam would be removed.
EP025	Greenfield Township	Dougan Road	Culverts appear to have been recently replaced.
EP026	Greenfield Township	Raymond Mills	Beaver dams. Dams are blocking the dual 48" HDPE culverts. Culverts may provide adequate capacity if dams were removed. The township has recently removed the dams.
EP027	Greenfield Township	N of I 86	Wetlands created for mitigation during I-86 highway construction.
EP119	Greenfield Township	German Road	Beaver dams. This is a continuous problem.
EP120	Greenfield Township	Raymond Road	Beaver dams. The township has recently cleared and maintained area.
EO009	Harborcreek Township	Backus Road culvert	Culvert does not appear to have adequate hydraulic capacity. It is in poor condition and may be structurally deficient.
EP012	Harborcreek Township	Fairfield area	The existing culvert does not appear to provide sufficient conveyance capacity.
EP013	Harborcreek Township	Villa Sites Road	Vague description of problem area provided by the township. Culvert appears adequate. Discharge from culvert leads to low lying areas located on neighboring properties which experience frequent flooding. The general area is a flood prone area.
EP014	Harborcreek Township	Lewis-Mooreheadville Roads Area	Inadequate roadside drainage.
EP015	Harborcreek Township	Beaver Road - Nagle to Clark	Problem area unable to be located during field visit.
EP016	Harborcreek Township	Brookside Area	This area is relatively low and receives substantial upslope runoff from residential properties. The conveyance channel through area appears to be insufficient. A new conveyance system with new culverts is likely needed.
EP017	Harborcreek Township	Clark Road to Firman Road	The culverts and channels along Clark Road appear to overtop and flood the neighboring properties.
EP052	Lake City Borough	Eagle St	An old foundation is deteriorating in the channel of Kelly Run.



Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EO013	Lawrence Park Township	Iroquois Ave - E.B. Ln	The E.B. Ln slopes to a low point where runoff ponds. There are no drainage structures present.
EO014	Lawrence Park Township	Snoopy & Cricket	It appears the conveyance under the railroad tracks is insufficient. The whole network appears in need of maintenance.
EP035	Lawrence Park Township	Iroquois Ave - EB Ln	See EO013.
EP036	Lawrence Park Township	Snoopy & Cricket	See EO014.
EP037	Lawrence Park Township	695 Smithson Ave	The yard area of the church is flooding during storm events.
EP039	Lawrence Park Township	Crotty, Smithson, Morse, Emmet	It appears neighboring property owners have been placing concrete pieces in the stream to prevent stream bank erosion.
EP040	Lawrence Park Township	Napier playground	It appears that Curtis Park playground is in or very close to the regulatory floodplain.
EP041	Lawrence Park Township	Four Mile Creek	Stream bank erosion. Debris is also present in creek.
EP042	Lawrence Park Township	Four Mile Creek	Pedestrian bridges constrict the floodplain causing stream bank erosion near their footings.
EP053	McKean Township	Old 99	Property near Lamson Run frequently floods.
EP054	McKean Township	Baron, West, Old 99, Reichert	Frequent flooding with areas near or in the floodplain of Elk Creek.
EP055	McKean Township	Reichert Road	Bridge is to be replaced in near future.
EO006	Mill Village Borough	Depot St Culvert	Culvert was replaced in 2008.
EO007	Mill Village Borough	Railroad Culvert #1	Culvert does not appear to have adequate hydraulic capacity.
EO008	Mill Village Borough	Railroad Culvert #2	Large sediment deposit is blocking culvert inlet. There is also a large deposit positioned at the outlet. It appears that the culvert would have adequate hydraulic capacity if channel was cleared.
EP009	Mill Village Borough	French Creek Tributary	Upstream sediment is depositing in within stream, creating an obstruction. Downstream of area appears to have adequate capacity.
EO032	Millcreek Township	Asbury Road SR4009 underpass	There appears to be inadequate drainage under the PennDOT bridge. The emergency spillway for the Lowe's discharges onto Asbury Road.
EO033	Millcreek Township	Heidler Road Channel	A heavily vegetated channel that appears to have inadequate hydraulic capacity frequently floods. Runoff from multiple upslope developments discharges to the channel.



Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EO034	Millcreek Township	Cider Mill to Lake Pleasant	Stream obstructions from large woody debris within Mill Creek.
EP076	Millcreek Township	Riviera Estates	Frequent flooding. Depth of water in general area varies between 2' -4' depth during storm events.
EP077	Millcreek Township	15th & Harper	Frequent flooding of homes, businesses, and roadways. SWM conveyance system may be inadequate.
EP078	Millcreek Township	Taki Mobile Home Park	Frequent flooding. Runoff is directed to a low lying area water backs up to Trailer #1545 and beyond.
EP079	Millcreek Township	17th & Harper	Frequent flooding of homes, businesses, and roadways. SWM conveyance system may be inadequate.
EP080	Millcreek Township	22nd & James	Frequent flooding of homes, businesses, and roadways. Upslope runoff appears to be conveyed towards Paragon Stair & Rail, Inc. The conveyance system appears to be in need of maintenance and may be hydraulically insufficient.
EP081	Millcreek Township	22nd & Homer to Midland	Frequent flooding of parking lots, businesses, and roadways. There is a low lying area along the property of Erie Advanced Manufacturing that appears to flood. The conveyance system may be insufficient and in need of maintenance.
EP082	Millcreek Township	EBCO Park	Frequent flooding of parking lots, businesses, and roadways. The SWM facility in area has no outlet. Infiltration appears to be the only means of discharge.
EP083	Millcreek Township	20th & 23rd, Lowell to Evanston	Street & yard flooding. No conveyance facility could be located.
EP084	Millcreek Township	InsulBoard & RR tracks	Frequent flooding of business, parking lot and truck dock. The channel along railroad appears to flood and backup into the parking lot and loading dock.
EP085	Millcreek Township	Sterling RR - Powell Ave	Frequent flooding of parking lots, businesses, and roadways. Channel along the railroad may back up and cause parking area to flood.
EP086	Millcreek Township	13th & 14th, Idaho Ave	Frequent yard flooding. Channels along Idaho Ave may be insufficient causing runoff to flood the neighboring properties.
EP087	Millcreek Township	12th St Area to Peninsula Drive	Frequent flooding of 4 lane highway, business, home, and yards. Conveyance system may be insufficient.



Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EP088	Millcreek Township	Enfield Lane	Frequent home & yard flooding. The storm system may be insufficient.
EP089	Millcreek Township	Walnut Creek to Timber Ridge	Frequent home & yard flooding. The storm system may be insufficient.
EP090	Millcreek Township	Shadybrock to Brockhollow	Frequent home & yard flooding. The storm system may be insufficient.
EP091	Millcreek Township	Michigan & Oregon, N of 10th	Frequent yard flooding. The channel behind the homes along road overtops regularly and backs water up close to homes. Channel is beginning to erode and appears to be insufficient.
EP092	Millcreek Township	28th & Contessa area	Frequent yard flooding. The storm system may be insufficient.
EP093	Millcreek Township	Arcadia Ave, S of 26th	Frequent home and yard flooding. The conveyance system near 2626 Arcadia Ave discharges to Marshall Run. The conveyance system may be insufficient.
EP094	Millcreek Township	16th to 18th	Frequent road, home and business flooding. A conveyance system is not present in this area.
EP095	Millcreek Township	Budd Drive, Southern Drive, Hidden Lane	Frequent yard flooding. Existing conveyance system may be insufficient.
EP096	Millcreek Township	Scarbor, Windsor, Feilder Area	Frequent yard flooding. This is a general problem in the entire development.
EP097	Millcreek Township	15th W of Pittsburgh	Frequent road, parking lot & business flooding. The conveyance system along 15th St appears to backup and cause flooding. The culvert appears to be obstructed by large debris and is in need of maintenance.
EP098	Millcreek Township	S of RR, Colonial to Lowes	Frequent business & yard flooding. A large upslope watershed discharges to this point.
EP099	Millcreek Township	32nd & Zuck	Frequent roads, parking lot and yard flooding. The conveyance network appears to be insufficient.
EP100	Millcreek Township	32nd, Pittsburgh to Zuck	Frequent home & yard flooding. The conveyance system appears to be insufficient.
EP101	Millcreek Township	Atlantic, 36th to 38th	Frequent home & yard flooding. The conveyance system appears to be insufficient.
EP102	Millcreek Township	Rt. 99 & Interchange	Road frequently floods. The conveyance system appears to contain a lot of debris.
EP103	Millcreek Township	Mill Creek, Conrad Road to Rt. 8	Frequent parking lot & yard flooding. This is a low lying area along mill creek. Area is in the floodplain.



Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EP104	Millcreek Township	Home & Glenwood Park Ave	Frequent yard flooding. Conveyance system may be inadequate.
EP105	Millcreek Township	Marshall Run Tributary, Timberwood	Frequent garage and yard flooding. Upslope runoff discharges to 3833 DBF Road and does not drain. Conveyance system may be insufficient.
EP106	Millcreek Township	W 23rd Walmart drainage	Portions of store and parking lot flood. The channel behind Wal-Mart appears to flood. A culvert under the railroad appears to be full of debris.
EP107	Millcreek Township	UNT Mill Creek S Ar buckle Road	Frequent yard flooding. Properties in this area are flood prone.
EP117	North East Borough	Various	Problem area unable to be located during field visit.
EO026	North East Township	Mouth of 16 Mile & 20 Mile Creeks	Ice jams. When Lake Erie freezes close to shore, ice from Sixteen and Twenty Mile Creeks cannot discharge to lake.
EO027	North East Township	Baker Run Creek	Debris from an upstream concrete plant and various large woody debris blocks the stream and overflows into Northeast Borough Waste Water Treatment Plant #1 property.
EP056	North East Township	Orchard Beach Creek Road	Culvert appears to provide adequate capacity. Neighboring properties located near the culvert outlet will most likely flood during even minor storm events.
EP057	North East Township	Brickyard Road north of Law Road	Bridge abutments appear to be deteriorating. The bridge severely constricts the floodplain, creating scouring velocities of up to 11 ft/s during the 2-year storm event.
EO016	Platea Borough	Platz Road Bridge	During the field visit, it appeared that the problem was fixed. The culvert appears adequate and the conveyance appears to be sufficient.
EP044	Platea Borough	Rt. 18 & West Peach Street	Runoff flows to lower railroad bed and floods during storm events.
EP010	Springfield Township	Tubbs Road	Outflow from culvert discharge to a channel that makes an abrupt turn. An additional culvert at beginning of Tubbs Road appears to provide adequate capacity but channel and culvert are not aligned correctly.
EP011	Springfield Township	Various streams	Beaver dams.
EO003	Summit Township	LeBoeuf Creek	Beaver dams.
EP118	Summit Township	LeBoeuf Creek	Beaver dams.





Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EO002	Union Township	Union LeBoeuf Road	Stream debris has been reported in the past. During the field visit, the stream appeared to be free of debris.
EP028	Venango Township	French Creek & Knoyle Road	Frequent flooding. Area is within the floodplain.
EO004	Waterford Township	Sedgwick Road	Beaver dams reported, but they appeared to be removed during the field visit.
EO005	Waterford Township	Juva Valley Road	Culverts do not appear to have adequate hydraulic capacity.
EP003	Waterford Township	1000' of Himrod Road	Flooding occurs because of inadequate drainage. The Erie County Conservation District is currently applying for funds to mitigate.
EP004	Waterford Township	750' of Flatts Road	The wooden bridge is closed due to its poor condition. Flooding occurs upstream and downstream of the bridge.
EP005	Waterford Township	Sedgwick Road	Same as EO004.
EP006	Waterford Township	Haugh Road	Dirt and Gravel Roads project completed in 2008.
EO001	Wattsburg Borough	Main St	Collapsed storm drains under Main St. Inlet box at house #14400 is full of debris. Runoff that drains to this area has no outlet. Failure to replace the failing infrastructure may endanger public health and welfare. Area is very close to floodplain.
EP001	Wattsburg Borough	North St near Wattsburg Lumber	Road appears to have inadequate drainage. Inlets are full of debris. Gravel from neighboring lots enters the inlets and reduces the hydraulic capacity.
EP002	Wattsburg Borough	French Creek	Overbank flow and flooding. Problem area is located in the floodplain.
EP069	Wayne Township	Hill Crest	Land was developed prior to SWM plan requirements. There is no outlet for water that collects at low points. Water appears to infiltrate rapidly in this area. This corresponds with soil maps (Howard and Phelps, "A" and "B" type soils).
EP070	Wayne Township	Country Club Road Subdivision	New upslope development is causing flooding impacts on downstream properties.
EP071	Wayne Township	Route 6 west of hatchery	Runoff that was diverted through a now defunct fish hatchery is now is diverted through neighboring properties. Runoff then ponds along ST RT 0006 and neighboring properties. The culvert outfall under ST RT 0006 is blocked.



Table 4.3.4.2.D

REPORTED STORMWATER PROBLEM AREAS			
ID #	Municipality	Location	Notes
EP072	Wayne Township	Dugway Stream	Severe erosion along state line road.

## PUBLIC HEALTH

Flooding affects mortality, physical health and mental health. Approximately one-third of all deaths during a flood occur away from floodwaters and are usually a result of dehydration, stroke, lack of medical supplies, and exacerbated medical conditions.

Flood waters pose multiple health risks, including infectious disease, wound infections, injuries, and other health effects. As water recedes, the priorities are to disinfect property, dispose of items that cannot be properly disinfected, and practice good hygiene. It is important to keep open wounds and rashes from becoming exposed to flood waters to avoid infection (CDC, 2014).

One of the more common causes of health issues after flooding is mold. Mold exposure usually occurs during cleanup when it is disturbed and easily transfers from surface to surface. Some items can be cleaned but porous materials (i.e., rugs, composite wood furniture, HVAC filters, etc.) should be disposed (FEMA, 2010).

The psychological effects of flooding can be acute; however, long-term effects are often impacted by conflicts between homeowners and insurance companies, and disruption of commercial, public, health, and government services (Rufat, Tate, Burton, & Maroof, 2015).

## SOCIAL VULNERABILITY

Age (elderly and young children) is the leading demographic for social vulnerability to floods. Extremes along the age spectrum affect mobility and increase the burden of care following a flood (Rufat, Tate, Burton, & Maroof, 2015). Those with low social economic standing are also considered vulnerable as their homes are often dilapidated or need repair prior to an event. More expensive homes are built in areas that are typically safer with better flood barriers (Clements, 2009).

The sick and terminal population of hospitals and nursing facilities are especially vulnerable. A recent report by the U.S. Department of Health and Human Services found that planning at nursing facilities is lacking. Inspections of multiple facilities found that many were unable to specify how patient medication would be



dealt with or how patients on ventilators or feeding tubes would be cared for after a flood (Graham, 2012).

## NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE

The NFIP provides flood insurance 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.

By adopting 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 Erie County are in the regular program. The minimum floodplain management requirements include the following.

- Review and permit all development in the SFHA
- Elevate new and substantially-improved residential structures above the base flood elevation
- Elevate or dry flood proof 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



- Anchor foundations or structure-resist floatation, collapse, or lateral movement

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, no municipalities in Erie County participate in CRS.

In Erie County, 35 of the 38 municipalities are participants in the NFIP (see Table 5.2.1.A). The program is managed by participating municipalities through ordinance adoption and floodplain regulation. Permitting processes needed for building construction and development in the floodplain are implemented at the municipal level through various ordinances (e.g., zoning, subdivision/land development, and floodplain ordinances), but the Planning Department provides guidance upon request. FEMA Region III also makes an ordinance review checklist listing required provisions for floodplain management ordinances available to communities. This checklist helps communities develop an effective floodplain management ordinance that meets federal requirements for participation in the NFIP.

The Pennsylvania Department of Community & Economic Development provides communities with a suggested ordinance document (based on their CFR, Title 44, Section 60.3 level of regulations) to assist municipalities in meeting the minimum requirements of the NFIP along with the Pennsylvania Floodplain Management Act (Act 166). These suggested or model ordinances contain provisions that are more restrictive than state and federal requirements. Suggested provisions include, but are not limited to the following.

- Prohibiting manufactured homes in the floodway
- Prohibiting manufactured homes within the area measured 50' landward from the top of bank of any watercourse within a special flood hazard area
- Special requirements for recreational vehicles within the special flood hazard area
- Special requirements for accessory structures
- Prohibiting new construction and development within the area measured 50' landward from the top of bank of any watercourse within a special flood hazard area



- Providing the county conservation district an opportunity to review and comment on all applications and plans for any proposed construction or development in any identified floodplain area

Act 166 mandates municipal participation in and compliance with the NFIP. It also establishes higher regulatory standards for new or substantially-improved structures used for the production or storage of dangerous materials (as defined by Act 166) by prohibiting them in the floodway. Additionally, Act 166 establishes the requirement that a special permit must be obtained prior to any construction or expansion of any manufactured home park, hospital, nursing home, jail, and prison if said structure is located within a special flood hazard area.

Table 4.3.4.2.E

COMMUNITIES PARTICIPATING IN THE NFIP						
CID	Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Reg-Emer Date
422409	Albion, Borough of	Erie County	01/17/75	06/19/89	02/19/14	06/19/89
421360	Amity, Township of	Erie County	01/31/75	11/04/88	02/19/14	11/04/88
422410	Concord, Township of	Erie County	01/17/75	11/05/82	02/19/14	11/05/82
421361	Conneaut, Township of	Erie County	12/13/74	11/15/89	02/19/14	11/15/89
420447	Corry, City of	Erie County	04/12/74	02/15/78	02/19/14	02/15/78
421356	Cranesville, Borough of	Erie County	12/20/74	06/19/89	06/19/89	06/19/89
420448	Edinboro, Borough of	Erie County	06/07/74	06/15/81	02/19/14	06/15/81
422411	Elgin, Borough of	Erie County	01/24/74	09/28/79	02/19/14	09/28/79
422412	Elk Creek, Township of	Erie County	01/24/75	06/19/89	02/19/14	06/19/89
420449	Erie, City of	Erie County	06/21/74	03/001/79	02/19/14	03/01/79
420450	Fairview, Township of	Erie County	11/15/74	09/29/78	02/19/14	09/29/78
421362	Franklin, Township of	Erie County	12/13/74	10/01/86	02/19/14	10/01/86
422413	Girard, Borough of	Erie County	12/27/74	06/30/76	02/19/14	06/30/76
421363	Girard, Township of	Erie County	01/10/75	06/30/76	02/19/14	06/30/76
421364	Greene, Township of	Erie County	03/28/75	12/01/86	02/19/14	12/01/86
421365	Greenfield, Township of	Erie County	12/06/74	08/02/90	02/19/14	08/02/90
421144	Harborcreek, Township of	Erie County	09/13/74	09/17/80	02/19/14	09/17/80
422414	Lake City, Borough of	Erie County	01/17/75	06/30/76	02/19/14	06/30/76
422415	Le Boeuf, Township of	Erie County	01/10/75	05/15/84	02/19/14	05/15/84
422416	McKean, Borough of	Erie County	03/28/75	09/30/77	02/19/14	09/30/77
422623	McKean, Township of	Erie County	04/18/75	07/16/80	02/19/14	07/16/80
422417	Mill Village, Borough of	Erie County	04/11/75	05/19/81	02/19/14	05/19/81



Table 4.3.4.2.E

COMMUNITIES PARTICIPATING IN THE NFIP						
CID	Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Reg-Emer Date
420452	Millcreek, Township of	Erie County	09/20/74	04/16/79	02/19/14	04/16/79
421359	North East, Borough of	Erie County	11/08/74	01/04/81	02/19/14	02/04/81
421368	North East, Township of	Erie County	09/20/74	05/19/81	02/19/14	05/19/81
421369	Springfield, Township of	Erie County	11/01/74	12/01/82	02/19/14	12/01/82
422418	Summit, Township of	Erie County	04/11/75	09/16/81	02/19/14	09/16/81
420453	Union City, Borough of	Erie County	04/12/74	09/28/79	02/19/14	09/28/79
421370	Union, Township of	Erie County	12/13/74	09/16/81	02/19/14	09/16/81
421371	Venango, Township of	Erie County	12/13/74	09/30/81	02/19/14	09/30/81
421372	Washington, Township of	Erie County	10/18/74	05/19/81	02/19/14	05/19/81
420454	Waterford, Borough of	Erie County	05/10/74	12/15/81	02/19/14	12/15/81
422419	Waterford, Township of	Erie County	01/24/75	02/17/82	02/19/14	02/17/82
420455	Wattsburg, Borough of	Erie County	08/16/74	05/19/81	02/19/14	05/19/81
421373	Wayne, Township of	Erie County	12/13/74	12/14/79	02/19/14	12/14/79
Communities Not Participating in the NFIP						
CID	Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Sanction Date
420451B	Lawrence Park, Township of	Erie County	5/31/74	09/29/78	02/19/14	09/29/78(S)
422699	Platea, Borough of	Erie County		02/19/14	02/19/14	02/19/15
420456	Wesleyville, Borough of	Erie County	05/31/74	07/16/81	02/19/14	02/20/14(S)

Source: FEMA NFIP Community Status Book Report

Currently, Wesleyville and Lawrence Park Township are suspended from the NFIP. Prior to being suspended, a community has a probation period at which time it is formally notified it is non-compliant for either a failure to adopt or a failure to enforce floodplain management regulations. Suspended communities are subject to sanctions including the following.

- No resident will be able to purchase a flood insurance policy
- Existing flood insurance policies will not be renewed
- No federal grants or loans for development may be made in identified flood hazard areas under programs administered by federal agencies such as HUD, EPA, and SBA
- No federal disaster assistance may be provided to repair insurable buildings located in identified flood hazard areas for damage caused by a flood



- No federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas including policies written by FHA, VA, and others
- Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazard areas that there is a flood hazard and that the property is not eligible for federal disaster relief

Prior to and after reinstatement, the community will have conditions imposed dependent upon the reason for suspension. Once reinstated, flood insurance will be available to the residents. However, an additional charge of \$50.00 will be added to the premium for each new or renewed policy for a period of at least one year.

#### 4.3.4.3 Past Occurrence

##### **Northern Erie County, Pennsylvania**

On September 17, 1996, thunderstorms brought up to seven inches of rain in some areas of the county causing streets, streams, basements and low lying areas to flood. Evacuation took place in the City of Erie as homes were destroyed. A wall collapsed at Central High School, businesses were damaged, sewers backed up, roads were washed out, and bridges were damaged. Many roads were closed in Millcreek Township due to high water. Residents from an apartment building and a nursing home evacuated while responders rescued residents from rooftops. The Red Cross opened shelters for displaced individuals. When the rain stopped and flooding subsided on the morning of the 18<sup>th</sup>, property damage was estimated to be \$5 million.

##### **Erie County, Pennsylvania**

Lake-enhanced showers re-intensified and shifted north of Interstate 90 on the morning of June 30, 2009. Mill Creek began to rise rapidly over its banks flooding roadways and homes near East Gore Road in Belle Valley. The Belle Valley Fire Station flooded to a depth of six feet; Henderson Road was washed out; and the Erie Zoo flooded. Emergency personnel responded to over 50 rescue calls and City of Erie authorities requested non-essential travel to stop due to widespread flooding. Property damage in the county was \$9.25 million.



### Albion, Pennsylvania

On July 10, 2013, three to four inches of rain fell between 3:30 p.m. and 4:30 p.m. to an already-saturated area. Law enforcement reported multiple road closures due to flooding and a bridge on Keepville Road was completely under water. Evacuations were requested near the Albion Borough Park and the Cranesville sewer system was compromised. The intense rainfall and floods caused \$200,000 in damage.



Table 4.3.4.3.A

### FLOOD AND FLASH FLOOD EVENTS IMPACTING ERIE COUNTY FROM 1993-2016 (NCEI, 2017)

Date	Location & Description
January 29, 1994	Countywide. Ice Jam/Flash Flood – An ice jam on Twenty Mile Creek resulted in flooding along roads and land between Route 5 and 20.
June 11, 1994	Countywide. Flood – Between one and two inches of rain fell within 25 minutes causing flooding on roads and highways.
June 13, 1994	Multiple locations. Flash Flood/Flood – Heavy rain caused flooding of streets and sidewalks in Wesleyville. Elk and North Creeks flooded in East Springfield causing five to six feet of flooding and stranding four people at the Tomes Campground.
August 13, 1994	Countywide. Flash Flood – Several thunderstorms produced between 2 to 4 inches of rain resulting in flooded streets and streams. An estimated \$35,000 of damage was done to a water treatment plant.
June 25, 1995	Corry and Union City. Flash Flood – Heavy rains produced flooding of streets and low lying areas.
June 26, 1995	Waterford and McKean. Flash Floods – Heavy rains produced flooding of streets and poor drainage areas.
July 25, 1995	Albion. Flash Flood – Heavy rains, about two inches in an hour, produced flooding of streets and poor drainage areas.
January 18, 1996	Countywide. Flash Flood – Heavy rains and snowmelt produced flooding of low lying areas, small streams, and poor drainage areas. Some roads were closed in Union City, Girard, and Albion.
February 21, 1996	Waterford. Flash Flood.
April 23, 1996	Western Erie County. Flash Flood – Heavy rains produced flooding which caused power outages and closed roads.
May 9, 1996	Countywide. Flash Flood – heavy rains during thunderstorms caused flooding of streets and low lying areas.
June 7, 1996	Union City. Flash Flood – Heavy rains produced flooding of roads and low lying areas.
June 11, 1996	Countywide. Flash Flood – Heavy rain caused flooding in streets and low lying areas. Roads were closed in the City of Erie.
June 18, 1996	North East and Erie. Flash Flood – Heavy rain caused flooding of streets, basements, and low lying areas. Streets were closed in the City of Erie.
June 18, 1996	Countywide. Flash Flood – Heavy rains caused flooding of streets, basements, and low lying areas; resulted in 1 to 2 feet of water on roads in Millcreek Township.



Table 4.3.4.3.A

**FLOOD AND FLASH FLOOD EVENTS IMPACTING ERIE COUNTY FROM 1993-2016 (NCEI, 2017)**

Date	Location & Description
June 19, 1996	Countywide. Flash Flood – Heavy rain caused flooding of streets, basements, and low lying areas. A street in the City of Corry was cut in half by a cave in resulting from the floods.
July 19, 1996	Countywide. Flash Flood – Heavy rain caused flooding of streets and low lying areas.
July 30, 1996	Hammett. Flash Flood – Heavy rain caused flooding of streets, streams, and low lying areas.
August 8, 1996	Edinboro. Flash Flood – Heavy rain caused flooding of roads and low lying areas.
September 17, 1996	Northern Erie County. Flash Flood – Seven inches of rain fell during heavy thunderstorms flooding streets, streams, basements, and low lying areas. About \$5 million of damage was done to businesses, houses, and roads in the City of Erie and Millcreek Township; people had to be rescued from rooftops.
September 28, 1996	Countywide. Flash Flood – Heavy rain caused flooding of creeks, streets, basements, and low lying areas.
May 19, 1997	City of Erie. Flash Flood – Heavy rain caused flooding of streams, streets, and low lying areas.
January 7, 1998	Countywide. Flood – Heavy rain on saturated soil from snowmelt caused flooding of streams, low lying areas, roads, and basements. Flood waters over six feet closed an underpass in Fairview Township.
January 9, 1998	Countywide. Flood – Heavy thunderstorm rain on saturated soil caused flooding of roads, low lying areas, and basements.
June 16, 1998	Shore of Lake Erie. Flash Flood – Heavy rain caused flooding of underpass and streets.
September 29, 1999	City of Erie. Flash Flood – Three inches of rain fell causing flooding of roads and low lying areas. Two passengers had to be rescued from cars under a railroad viaduct.
August 2, 2000	Countywide. Flash Flood – Three to five inches of rain fell in one evening causing streams and creeks to flood. Roads were closed, some of which were covered by up to 5 feet of flood waters. Foundations of houses were washed out in Millcreek and Lawrence Park Townships.
August 3, 2001	Countywide. Flash Flood – Over four inches of rain fell during thunderstorms in eastern and southern parts of the county. Roads and streams flooded across the area.
August 31, 2001	City of Erie. Flash Flood – One to two inches of rain fell in less than 90 minutes causing streets and low lying areas to flood. Cars were stranded in areas of the city and passengers had to be rescued.
September 15, 2002	Countywide. Flash Flood – Over three inches of rain fell in less than two hours flooding and washing out roads across the county
June 12, 2003	Southern Erie County. Flash Flood – Two inches of rain fell in 45 minutes, total of 5 inches during the string of storms. Roads and streams were flooded, and two culverts were damaged.
July 21, 2003	Mill Village. Flash Flood – Heavy rains fell on already saturated soils causing French Creek to flood much of Mill Village, including one to two feet of water on many of the streets.
July 22, 2003	Countywide. Flash Flood – thunderstorms caused one to two inches of rain in short time period producing flooding in lowland and urban areas. A neighborhood in Mill Village was evacuated; hundreds of homes were damaged and several roads were washed out in the southern part of the county.
July 31, 2003	Countywide. Flash Flood – Heavy rains during thunderstorms caused urban and lowland flooding. A road was washed out in Millcreek and a landslide at a nearby construction site damaged houses.
August 5, 2003	Countywide. Flood – Heavy rains during thunderstorms caused flooding in small streams and creeks. Roads were closed in Corry, Lake City and Greenfield Township.
March 17, 2004	Wattsburg. Flooding
May 10, 2004	Central Erie County. Flash Flood – A cluster of thunderstorms produced three to four inches of rain in a short time period causing levels of streams and creeks to rise rapidly and flood nearby roads and neighborhoods.
May 22, 2004	Countywide. Flash Flood – Multiple days of rain preceded by heavy rainfall causing flooding across Erie County resulting in \$2.7 million in damage to homes, businesses and vehicles. Damage and flooding was most extensive in Mill Village where two bridges were washed out and people had to be rescued from their homes.
July 12, 2004	Southern Erie County. Flash Flood – Runoff from heavy rain flooded several streams and creeks producing flood waters of up to four feet on roads near Corry.
July 17, 2004	Southern Erie County. Flash Flood – Heavy rains caused flooding in streams and creeks near Corry, causing many roads to close and some roads to wash out.
July 18, 2004	Southeast Erie County. Flash Flood – Runoff from heavy rains flooded roads near Corry with up to two feet of standing water.



Table 4.3.4.3.A

**FLOOD AND FLASH FLOOD EVENTS IMPACTING ERIE COUNTY FROM 1993-2016 (NCEI, 2017)**

Date	Location & Description
September 8, 2004	Countywide. Flood – Two to four inches of rain fell as the remnants of Tropical Storm Francis moved through the area causing lowland and urban flooding.
September 9, 2004	Countywide. Flash Flood – Rains from Tropical Storm Francis persisted producing up to six inches of rainfall in some areas. Water overflowed a dam on Edinboro Lake resulting in evacuations of residents across the area. Additional evacuations took place across the county. Two bridges and multiple roads and routes were washed out. A landslide wiped out 500 feet of PA Route 5 in Fairview Township. Overall \$5.6 million of damage was done.
September 17, 2004	Erie and Crawford Counties. Flood – The remnants of Hurricane Ivan produced heavy rains causing flooding across streams, creeks, roads, and lowland areas.
January 1, 2005	Erie and Crawford Counties. Flood – Heavy rain and snowmelt caused widespread flooding in low lying areas and across a few roads.
July 16, 2005	Southern Erie County. Flash Flood – Heavy rains produced over two inches of rainfall in an hour, flood waters reached over two feet high in some areas.
July 22, 2005	Wesleyville. Flash Flood – heavy rains produced urban flooding. Roads were closed with reports of three to four feet of flood water flowing over roads.
November 29, 2005	Northern Erie County. Flood – Heavy rains produced flooding of roads and basements in northern portions of the county.
October 28, 2006	Northern Erie County. Flood – High waves along Lake Erie shore caused flooding in this area.
December 1, 2006	Millcreek Township. Flood – Severe weather caused flooding which resulted in a flooded trailer park in Millcreek Township.
March 2, 2007	Countywide. Flood.
March 15, 2007	Countywide. Flood – Flooding on roadways closed roads throughout the county.
August 7, 2007	Countywide. Flash Flood – Heavy rains during thunderstorms produced areas of flooding across the area including some houses and roads.
September 8, 2007	City of Erie. Flash Flood – Heavy rainfall flooded a creek and a nearby underpass.
February 6, 2008	Countywide. Flood – Severe weather caused flooding which resulted in many roads being closed.
June 30, 2008	Mill Village. Flood – Flooding caused deterioration and closure of roadways in Mill Village.
July 8, 2008	City of Erie. Flood – Heavy rain flooded streets throughout the City of Erie.
July 22, 2008	Northeast Erie County. Flash Flood – Heavy rain produced 2 to 3.5 inches of rain in less than 90 minutes flooding streams and roads in the area.
July 26, 2008	City of Corry. Flood.
December 11, 2008	Venango Township. Flood – Heavy rains and flooding caused road closures in Venango.
December 26, 2008	Waterford Township. Flood – Flooding closed roadways in Waterford Township.
February 11, 2009	Union City Borough and Fairview Township. Ice Jams – ice jams reported on French Creek and Walnut Creek.
March 10, 2009	Girard and Washington Townships. Flood – heavy rain caused minor flooding closing two roads and flooding basements.
June 30, 2009	Countywide. Flood – Steady rain produced flooding causing roadways to be impassable and close. Flooding was especially severe near Millcreek as the creek flooded and storm drains close. Flooding across the county caused over \$8 million in damage.
August 10, 2009	Waterford. Flash Flood – Thunderstorms produced 3.5 inches of rain in less than 2 hours. Flood waters rising out of the streams flooded mobile homes moving them off their foundations. PA route 19 was closed as large logs were deposited by flood waters.
May 28, 2013	Union City. Flash Flood – Heavy rains that were part of a tornadic storm caused reservoir levels to jump 30 feet. French Creek came up quick. Most of the flood damage was along this creek. Seven residents were rescued by local fire departments and flood damage was estimated at \$100,000.
June 6, 2013	Wattsburg. Flash Flood – Heavy rainfall measuring between 4 to 5 inches over saturated grounds produced widespread flooding. Basements were flooded and Hamot Road was washed out.
July 20, 2013	Albion. Flash Flood – Heavy rain closed roadways. Residents of the Albion Borough Park area were evacuated by local officials and the Cranesville sewer system was compromised.



Table 4.3.4.3.A

**FLOOD AND FLASH FLOOD EVENTS IMPACTING ERIE COUNTY FROM 1993-2016 (NCEI, 2017)**

Date	Location & Description
August 10, 2016	City of Erie and Millcreek. Flash Flood – Heavy rain during thunderstorms overwhelmed storm drainage resulting in flash flooding, especially in the Millcreek area. Twenty to thirty vehicle were seen floating in the roadway. The Walnut Creek saw a rapid rise resulting in the need for sandbags to keep homes from becoming flooded.

During the planning process, FEMA hosted a resiliency workshop that coincided with the release of new FIRM information for coastal areas of the county. During the workshop, there were presentations on the new FIRM information. The spreadsheet below was provided at the workshop.



Table 4.3.4.3.B

COMMUNITY INSURANCE INFORMATION										
Municipality	Effective FIRM	NFIP Status	Total # of Policies in Force	Insurance in Force	Total Number of Paid Losses Since 1978	Total Losses Paid Since 1978	Substantial Damage Claims Since 1978	Number of Repetitive Loss (RL) Structures	Number of Severe Repetitive Loss (SRL) Structures	Level of NFIP Regulations Required
Albion Borough	2/19/2014	Participating	-	-	2	\$14,593	-	-	-	60.3(c) - FEMA has provided a FIRM with BFEs
Amity Township	2/19/2014	Participating	2	\$216,700	-	-	-	-	-	60.3(b) – FEMA has provided a map with approximate A Zones
Concord Township	2/19/2014	Participating	3	\$590,000	-	-	-	-	-	60.3(b) – FEMA has provided a map with approximate A Zones
Conneaut Township	2/19/2014	Participating	3	\$700,000	-	-	-	-	-	60.3(c) - FEMA has provided a FIRM with BFEs
Corry City	2/19/2014	Participating	13	\$2,832,200	5	\$219,741	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Cranesville Borough	6/19/1989	Participating	-	-	2	\$7,080	1	-	-	60.3(c) - FEMA has provided a FIRM with BFEs
Edinboro Borough	2/19/2014	Participating	22	\$4,952,300	1	\$161	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Elgin Borough	2/19/2014	Participating	-	-	-	-	-	-	-	60.3(b) – FEMA has provided a map with approximate A Zones
Elk Creek Borough	2/19/2014	Participating	2	\$111,000	-	-	-	-	-	60.3(c) - FEMA has provided a FIRM with BFEs
Erie City	6/7/2017	Participating	60	\$18,062,800	39	\$374,944	1	3	-	60.3(e) FEMA has provided a FIRM that shows coastal high hazard areas
Fairview Township	6/7/2017	Participating	22	\$6,294,000	12	\$161,603	1	1	-	60.3(e) FEMA has provided a FIRM that shows coastal high hazard areas
Franklin Township	2/19/2014	Participating	-	-	-	-	-	-	-	60.3(b) – FEMA has provided a map with approximate A Zones
Girard Borough	6/7/2017	Participating	8	\$1,168,700	-	-	-	-	-	60.3(b) – FEMA has provided a map with approximate A Zones
Girard Township	6/7/2017	Participating	10	\$2,870,000	18	\$243,072	3	-	-	60.3(e) FEMA has provided a FIRM that shows coastal high hazard areas



Table 4.3.4.3.B

COMMUNITY INSURANCE INFORMATION										
Municipality	Effective FIRM	NFIP Status	Total # of Policies in Force	Insurance in Force	Total Number of Paid Losses Since 1978	Total Losses Paid Since 1978	Substantial Damage Claims Since 1978	Number of Repetitive Loss (RL) Structures	Number of Severe Repetitive Loss (SRL) Structures	Level of NFIP Regulations Required
Greene Township	2/19/2014	Participating	3	\$770,000	4	\$9,850	1	-	-	60.3(b) – FEMA has provided a map with approximate A Zones
Greenfield Township	2/19/2014	Participating	-	-	-	-	-	-	-	60.3(c) - FEMA has provided a FIRM with BFEs
Harborcreek Township	6/7/2017	Participating	34	\$8,632,400	14	\$264,742	6	1	-	60.3(e) FEMA has provided a FIRM that shows coastal high hazard areas
Lake City Borough	6/7/2017	Participating	2	\$693,100	7	\$306,396	2	2	-	60.3(e) FEMA has provided a FIRM that shows coastal high hazard areas
Lawrence Park Township	6/7/2017	Suspended	1	\$210,000	-	-	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
LeBoeuf Township	2/19/2014	Participating	8	\$1,039,400	-	-	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
McKean Borough	2/19/2014	Participating	3	\$560,000	5	\$206,941	-	1	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
McKean Township	2/19/2014	Participating	7	\$1,307,900	7	\$86,570	2	1	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Mill Village Borough	2/19/2014	Participating	1	\$175,000	2	\$1,283	-	-	-	60.3(c) - FEMA has provided a FIRM with BFEs
Millcreek Township	6/7/2017	Participating	123	\$32,783,200	103	\$1,559,987	12	13	1	60.3(e) FEMA has provided a FIRM that shows coastal high hazard areas
North East Borough	6/7/2017	Participating	31	\$4,341,100	14	\$199,069	2	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
North East Township	6/7/2017	Participating	38	\$8,819,500	116	\$778,628	22	15	-	60.3(e) FEMA has provided a FIRM that shows coastal high hazard areas
Platea Borough	2/19/2014	Not Participating	-	-	-	-	-	-	-	60.3(b) – FEMA has provided a map with approximate A Zones
Springfield Township	6/7/2017	Participating	6	\$1,155,300	3	\$26,256	2	-	-	60.3(e) FEMA has provided a FIRM that shows coastal high hazard areas



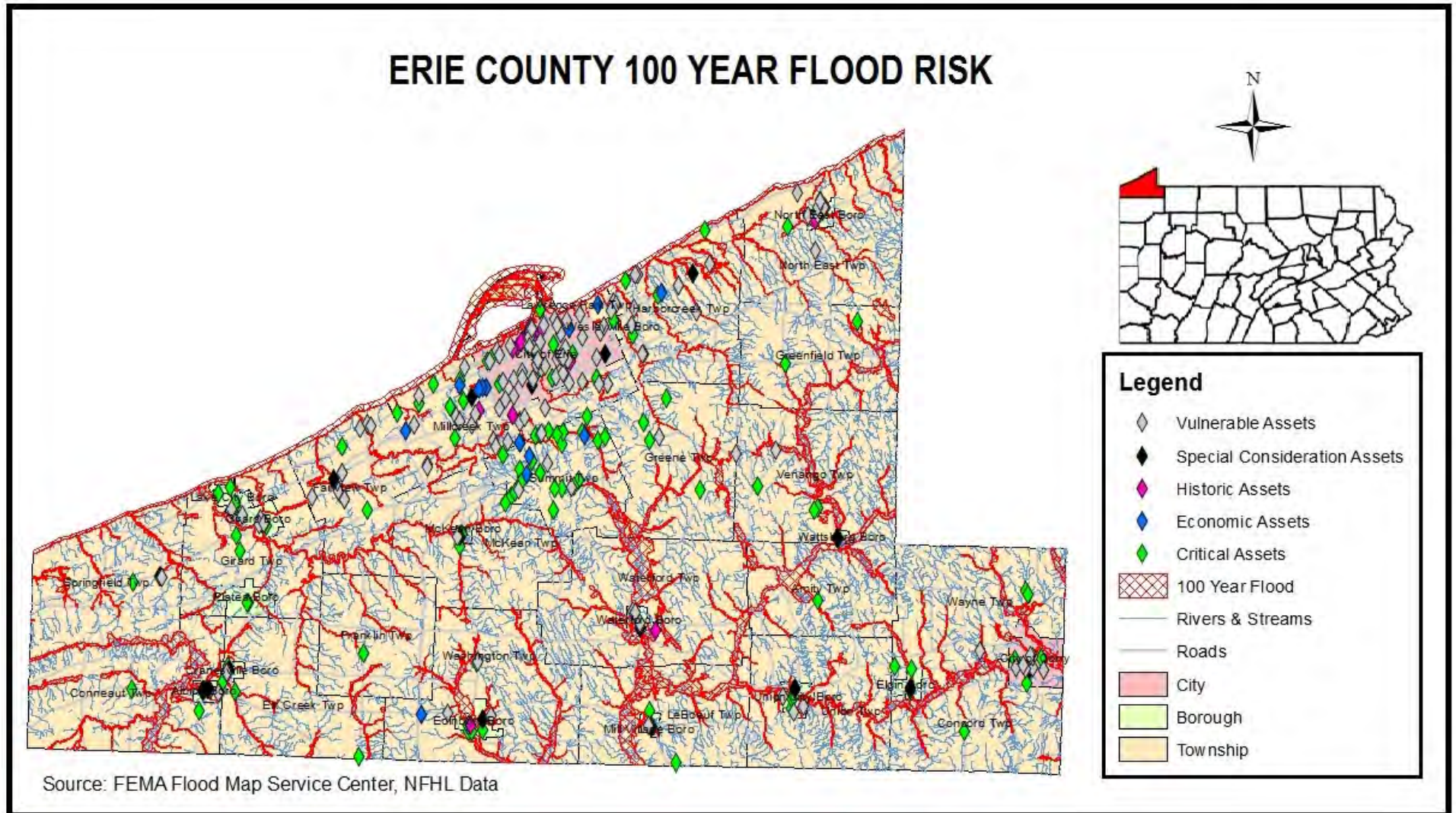
Table 4.3.4.3.B

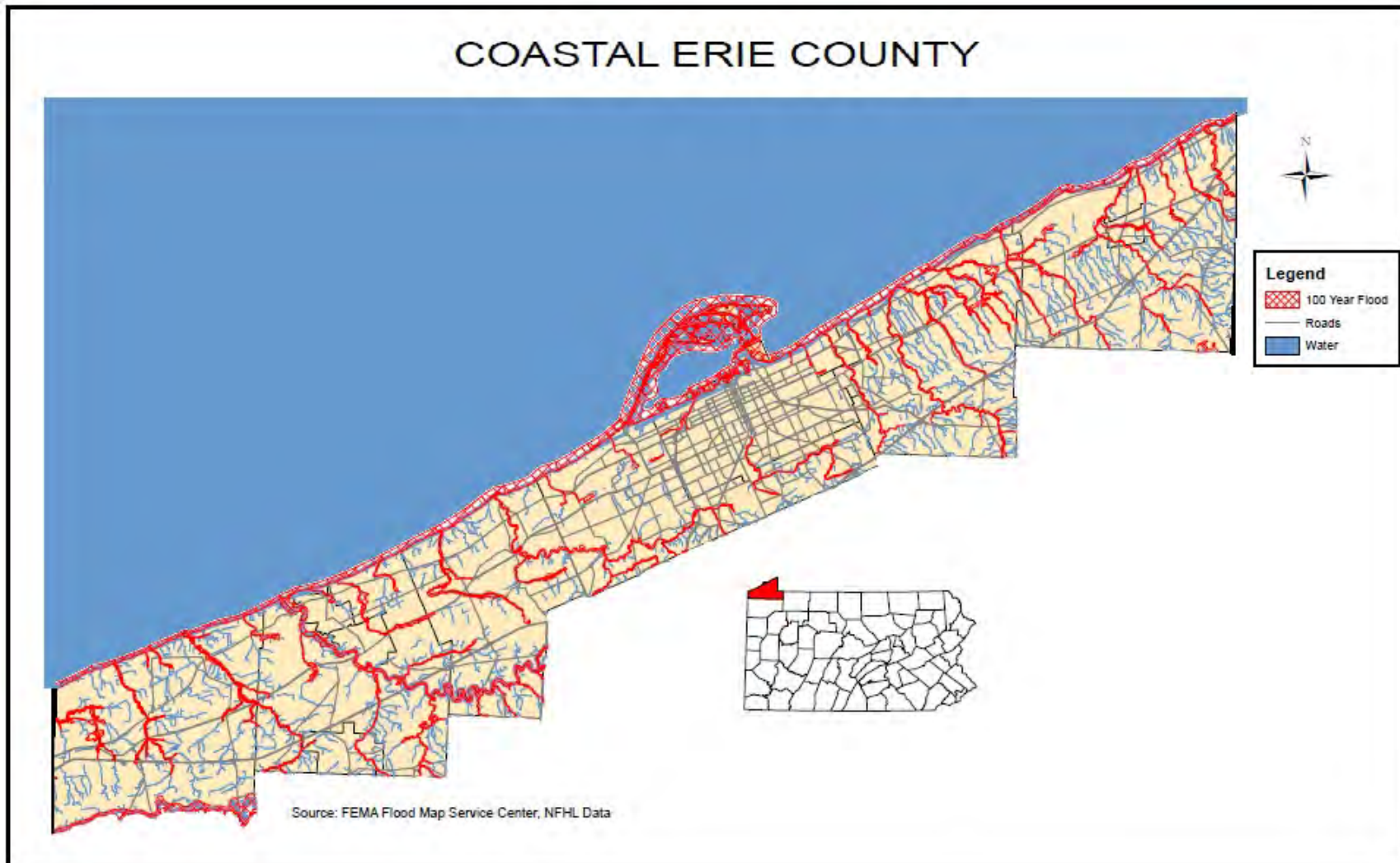
COMMUNITY INSURANCE INFORMATION										
Municipality	Effective FIRM	NFIP Status	Total # of Policies in Force	Insurance in Force	Total Number of Paid Losses Since 1978	Total Losses Paid Since 1978	Substantial Damage Claims Since 1978	Number of Repetitive Loss (RL) Structures	Number of Severe Repetitive Loss (SRL) Structures	Level of NFIP Regulations Required
Summit Township	2/19/2014	Participating	9	\$2,725,000	2	\$8,087	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Union City Borough	2/19/2014	Participating	20	\$3,065,100	6	\$16,110	-	-	-	60.3(b) – FEMA has provided a map with approximate A Zones
Union Township	2/19/2014	Participating	-	-	-	-	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Venango Township	2/19/2014	Participating	6	\$1,158,100	1	\$129	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Washington Township	2/19/2014	Participating	19	\$3,778,600	4	\$45,798	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Waterford Borough	2/19/2014	Participating	5	\$1,507,100	-	-	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Waterford Township	2/19/2014	Participating	10	\$1,976,000	-	-	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Wattsburg Borough	2/19/2014	Participating	21	\$1,179,200	1	\$12	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Wayne Township	2/19/2014	Participating	1	\$105,000	-	-	-	-	-	60.3(d) – FEMA has provided a FIRM with BFEs & a map that shows floodway
Wesleyville Borough	2/19/2014	Suspended	-	-	1	\$1,151	-	-	-	60.3(b) – FEMA has provided a map with approximate A Zones

This spreadsheet was presented during a FEMA resiliency in Erie County.

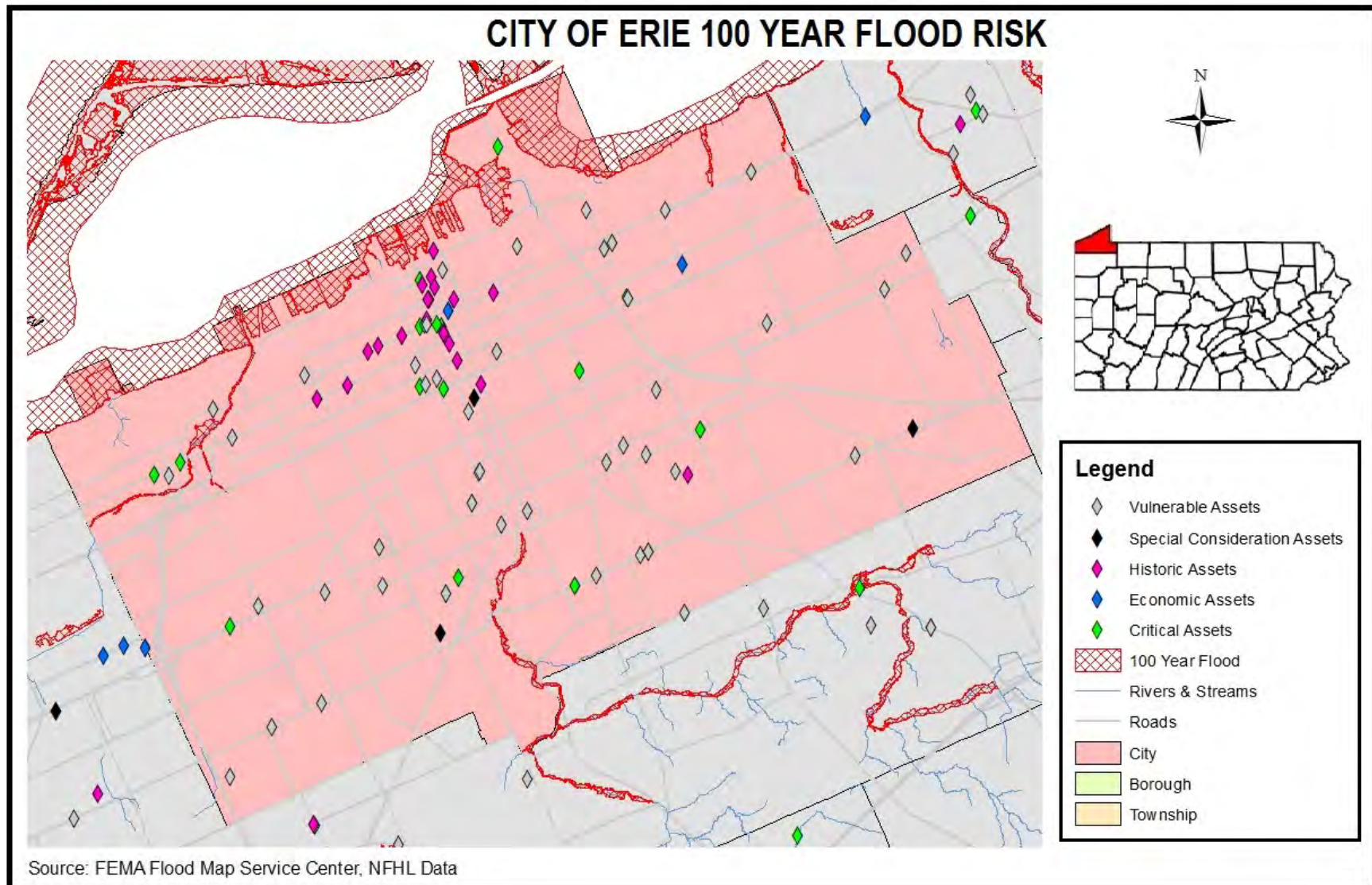


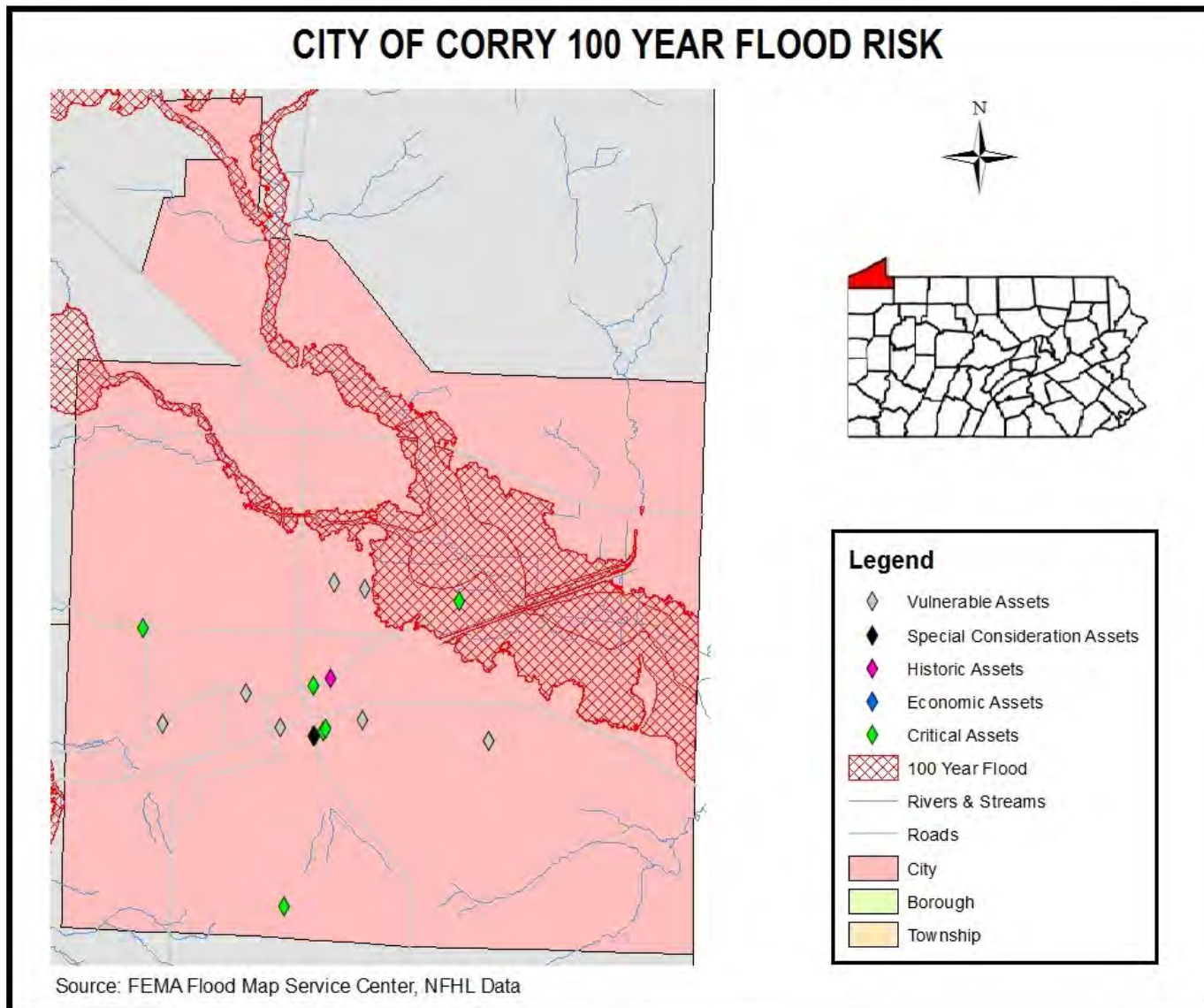
4.3.4.4 Future Occurrence (Source: FEMA DFIRM 100 Year Flood)

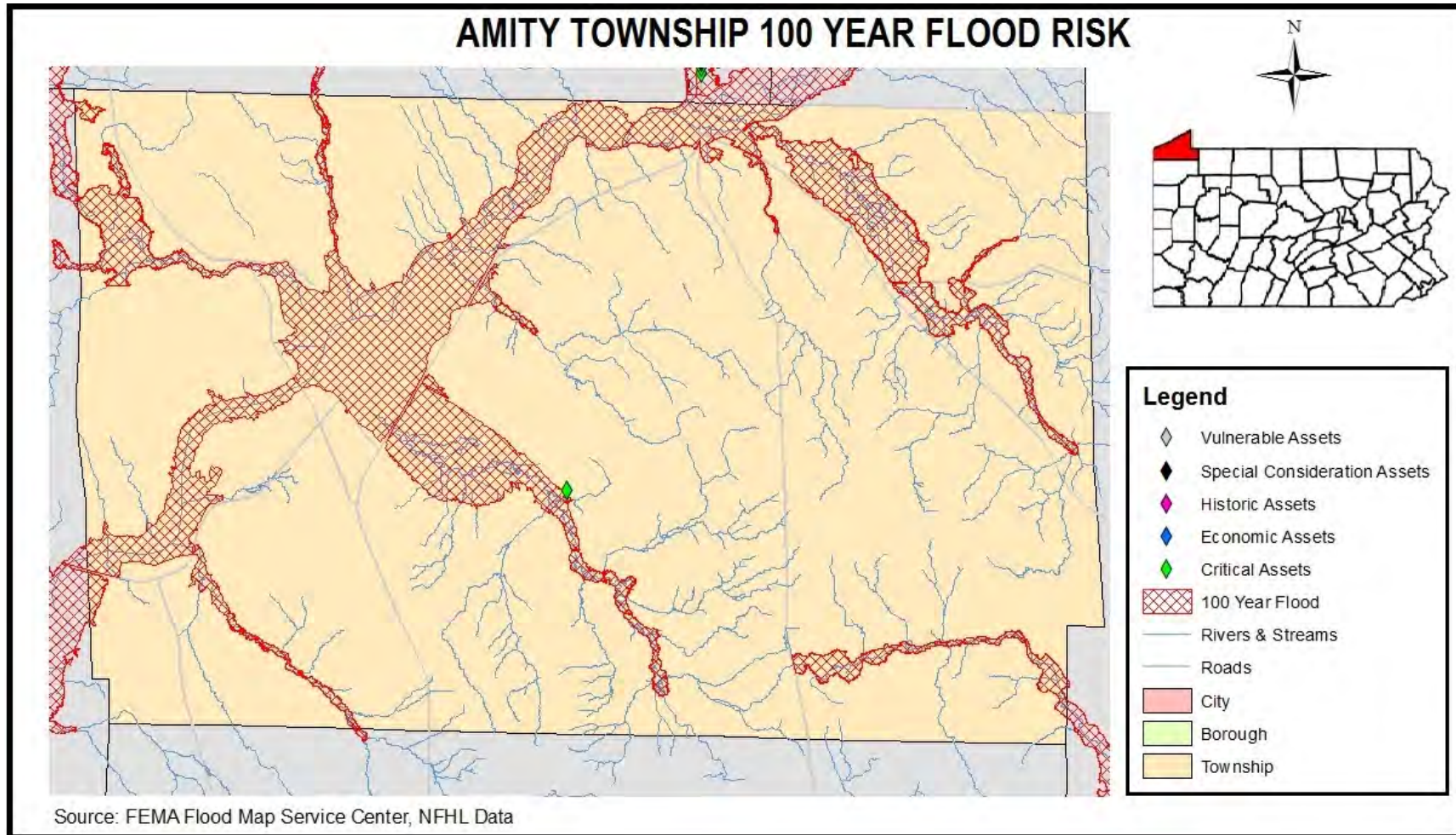


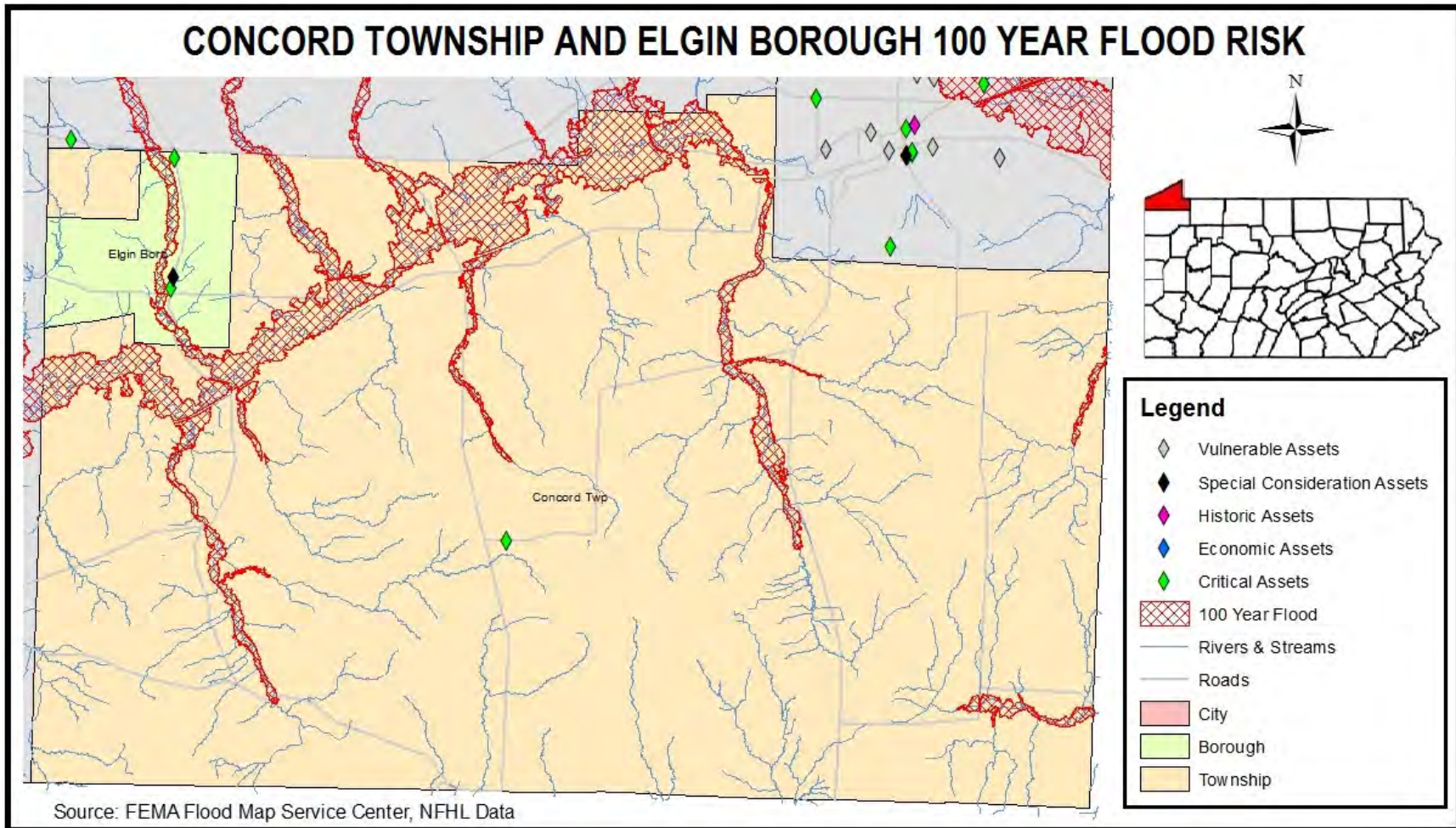




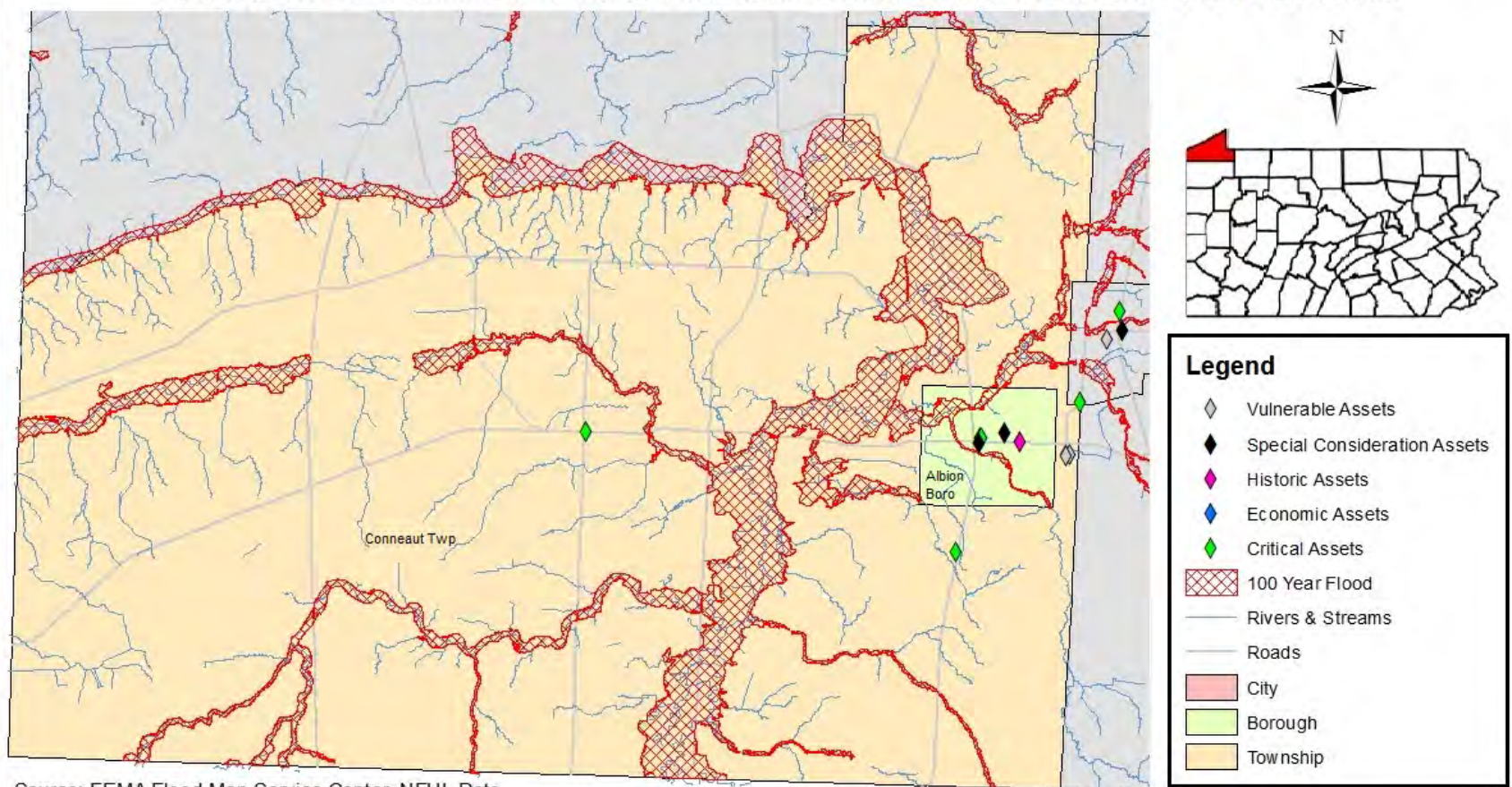






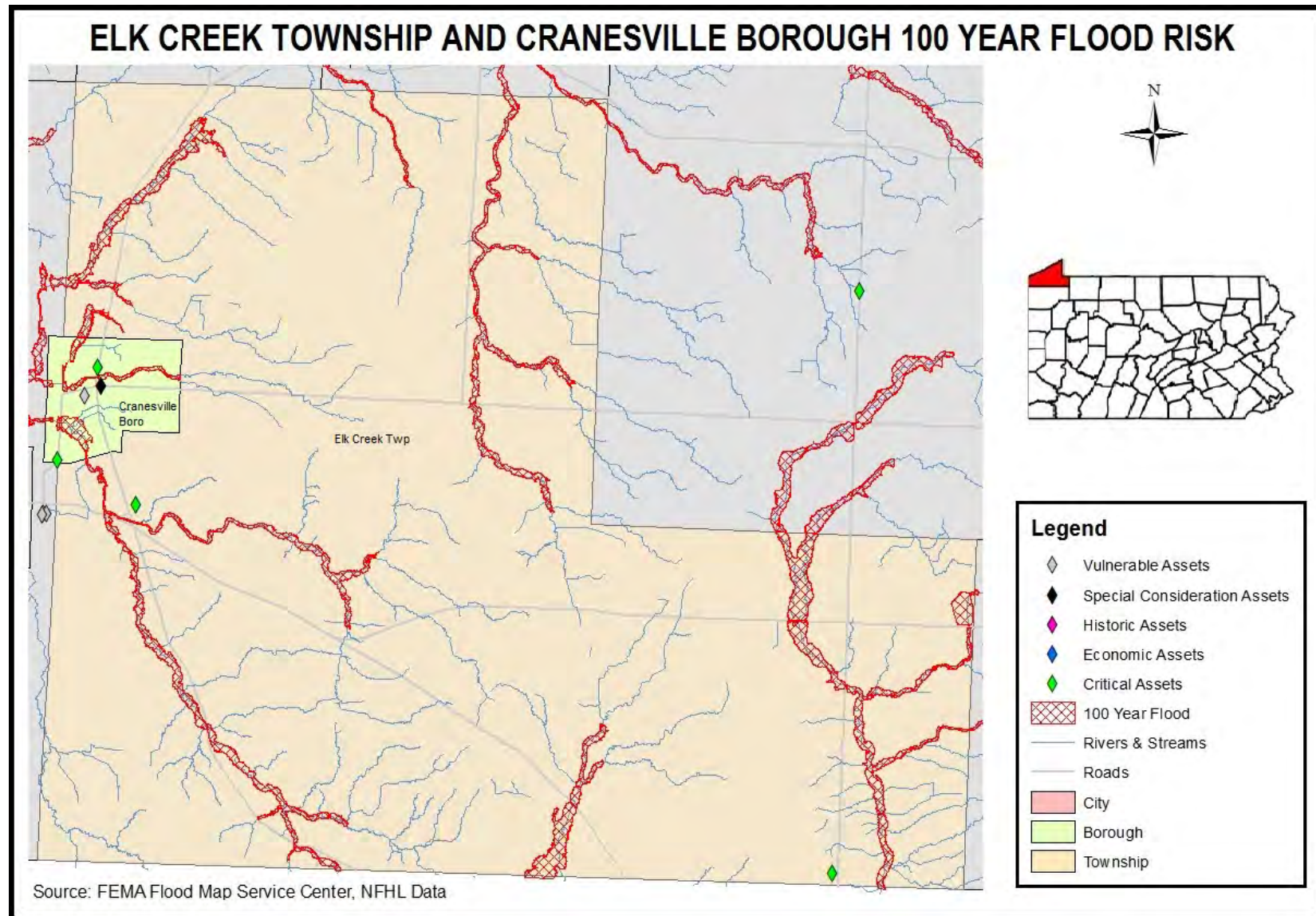


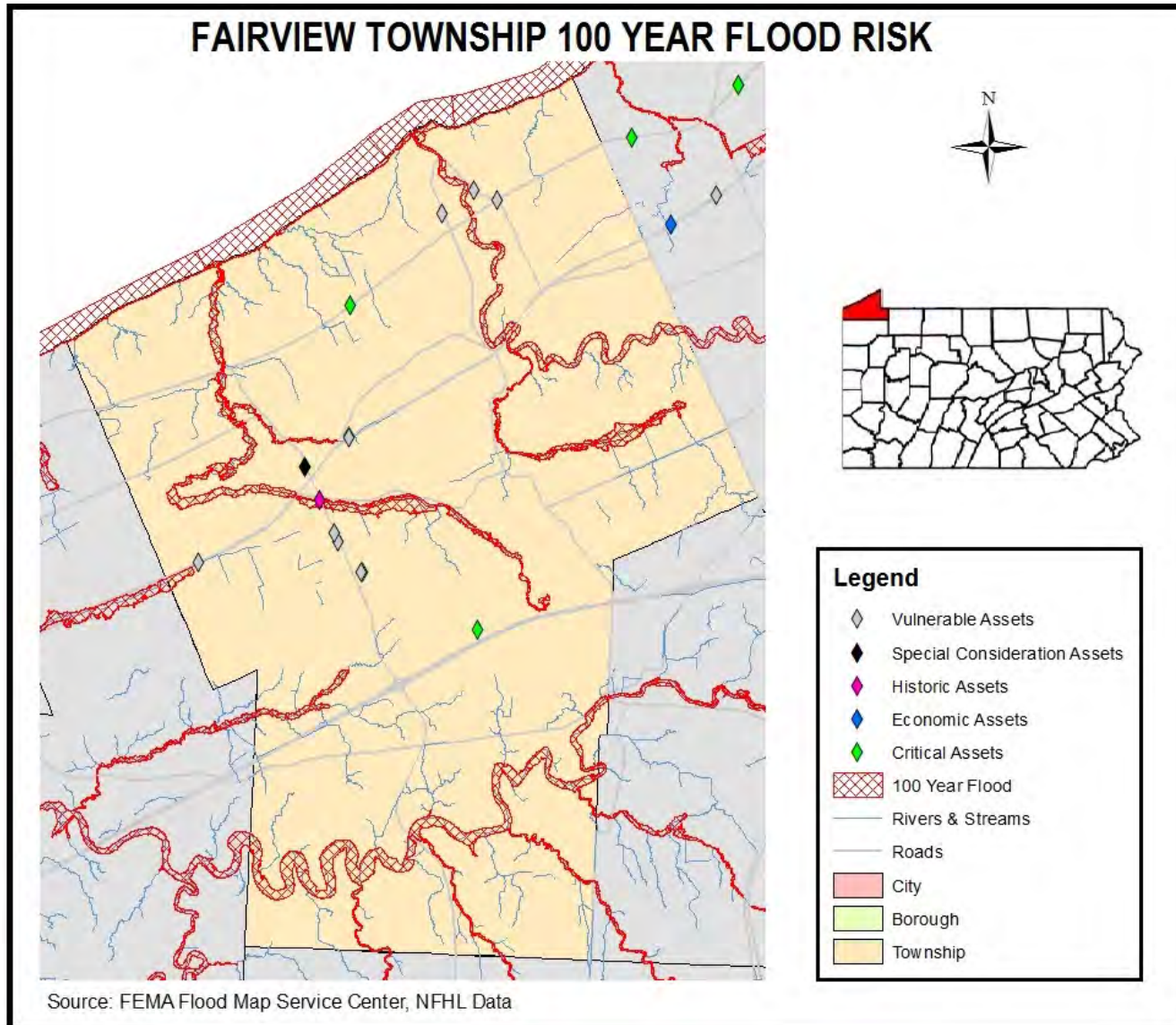
### CONNEAUT TOWNSHIP AND ALBION BOROUGH 100 YEAR FLOOD RISK



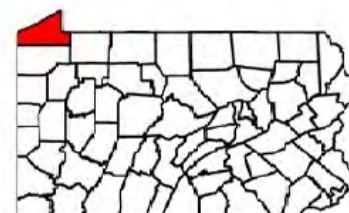
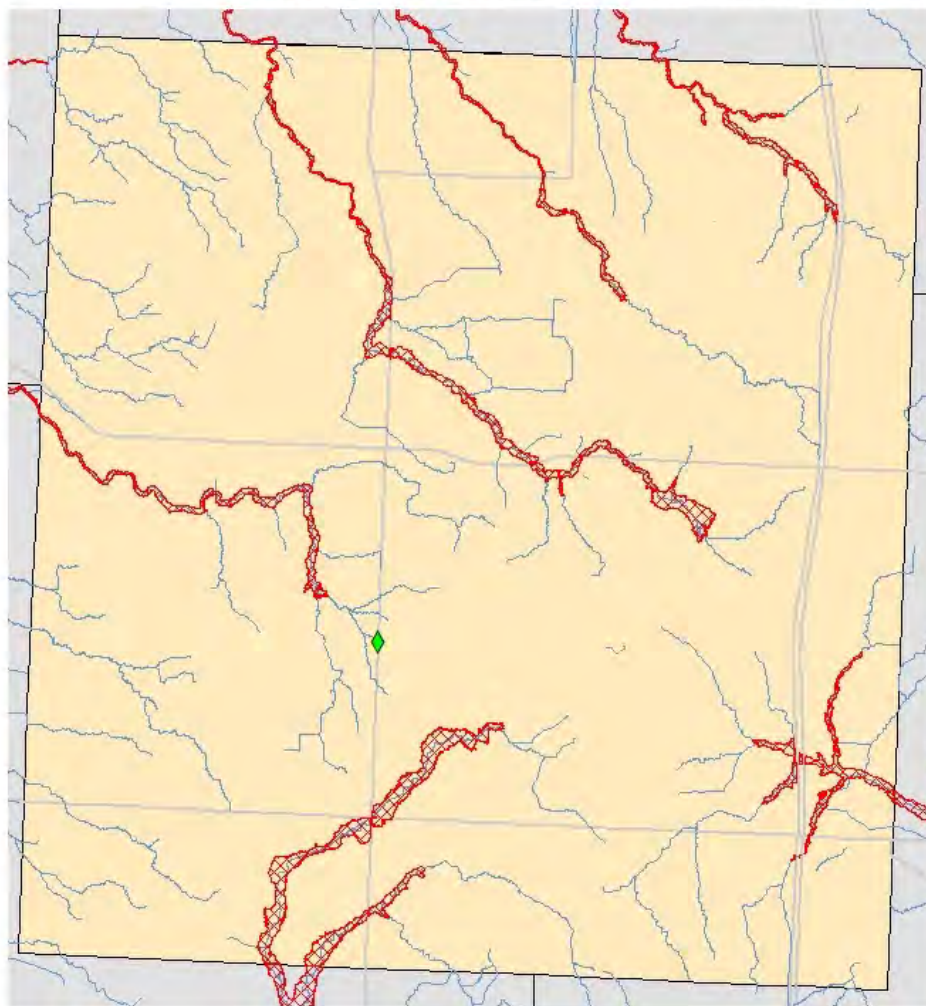
Source: FEMA Flood Map Service Center, NFHL Data







## FRANKLIN TOWNSHIP 100 YEAR FLOOD RISK



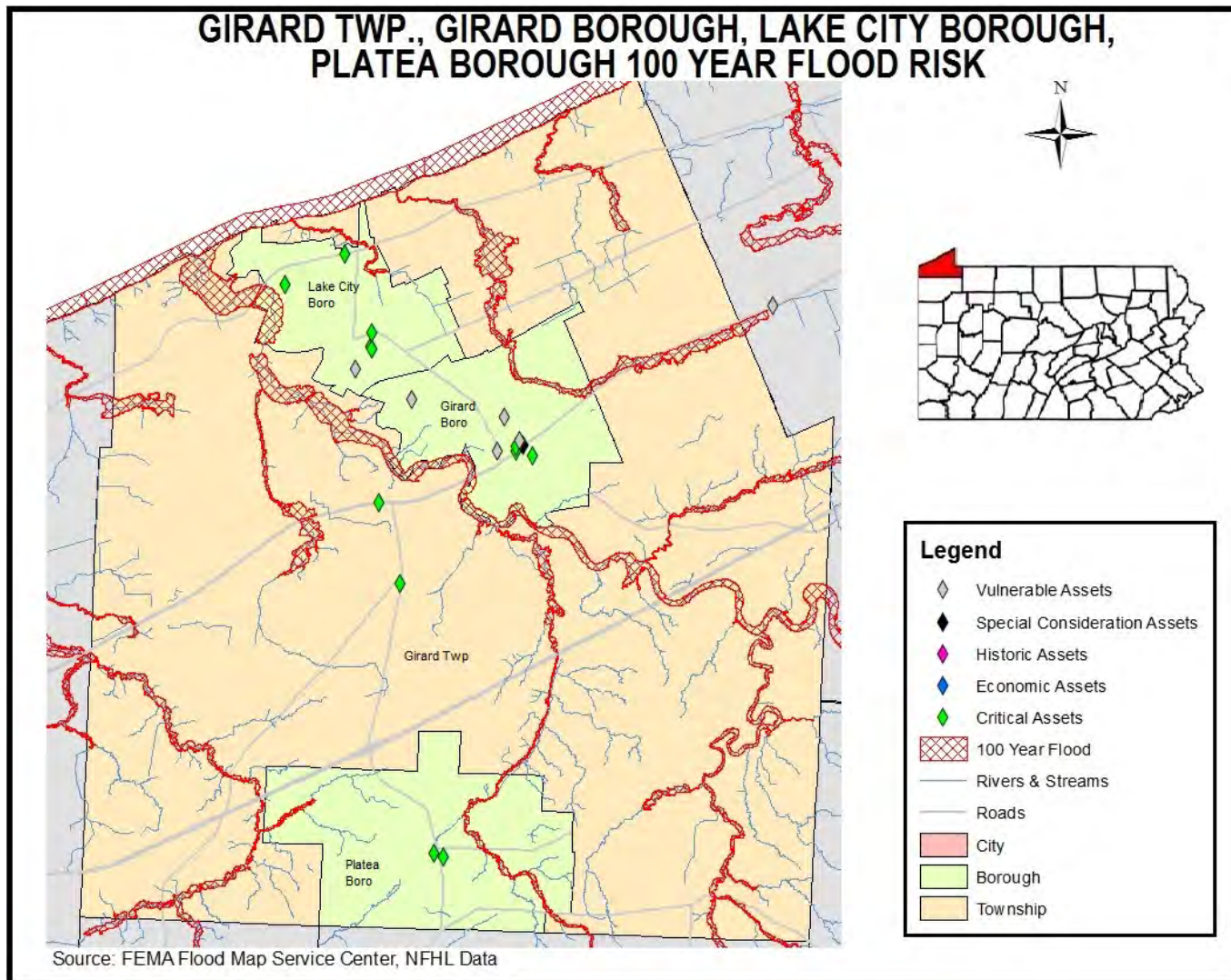
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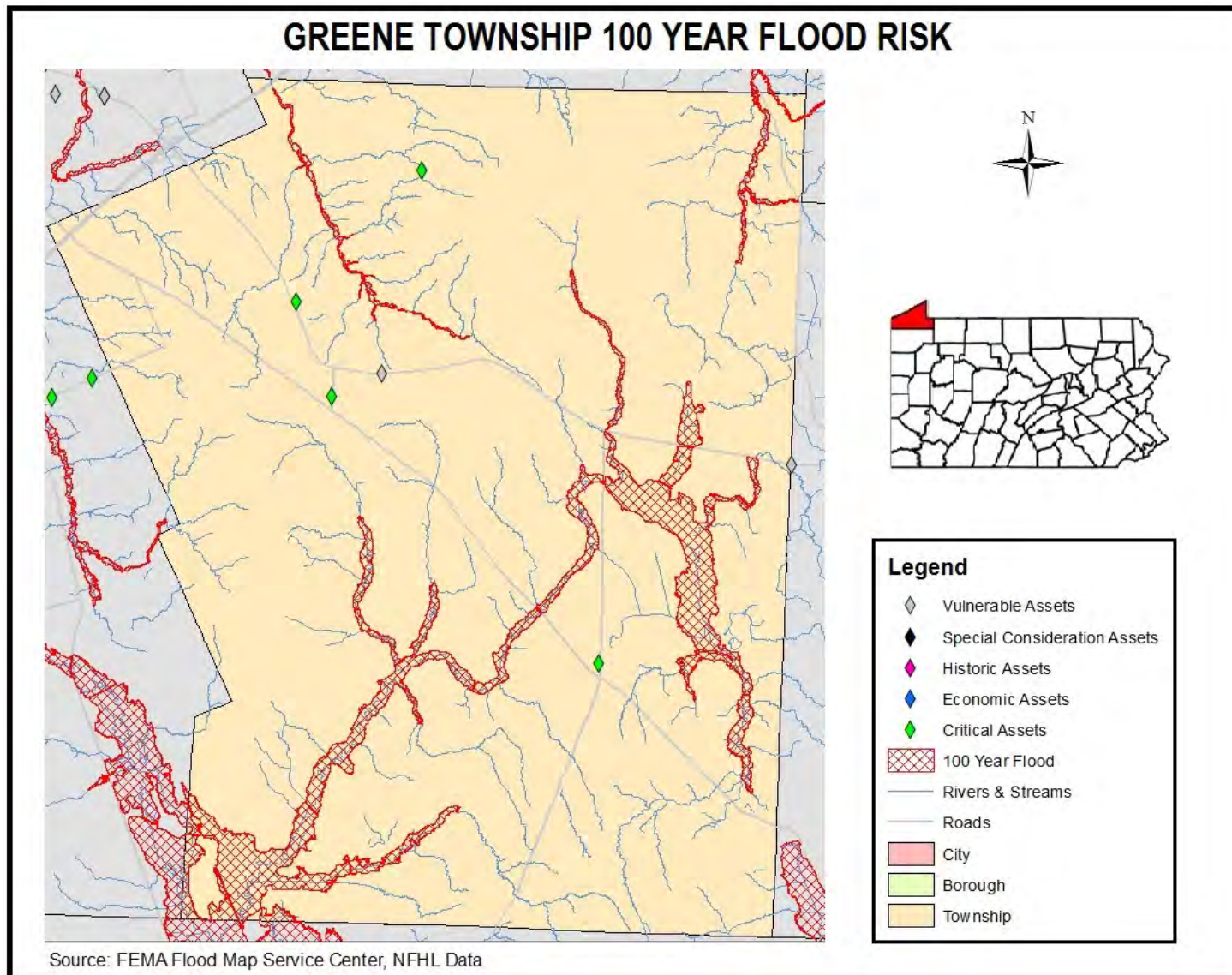
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- ◆ Special Consideration Assets
- ◆ Historic Assets
- ◆ Economic Assets
- ◆ Critical Assets
- ▨ 100 Year Flood
- Rivers & Streams
- Roads
- City
- Borough
- Township

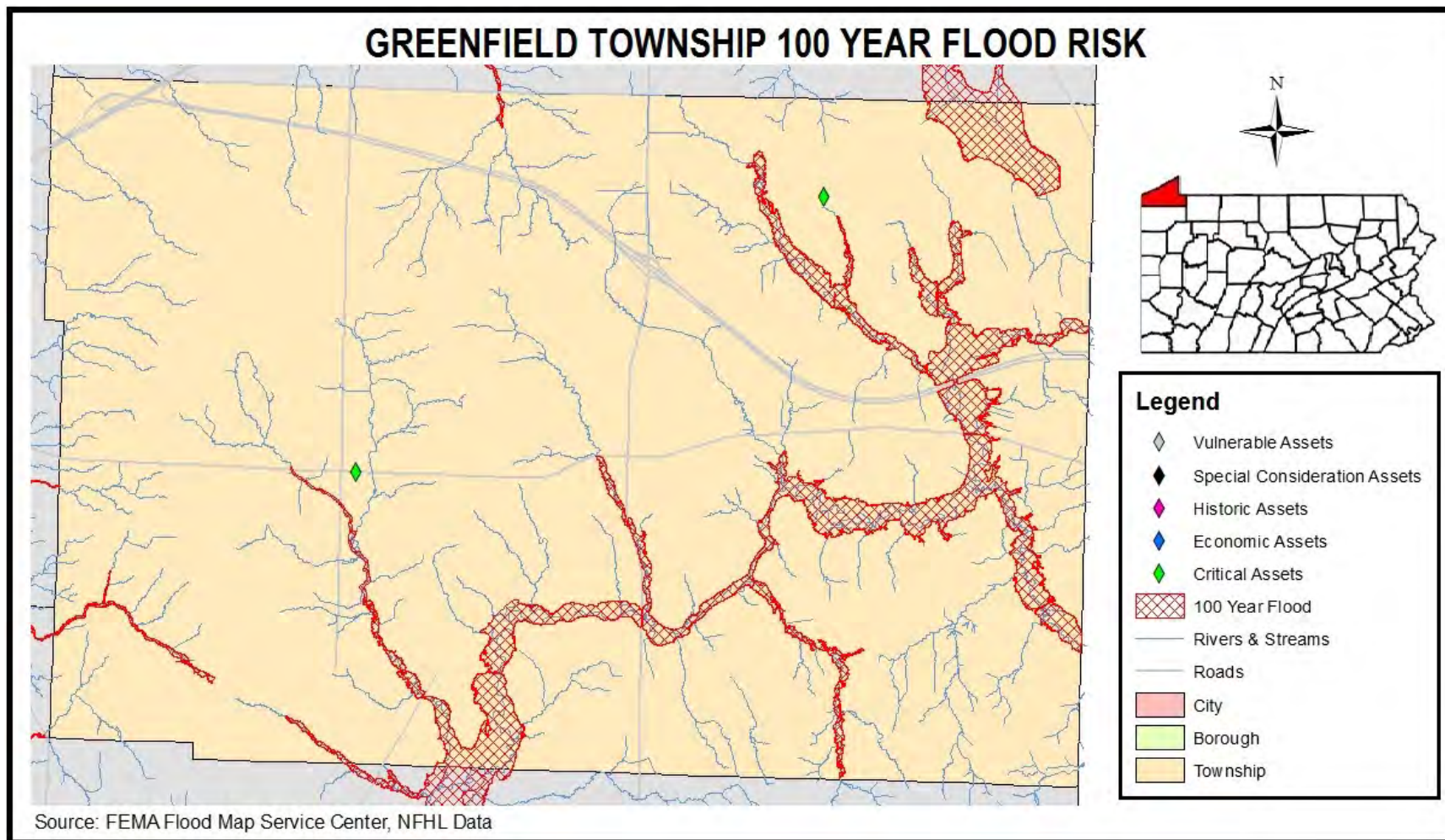
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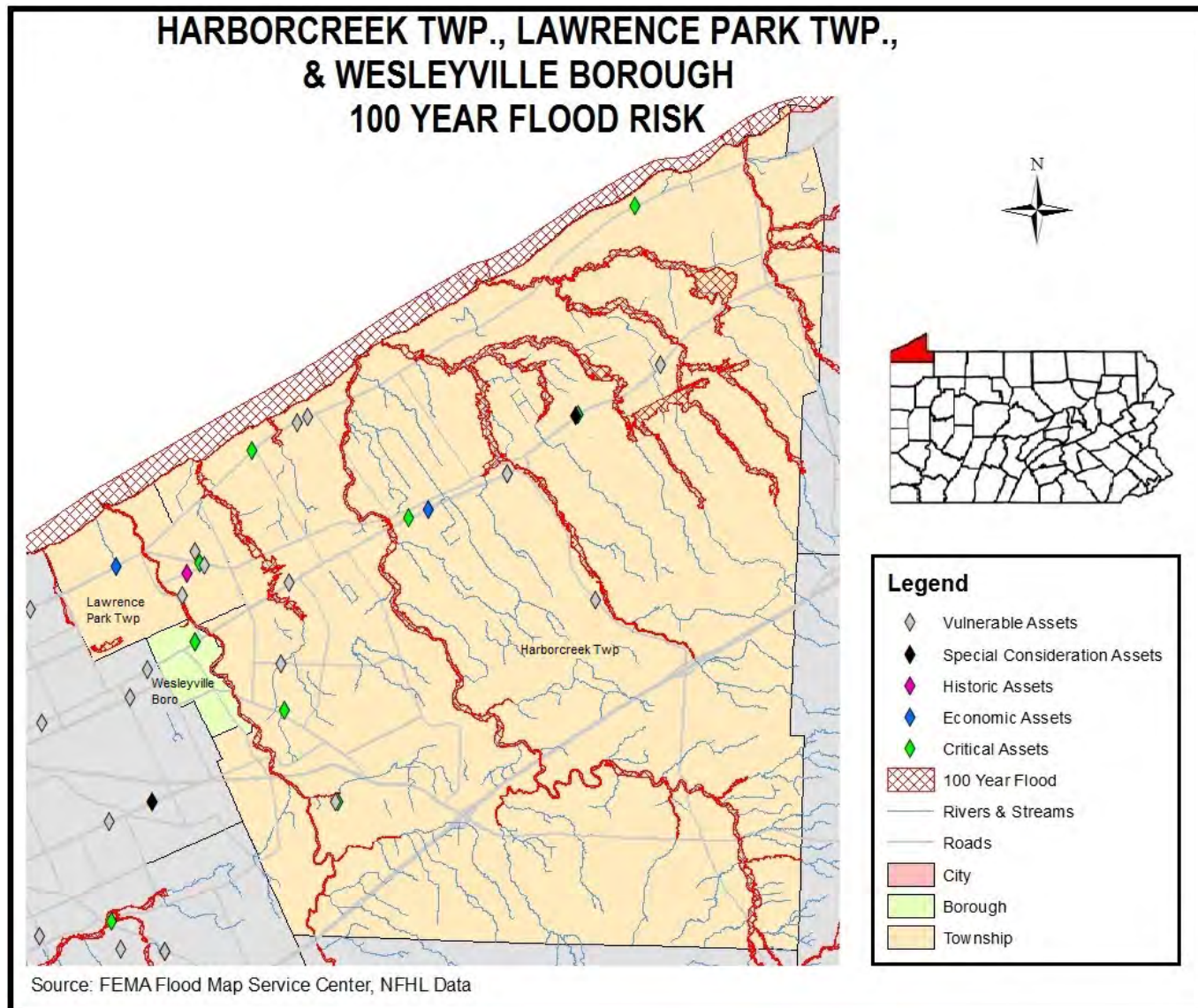




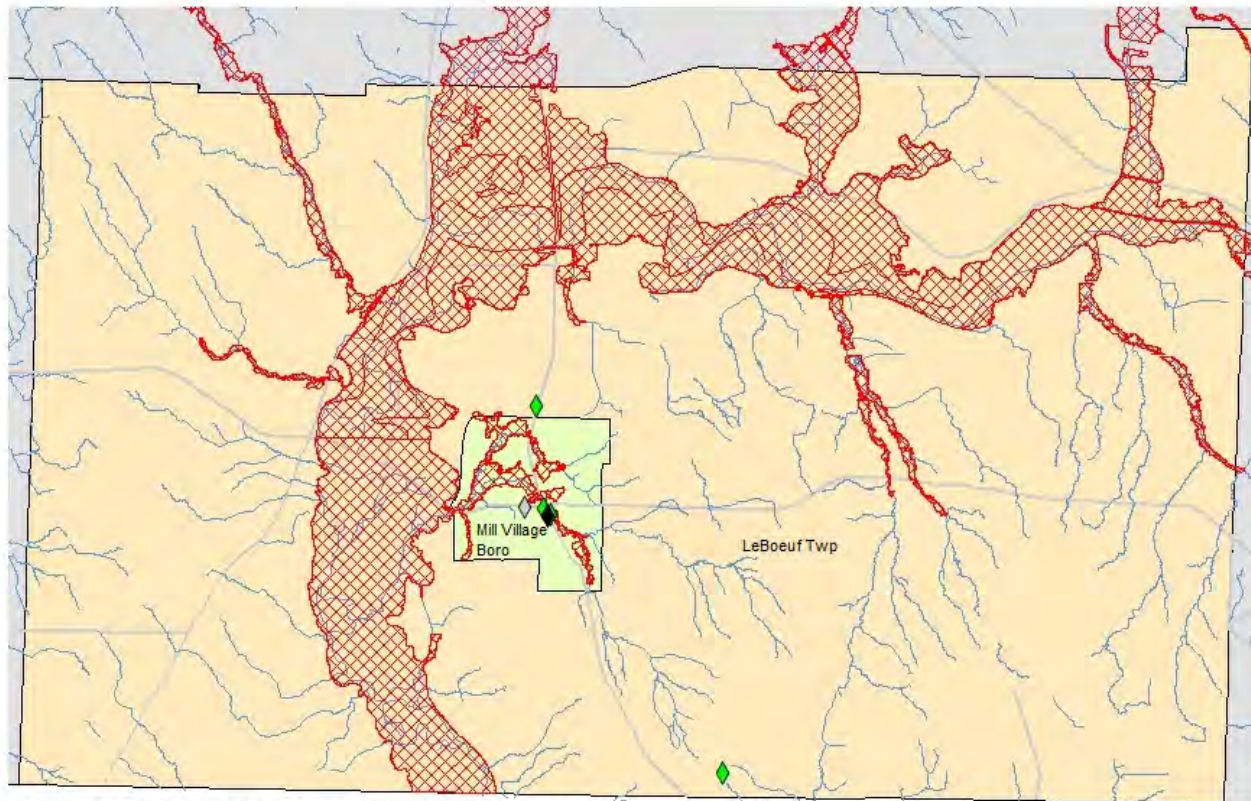








## LEBOEUF TWP. & MILL VILLAGE BOROUGH 100 YEAR FLOOD RISK



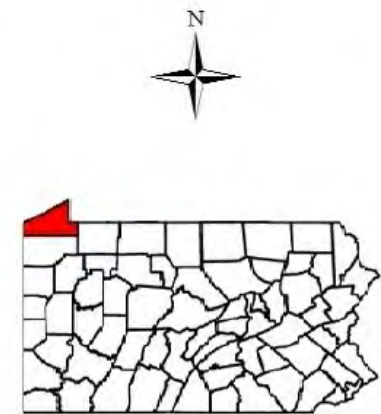
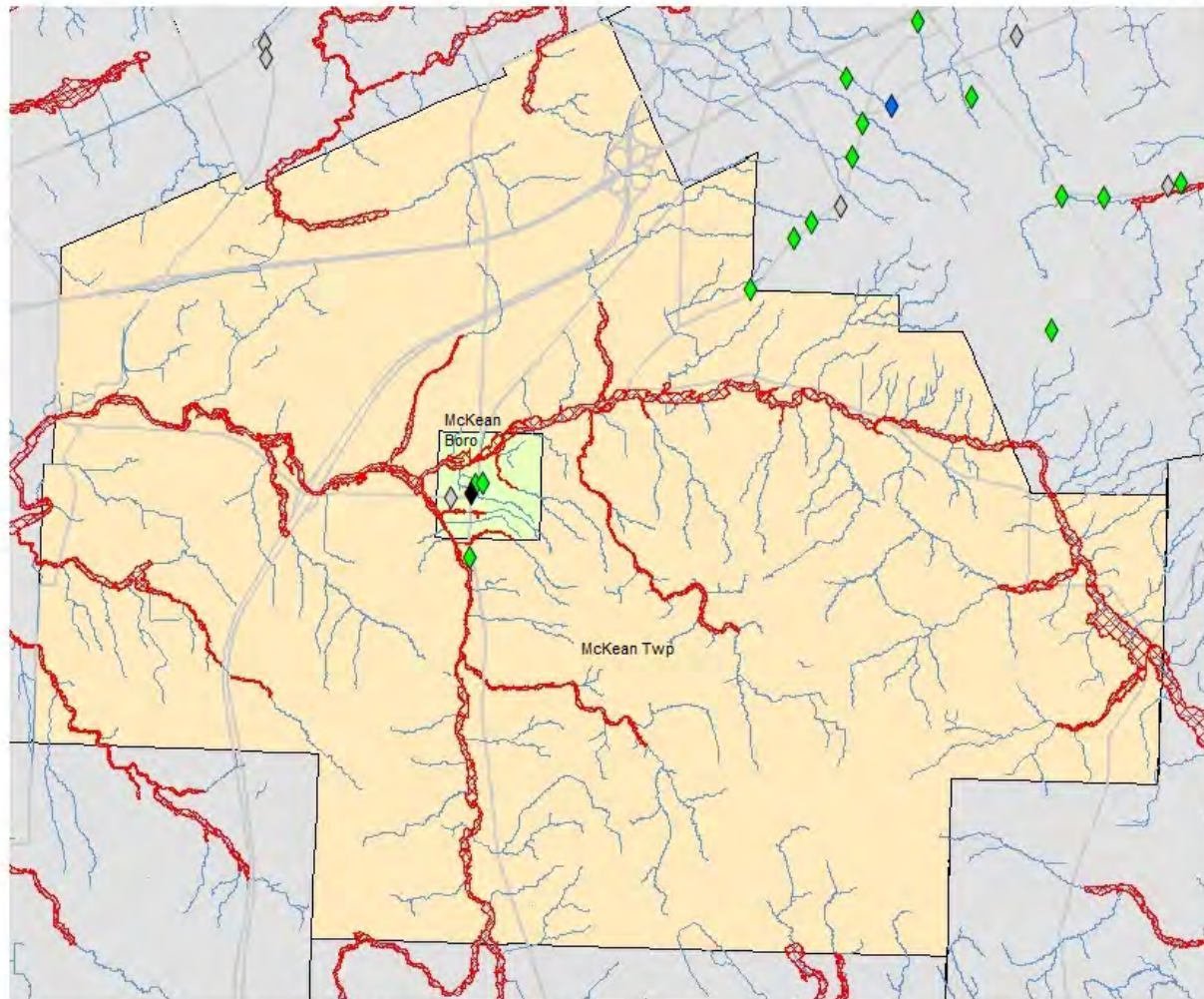
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- ◆ Special Consideration Assets
- ◆ Historic Assets
- ◆ Economic Assets
- ◆ Critical Assets
- ▨ 100 Year Flood
- Rivers & Streams
- Roads
- City
- Borough
- Township

Source: FEMA Flood Map Service Center, NFHL Data



### MCKEAN TWP. & MCKEAN BOROUGH 100 YEAR FLOOD RISK

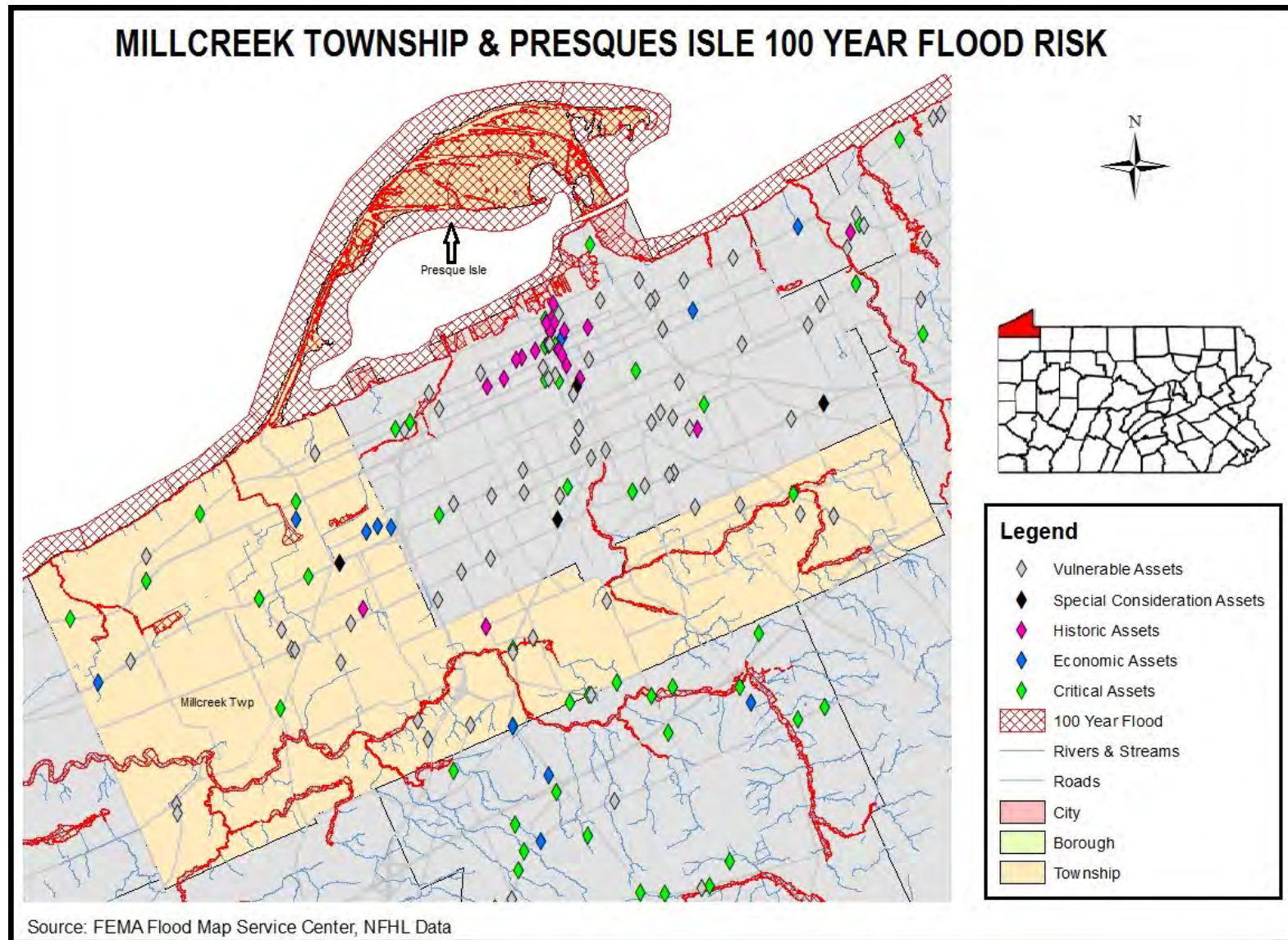


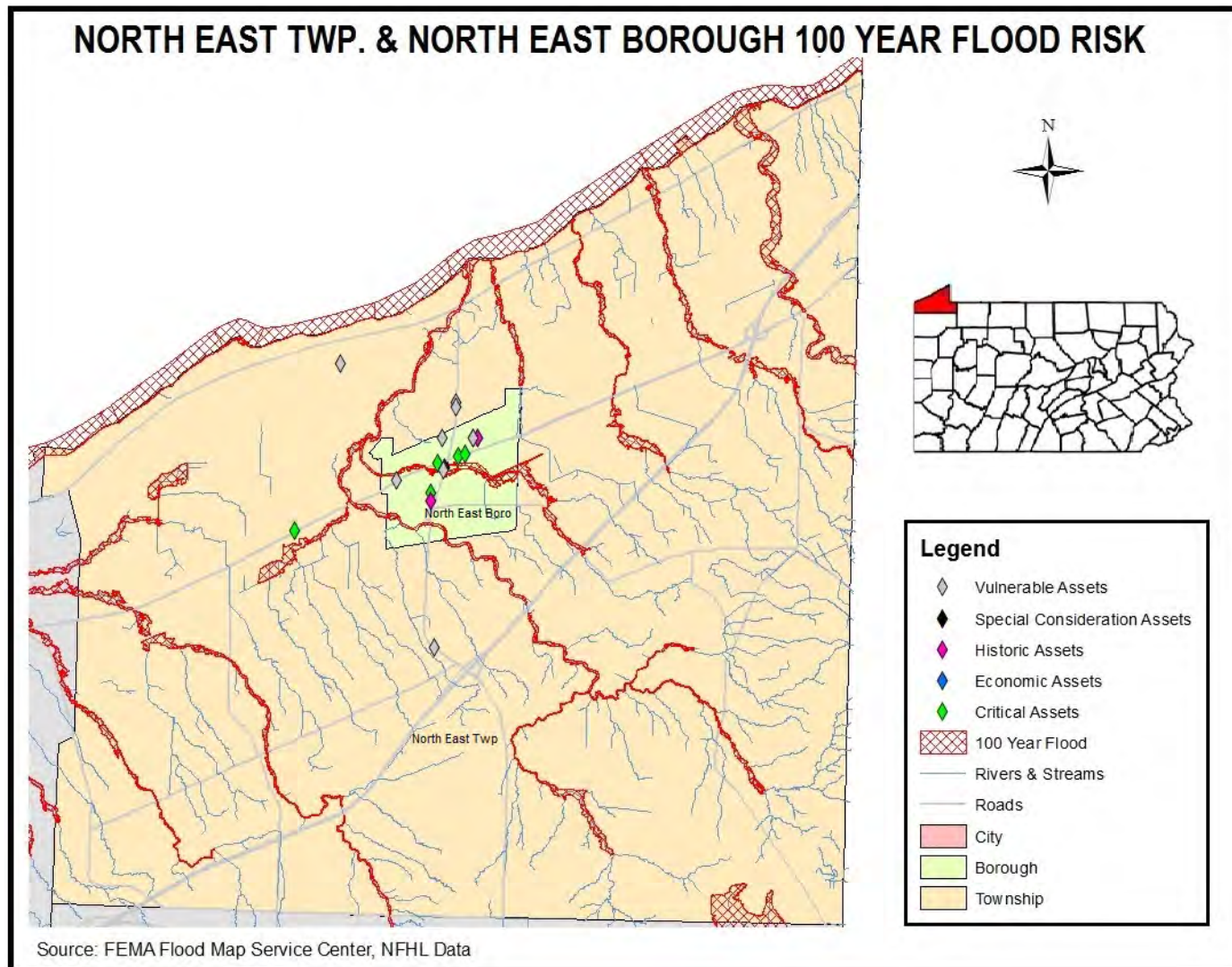
**Legend**

- ◇ Vulnerable Assets
- ◆ Special Consideration Assets
- ◆ Historic Assets
- ◆ Economic Assets
- ◆ Critical Assets
- ▨ 100 Year Flood
- Rivers & Streams
- Roads
- City
- Borough
- Township

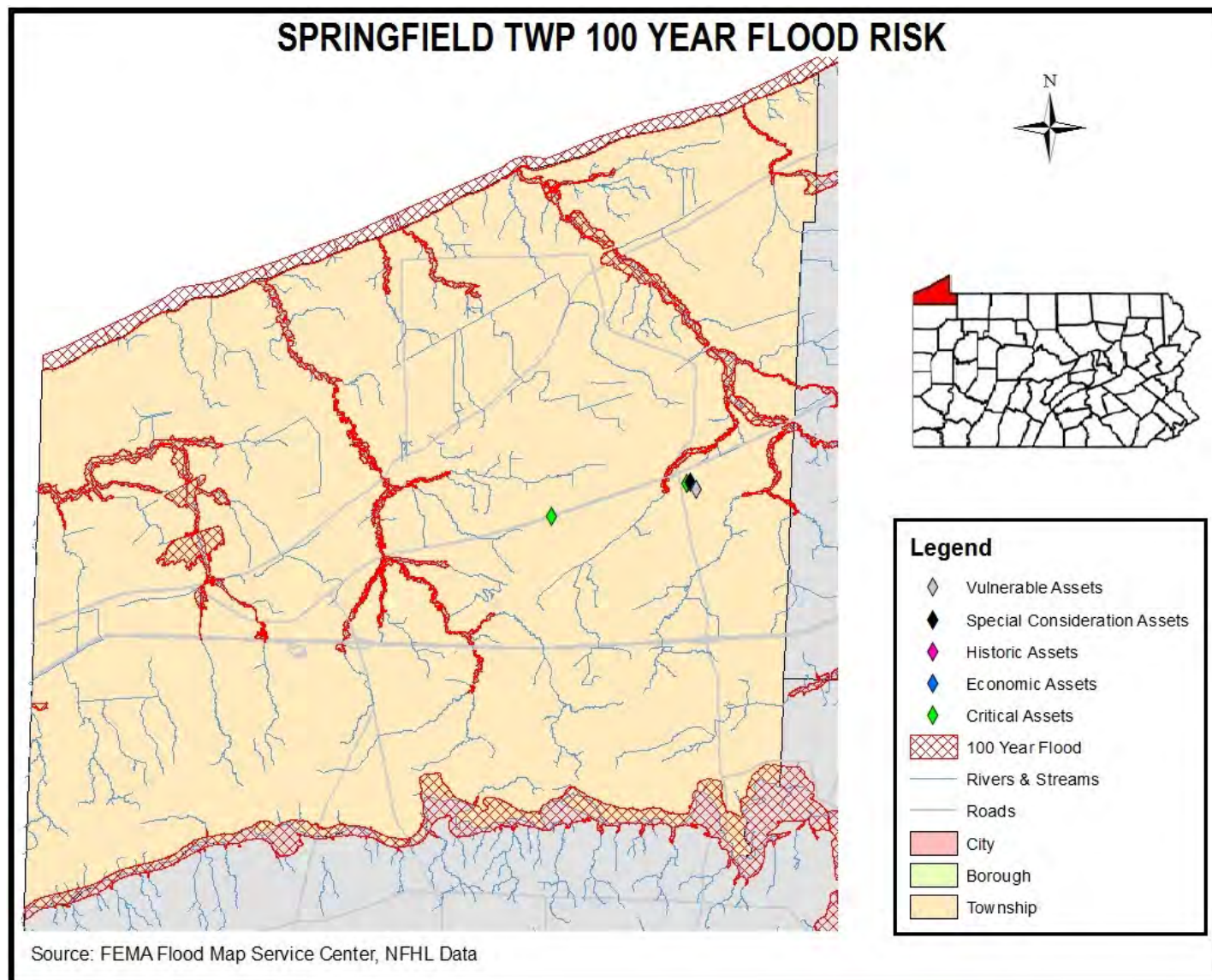
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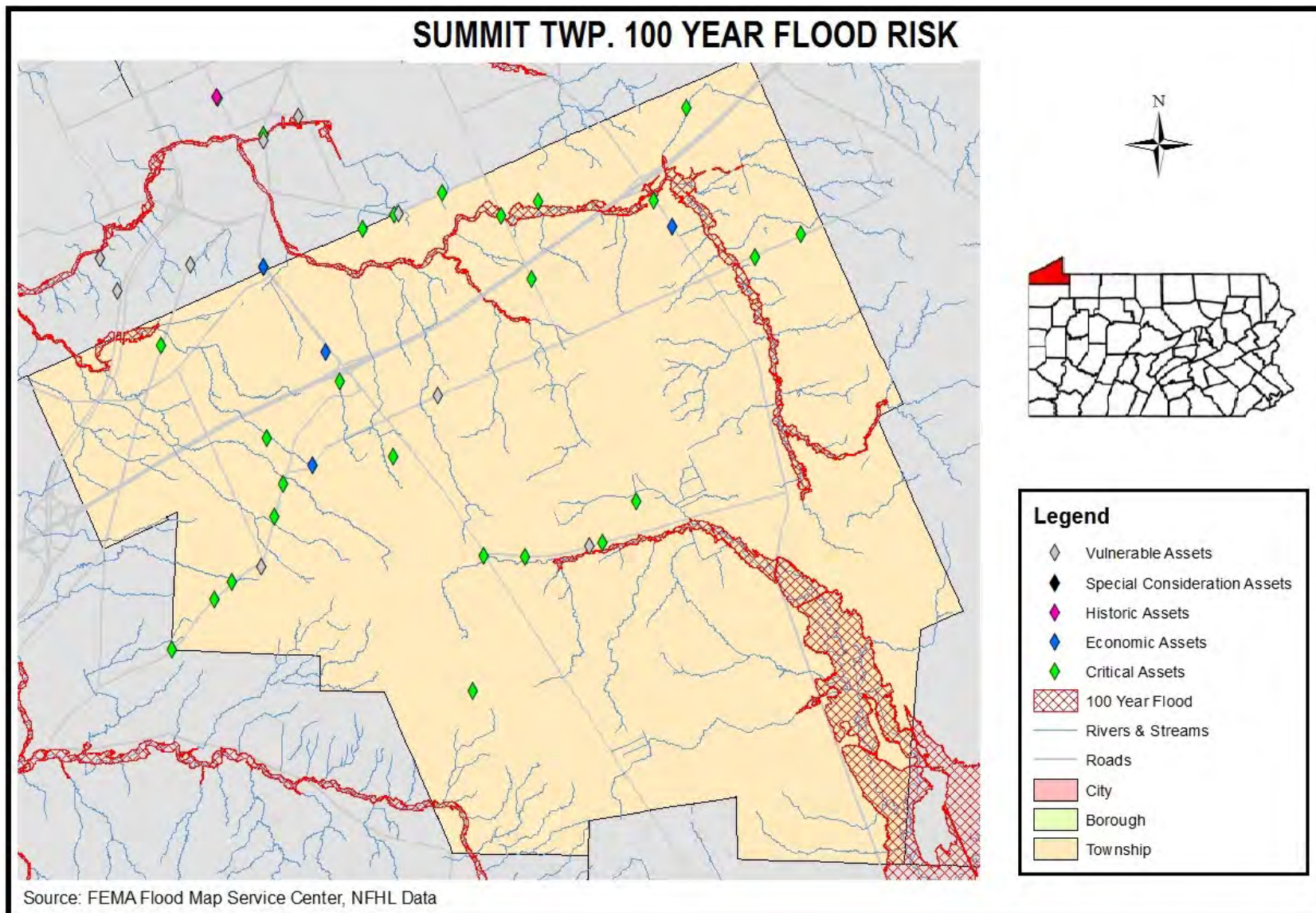


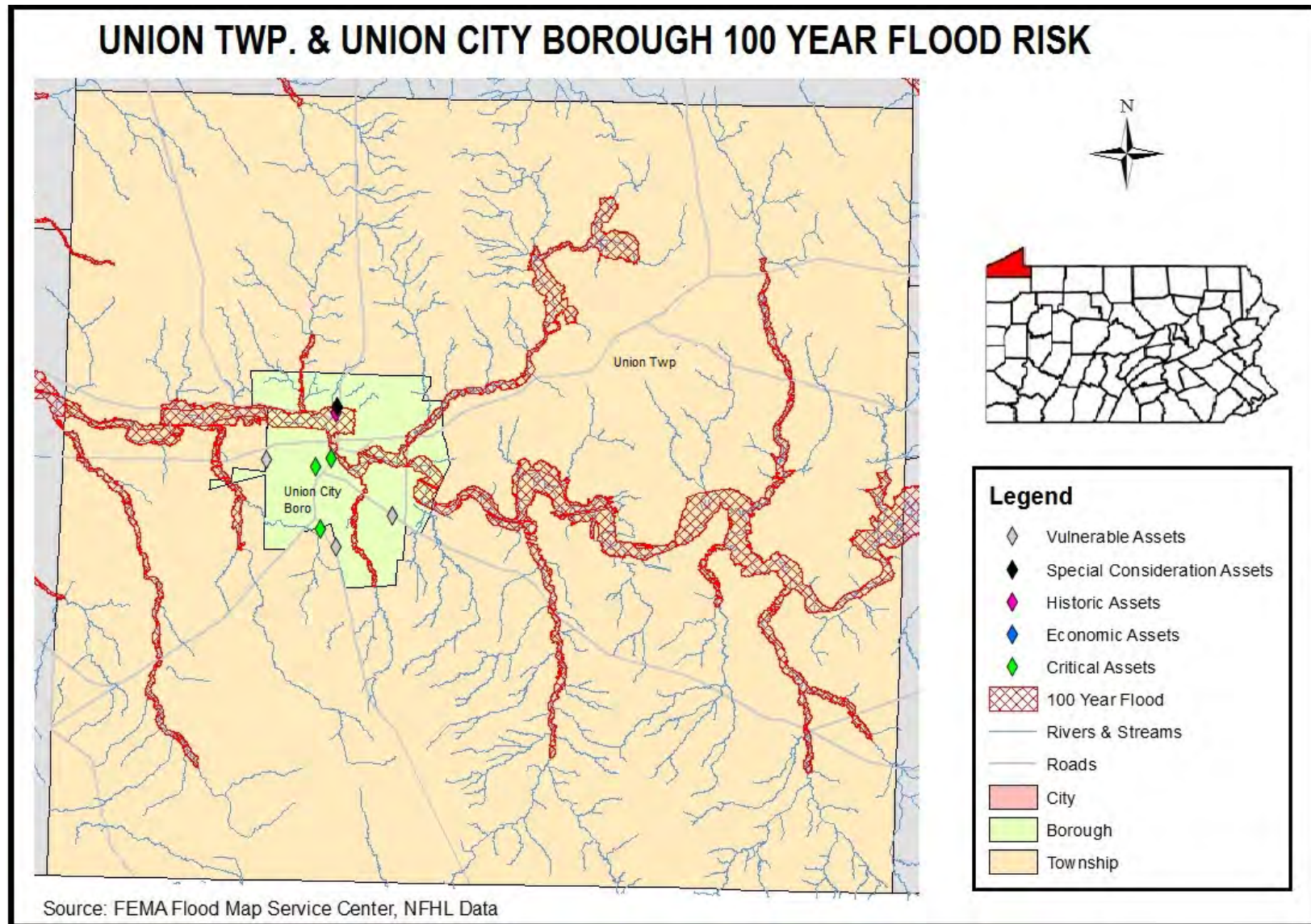


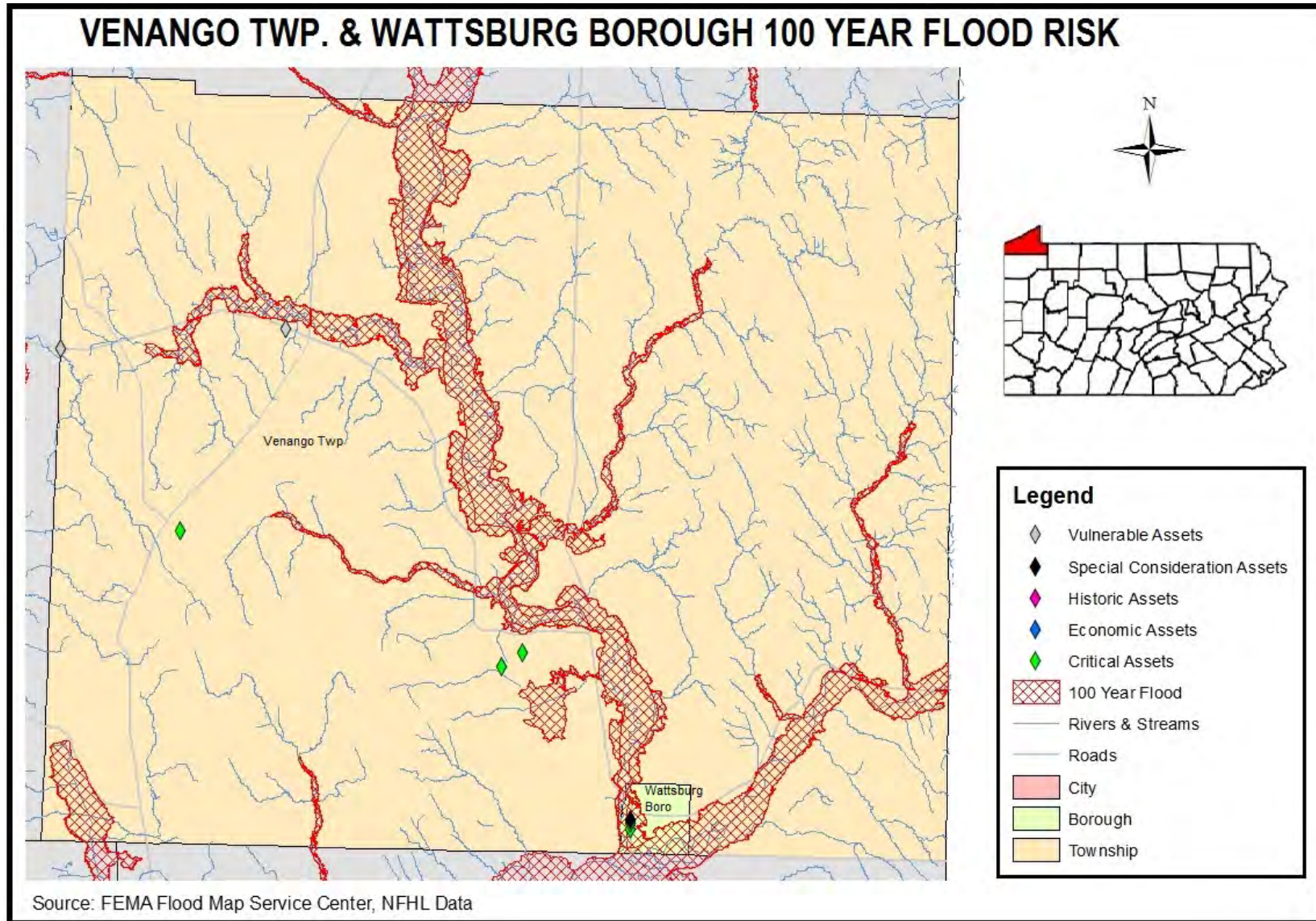




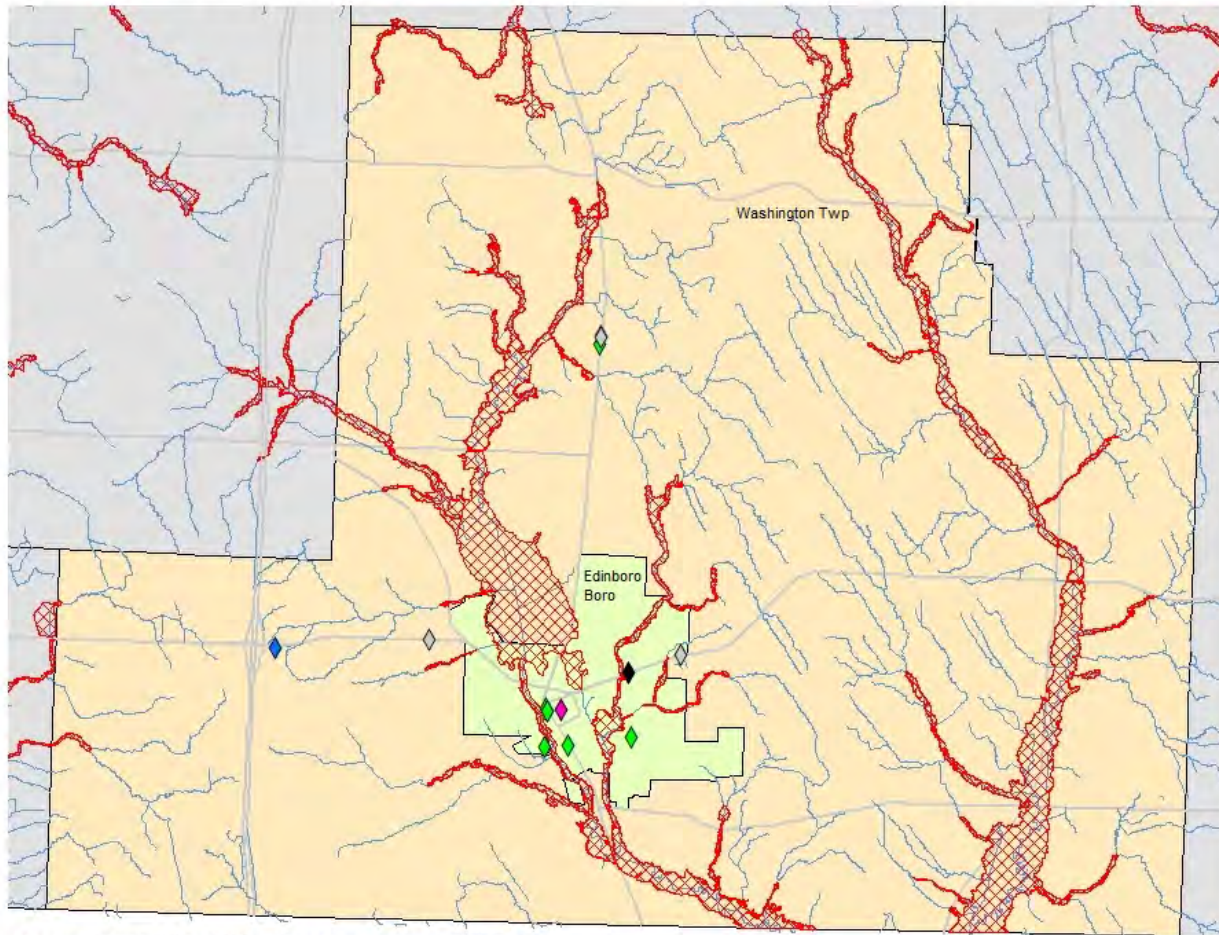








### WASHINGTON TWP. & EDINBORO BOROUGH 100 YEAR FLOOD RISK



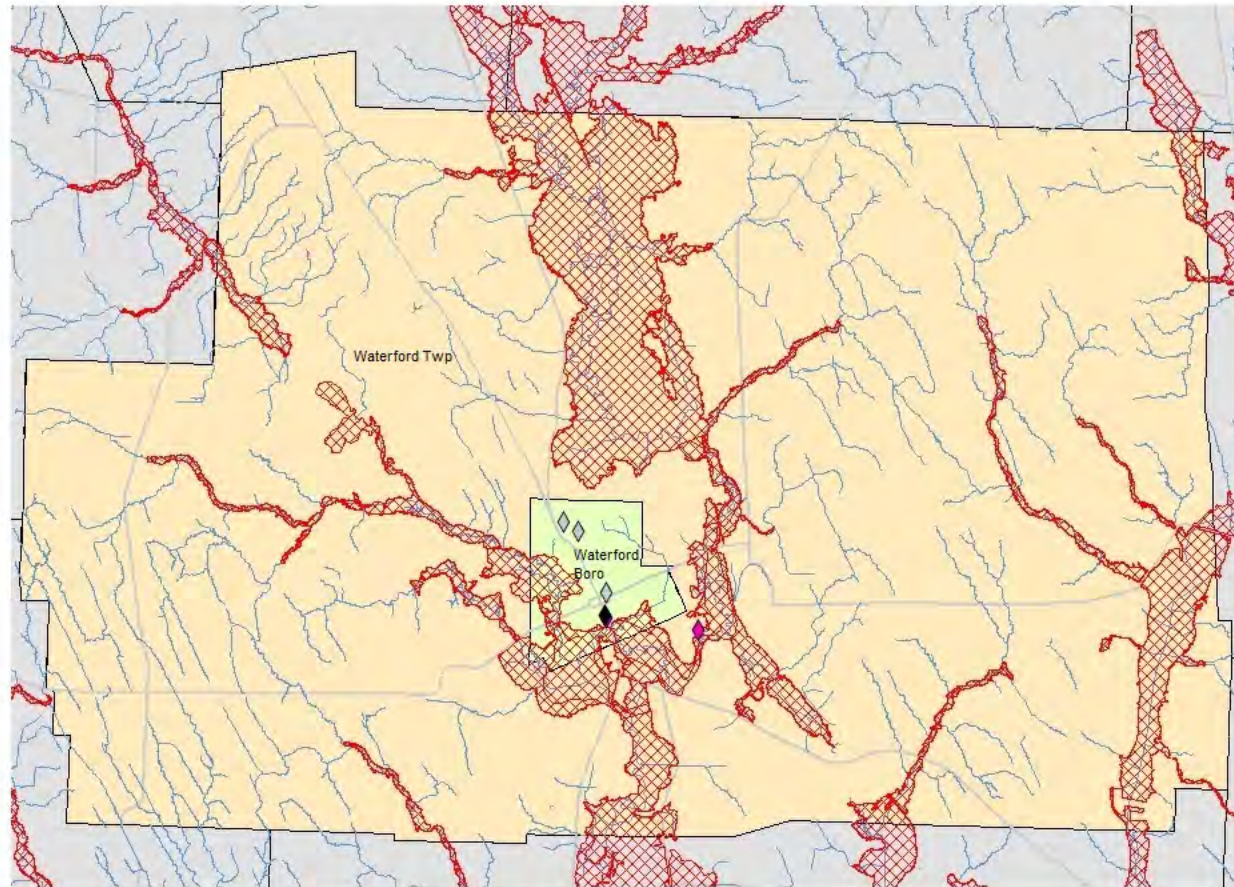
Source: FEMA Flood Map Service Center, NFHL Data

**Legend**

- ◇ Vulnerable Assets
- ◆ Special Consideration Assets
- ◆ Historic Assets
- ◆ Economic Assets
- ◆ Critical Assets
- ▨ 100 Year Flood
- Rivers & Streams
- Roads
- City
- Borough
- Township



## WATERFORD TWP. & WATERFORD BOROUGH 100 YEAR FLOOD RISK

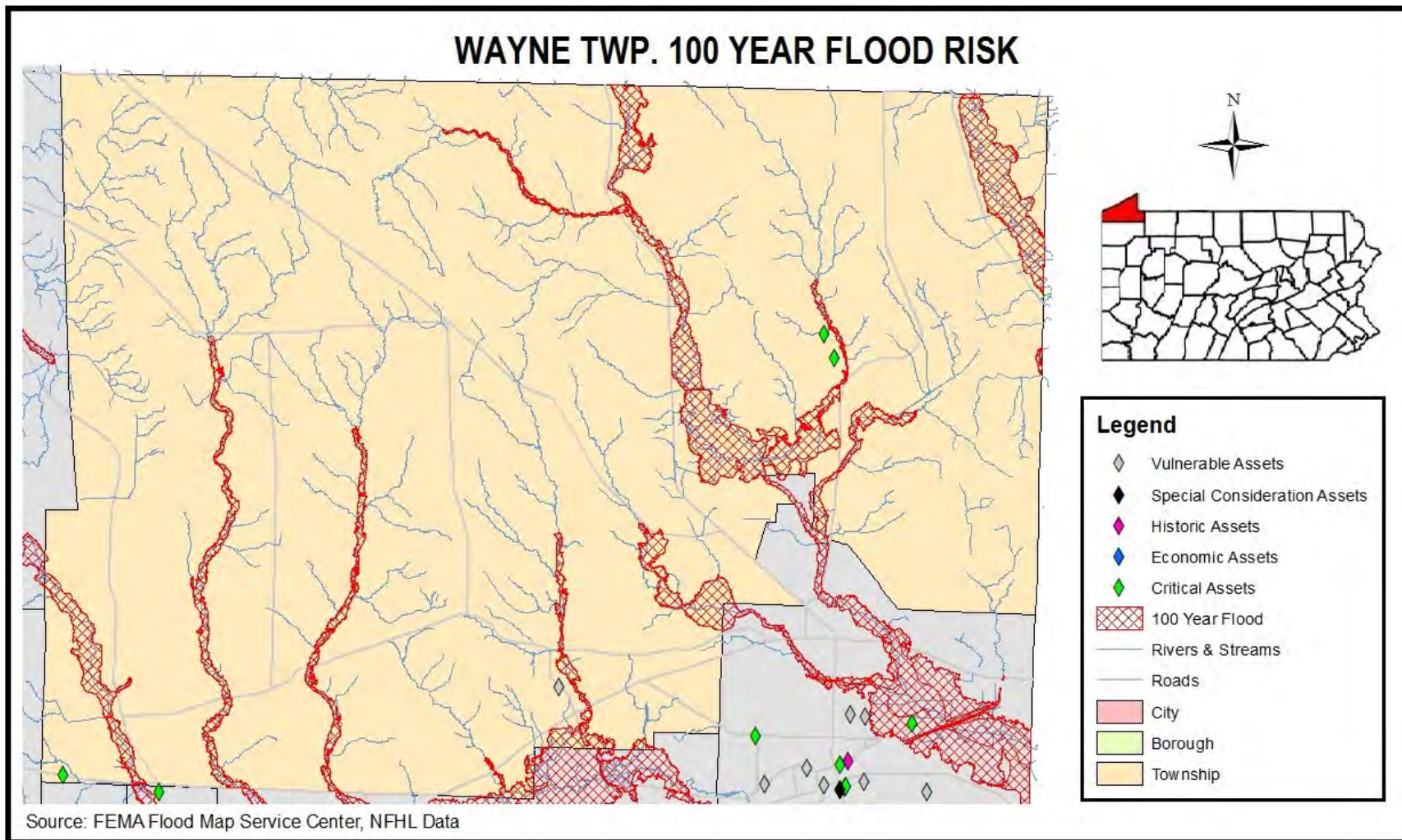


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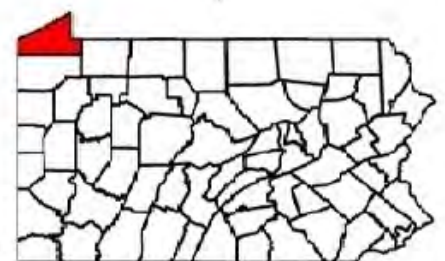
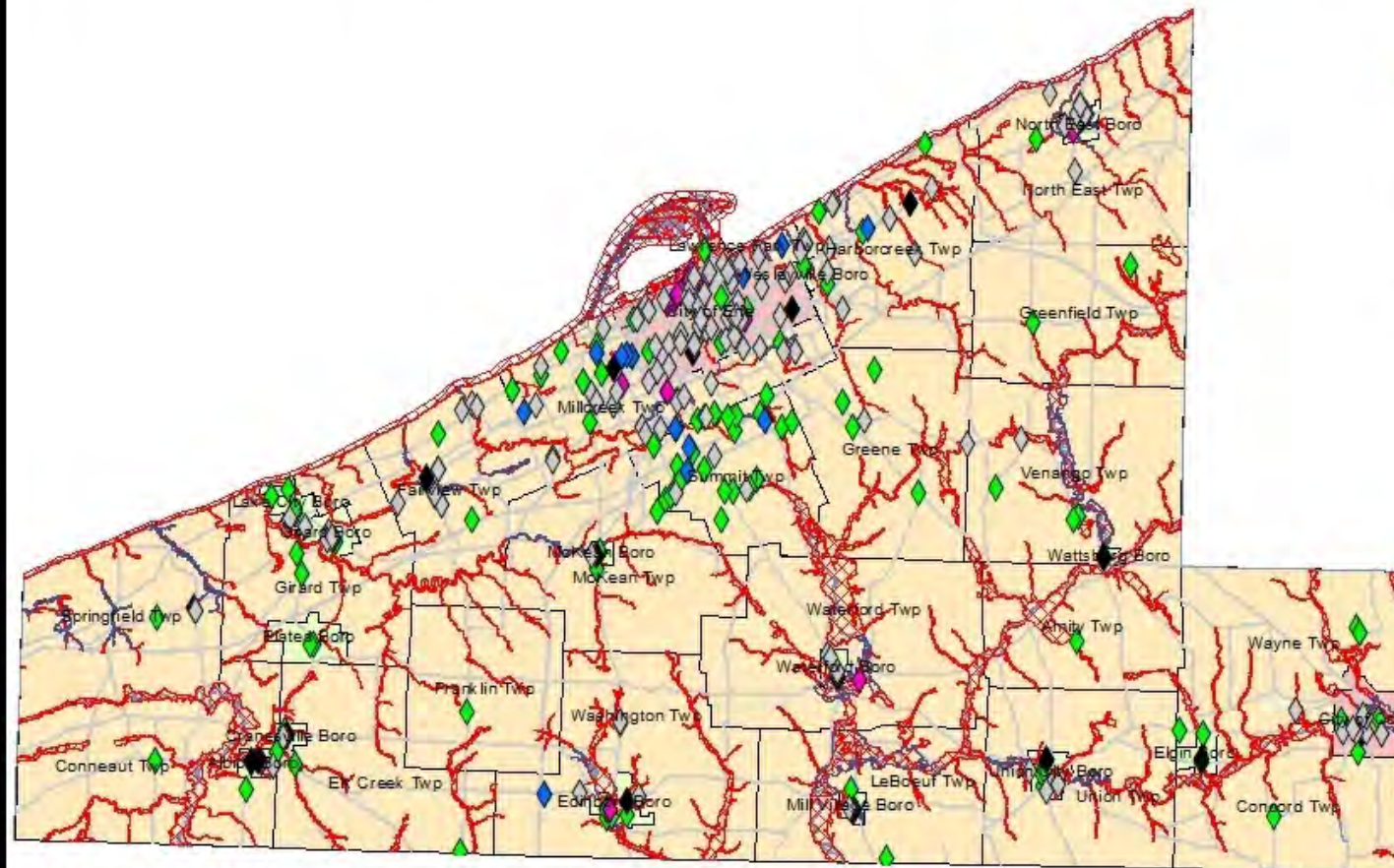
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- ◆ Economic Assets
- ◆ Critical Assets
- ▨ 100 Year Flood
- Rivers & Streams
- Roads
- City
- Borough
- Township

Source: FEMA Flood Map Service Center, NFHL Data





## ERIE COUNTY .2 PERCENT FLOOD RISK



**Legend**

- ◇ Vulnerable Assets
- ◆ Special Consideration Assets
- ◆ Historic Assets
- ◆ Economic Assets
- ◆ Critical Assets
- ▨ .2 Percent Flood Risk
- ▨ 100 Year Flood
- Rivers & Streams
- Roads
- City
- Borough
- Township

Source: FEMA Flood Map Service Center, NFHL Data





4.3.4.5 Vulnerability Assessment

TABLE 4.3.4.5.A FLOOD, FLASH FLOOD, ICE JAM VULNERABILITY ASSESSMENT					
<i>Probability</i>			<i>Severity</i>		<i>Risk</i>
FREQUENT			MARGINAL		MODERATE
Events	66	=3.14	+	=	A combination of frequent occurrence and marginal level of severity puts this hazard at moderate risk to Erie County.
Years	21				
There is likely a chance that a flood event will occur several times throughout the year.					
			The average property damage for historical events in NCEI is \$441,000 with no records of injuries or death.		



### 4.3.5 Invasive Species

"Invasive alien species are plants, animals, or other organisms that are introduced to a given area outside their original range and cause harm in their new home" (Defenders of Wildlife).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
May be introduced to the environment at any time.	None to Years	MODERATE

#### 4.3.5 Location and Extent

Invasive plants grow rapidly and aggressively, thereby displacing other plants. Invasive plants are usually non-native species introduced to a region either accidentally or on purpose by people. These plants can be trees, shrubs, vines, grasses, or flowers. When introduced to a new environment, the conditions within their natural range are no longer present, allowing invasive species to aggressively change an ecosystem (PADCNR, 2017). Harmful algal bloom (HAB) is an invasive species that grows in water and can be extremely toxic. HABs are a type of bacteria and have been present in Lake Erie since the 1990s. Though certain invasive species affecting the lake are discussed below, HABs are included in the lake hazards profile.

Invasive animals have the ability to thrive and spread aggressively outside their native habitats. A naturally aggressive animal may be especially invasive. Invasive animals include aquatic animals such as the zebra mussel and the quagga mussel. Both can be found in Lake Erie (USDA, 2016).

Other types of invasive species include insects and diseases. Invasive insects that have been identified in Pennsylvania or contiguous states include the Asian Longhorned Beetle, Emerald Ash Borer, Gypsy Moths and the Hemlock Woolly Adelgid. Most of the diseases that afflict trees, such as Beech Bark Disease and Sudden Oak Death, are caused by fungi (PADCNR, 2017).

#### HARMFUL ALGAL BLOOMS

Harmful algal blooms (HAB) are overgrowths of algae in the water. HABs have been plaguing the lake since the 1990s (Flesher, 2016). They have the ability to produce toxins, but even the nontoxic blooms damage the environment and local economies. Toxins created by HAB can cause illness or be fatal to humans and animals. HAB raise the cost of treating drinking water and hurt industries that rely on clean water (USEPA, 2017). The Department of Environmental Protection reports



that Presque Isle Bay is at the highest risk for HABS due to warm fertile waters. Also at risk are the off-shore public water intakes used by the City of Erie and North East Borough (PSU, 2017).

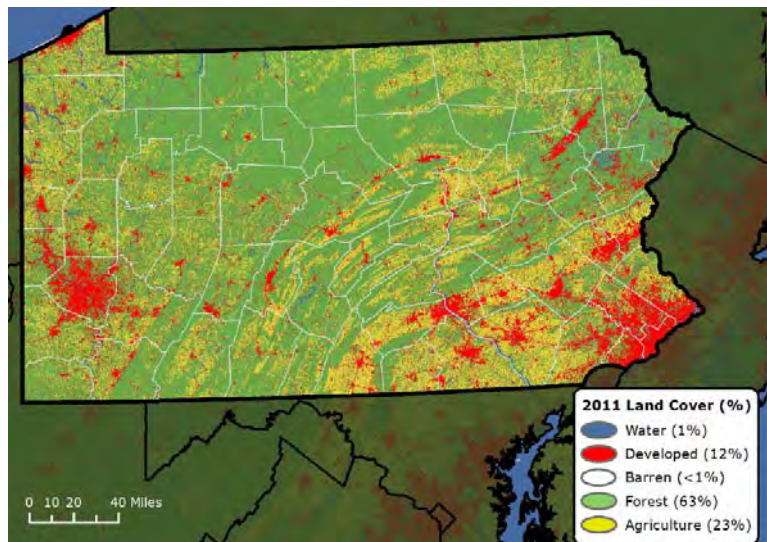
HAB put wildlife at risk from toxins, through direct ingestion and consuming food containing the toxins. Pets and livestock are also at risk from exposure to HAB, with deaths documented at various locations nationwide (National Wildlife Federation, 2017).

In 2013, the Pennsylvania Sea Grant facilitated workshops on HAB which led to the formation of the Erie County HAB Task Force. The task force developed a document on preparedness and response strategies which now guides monitoring and advisories in Pennsylvania Lake Erie waters ([www.seagrant.psu.edu](http://www.seagrant.psu.edu), 2016).

#### 4.3.5.2 Range of Magnitude

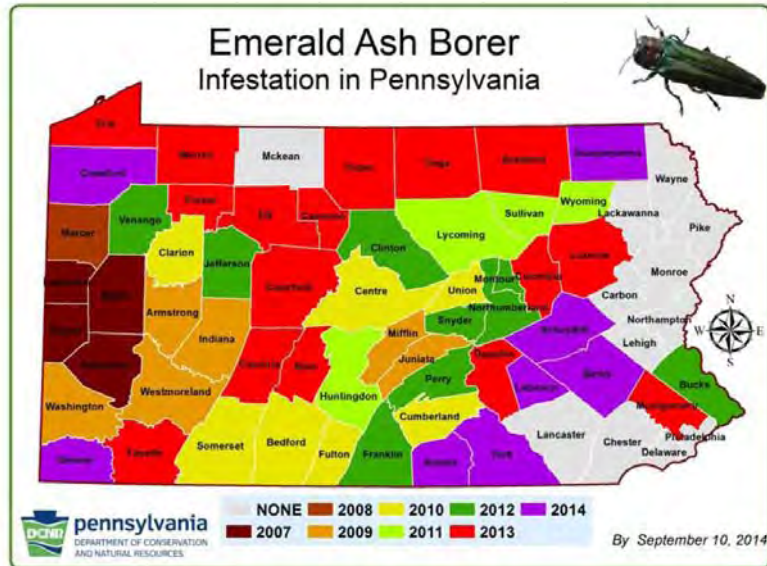
People can accidentally spread invasive species. Seeds of plants, larvae and aquatic animals can become attached to clothing, boots, personal belongings and vehicles and be carried from one location to another. However, some people purposely introduce invasive species by releasing exotic pets, plants or fish into Erie County's ecosystem (PADCNR, 2017).

Similar to the entire state, Erie County has small developed sections with the majority of the land being forested or agricultural. As such, Erie County is vulnerable to invasive species. Lake Erie is



also susceptible to aquatic plants and animals, such as Eurasian water-milfoil and zebra mussels, which both have concentrations in the Great Lakes. Eurasian water-milfoil is believed to have been introduced in the U.S. accidentally between the later 1800s and the 1940s, possibly from the aquarium trade. Once established in its new habitat, this plant blocks light, killing native plants and reducing habitats for fish

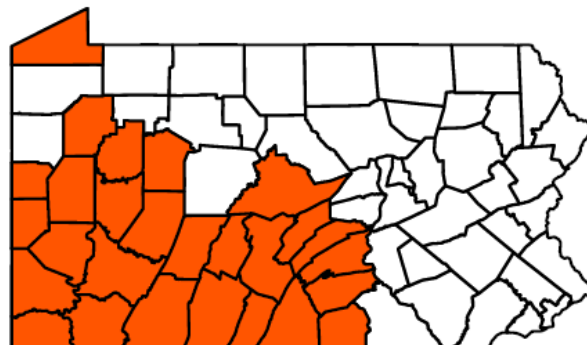
spawning and breeding (PADCNR, 2017). Zebra mussels have disrupted the aquatic food chain, caused a reduction in the native mussels populations, and increase organic pollutants ([www.protectourwaters.net](http://www.protectourwaters.net)).



**Invasive**

insects have been identified in and around Erie County. First found in Erie County in 2007, by 2013, the county had an infestation of the Emerald Ash Borer (EAB). The adult EAB eats ash foliage but causes little damage to the tree. However, the larvae feed on the inner bark of the tree.

Feeding on the inner bark disrupts the tree’s ability to transport necessary water and nutrients. Since first being identified in the U.S. in 2002, the EAB has killed millions of ash trees, forcing the USDA to enforce quarantines and



costing landowners, nursery operators and forest product industries hundreds of millions of dollars ([www.emeraldashborer.info](http://www.emeraldashborer.info), 2017).

Oak wilt, an invasive disease, was first identified in 1944. Oak wilt is a fungal disease that kills oak trees in forests, woodlots, and home landscapes. The disease is spread through connections between root systems and through insects carrying the fungus from tree to tree. Once infected, symptoms can include wilting and discoloration of the foliage and premature leaf drop. Trees will die within days or weeks after signs of the first symptoms. It became more apparent in the 1980s primarily due to home construction in oak woods. As seen in the map on the right,



oak wilt has been found in Erie County and 26 other counties in Pennsylvania since 2010 (USDA, 2017).

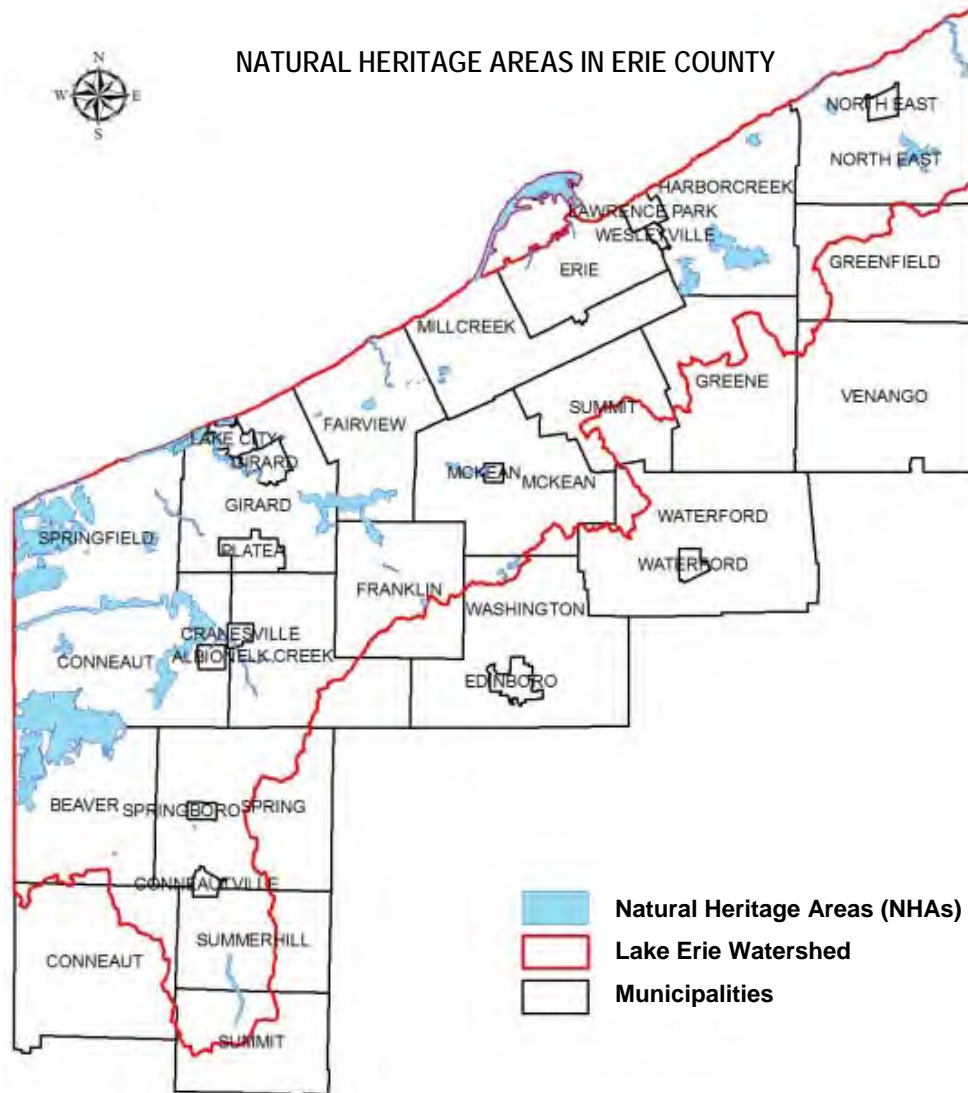
The table below lists the significant invasive species known to be in or near Erie County.

Table 4.3.5.2.A

<b>SIGNIFICANT INVASIVE SPECIES</b>		
<b>Plant Species</b>		
Black jetbead	Tree-of-heaven	Japanese knotweed
Giant knotweed	Mile-a-minute	Purple loosestrife
Garlic mustard	Japanese honeysuckle	Oriental bittersweet
Bush honeysuckles	Canada thistle	Bull thistle
Nodding thistle	Spotted knapweed	Autumn olive
Japanese barberry	Winged burning bush	Multiflora rose
Privet	Reed canary grass	Curly pondweed
Eurasian water-milfoil	Marijuana	Goatsrue
Johnson grass	Jimson weed	Giant hogweed
<b>Animal Species</b>		
Asian Clam	Common carp	Common pine shoot beetle
Emerald ash borer	House sparrow	European starling
Feral swine	Gypsy moth	Hemlock woolly adelgid
House cat	House mouse	Multicolored Asian ladybird beetle
Mute swan	Norway rat	Roundy goby
Rusty crayfish	Sirex woodwasp	Viburnum leaf beetle
Zebra mussel	Quagga mussel	

The Lake Erie Watershed encompasses either portions or the full extent of 33 municipalities and townships between Erie and Crawford Counties. Many locations within the watershed have been designated as Natural Heritage Areas (NHAs) by the Pennsylvania Natural Heritage Program. The Lake Erie watershed is the most ecological diverse habitat in Pennsylvania. It is home to rare, endangered and threatened species. The graphic below highlights these NHAs in light blue.





Part of Erie County is in the Lake Erie Watershed Cooperative Weed Management Area (CWMA). The Pennsylvania Sea Grant completed a five year plan for this weed management area in 2013. The plan includes target management locations, with 53 being in Erie County. Target management locations are designated areas of high ecological importance that are threatened by invasive species. Table 4.3.5.B lists the target management locations in Erie County as listed in the Sea Grant plan. The graphic following the table shows these locations graphically (and is taken directly from the Sea Grant plan).

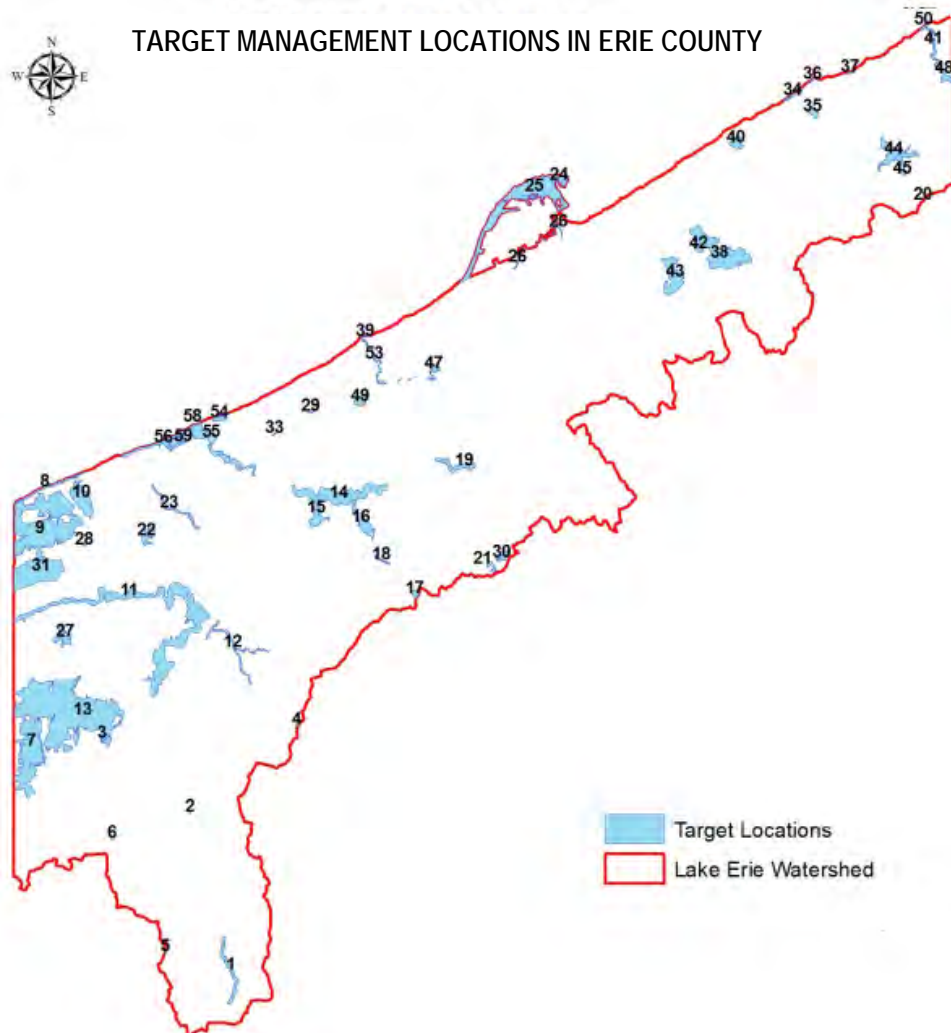
Table 4.3.5.2.B

TARGET MANAGEMENT LOCATIONS		
ID #	Site Name	County
7	West Branch Conneaut Creek	Erie, Crawford
8	Lake Erie Coastline – Roderick	Erie
9	Roderick Reserve	Erie
10	Raccoon Creek Swamp	Erie
11	Conneaut Creek	Erie
12	East Branch Conneaut Creek	Erie
13	West Branch Conneaut Creek	Erie, Crawford
14	Elk Creek	Erie
15	Devil's Backbone	Erie
16	Falls Run	Erie
17	Falls Run – Shenango Creek Headwaters	Erie
18	Falls Run	Erie
19	Elk Creek – McKean	Erie
20	Howard Eaton Reservoir	Erie
21	McLane Fens	Erie
22	Springfield Township Vernal Pools	Erie
23	Crooked Creek	Erie
24	Presque Isle – Gull Point	Erie
25	Presque Isle – Peninsula	Erie
26	Presque Isle – Bay	Erie
27	Ashtabula Creek Headwaters	Erie
28	West Springfield – Route 20	Erie
29	Trout Run Pond	Erie
30	McLane Fens – East	Erie
31	Pond Road Wetlands – South	Erie
32	Pond Road Wetlands – North	Erie
33	Mercyhurst Fen	Erie
34	Cemetery Road Bluffs	Erie
35	Vineyard Swamp	Erie
36	Unnamed	Erie
37	Northeast Lake Bluff Seeps	Erie
38	Six Mile Creek Gorge	Erie
39	Manchester Beach	Erie
40	Higmeyer Road Park	Erie
41	Twenty Mile Creek	Erie
42	Gospel Hill	Erie
43	Wintergreen Gorge	Erie
44	Sixteen Mile Creek Gorge	Erie
45	German Road Ponds	Erie
46	Asbury Woods	Erie
47	Asbury Woods	Erie
48	Twenty Mile Creek Gorge	Erie
49	Fairview Swamp	Erie
50	Twenty Mile Creek Beach	Erie
51	Twenty Mile Creek Beach	Erie
52	Twenty Mile Creek Beach	Erie
53	Walnut Creek	Erie
54	Lake Erie Community Park	Erie
55	Elk Creek – Mouth	Erie
56	Erie Bluffs – Shoreline	Erie



Table 4.3.5.2.B

TARGET MANAGEMENT LOCATIONS		
ID #	Site Name	County
57	Erie Bluffs – Sand Dune	Erie
58	Elk Creek – Mouth	Erie
59	Erie Bluffs – Swamp	Erie



Along with the target management locations, the CWMA created lists of immediate target species and watch list species. The list below represents the primary invasive species of concern in the watershed (not a comprehensive list).



Table 4.3.5.2.C

IMMEDIATE TARGET SPECIES		
Common reed	Narrow leaved cattail	Hybrid cattail
Amur honeysuckle	Morrow's honeysuckle	Tatarian honeysuckle
Eurasian water milfoil	Canada thistle	Garlic mustard
Purple loosestrife	Oriental bittersweet	Spotted knapweed
Japanese knotweed	Multiflora rose	Guelder rose
Japanese stiltgrass	Giant hogweed	Reed canary grass

Table 4.3.5.2.D

WATCH LIST SPECIES		
Poison hemlock	Mile-a-minute	Kudzu
Tree-of-heaven	Glossy buckthorn	Common buckthorn
Border privet	Chinese privet	Common privet
Japanese privet	Japanese barberry	European barberry
Didymo	Black swallow-wort	Water chestnut

Invasive species impose enormous costs to agriculture, forestry, fisheries, and other human enterprises, as well as to human health. They are recognized as one of the leading threats to biodiversity.

#### PUBLIC HEALTH

Invasive species can have various health effects, including disease epidemics, West Nile Virus, cholera risks and parasites. Epidemics such as malaria and bubonic plague have used organisms introduced to an area as vectors and reservoirs. Waterborne disease agents, such as cholera and causative agents of harmful algal blooms, are often transported in the ballast water of ships. Long-term effects can be caused by pesticides and chemicals used to control invasive species by contaminating soil and water (NOAA, 2017).

Many invasive plants are poisonous to humans when ingested or if there is contact with exposed skin. Allergies to sap oils from plants can cause a myriad of reactions from minor skin rashes to anaphylaxis which is potentially fatal if not treated (CDC, 2017). Invasive fungi can be a direct cause of human illness. Fungi often live in moist soil or decomposing wood and leaves and can infect humans through respiration. Most fungal infections affect the respiratory system or cause flu like symptoms; however, several can attack the nervous system (CDC, 2017).

#### SOCIAL VULNERABILITY

Outdoor workers are exposed to invasive species more frequently. At risk are farmers, foresters, landscapers, groundskeepers, construction workers, etc. Forestry



personnel and wildland firefighters are at additional risk because they can develop rashes and lung irritation from burning poisonous plants (The National Institute for Occupational Safety and Health, 2017).

People with compromised immune systems are more vulnerable to illnesses caused by invasive species. Infections such as Aspergillosis are caused by common mold spores which most people breathe everyday with no effect. However, those with weakened immune systems can develop allergic reactions, lung infections, and infections in other organs (CDC, 2017).

#### 4.3.5.3 Past Occurrence

##### **Erie Bluffs State Park, Pennsylvania**

The Western Pennsylvania Conservancy along with the PDCNR identified and began working to remove invasive plants including black locust trees, bush honeysuckle, and garlic mustard from the bluffs to stimulate the recovery of native species. Over three acres of black locust trees, that are native to the Appalachian Mountains, were removed from the bluffs.

##### **Lake Erie**

The introduction of quagga mussels into Lake Erie is presenting an immediate danger to lake ecology. Quagga mussels are contributing to the decline of the diporeia, a key food source for native Great Lakes fish. The decline of diporeia in turn is having an impact on the fish population.

##### **Presque Isle (2016)**



Algal blooms in Lake Erie

Harmful algal blooms were found around Presque Isle on July 28, 2016. They were detected at seven locations: vistas 2 and 3, Leo's Landing, Sturgeon Bay, the ferry slip, the marina gas dock, and the lagoon boat launch. Signage warned visitors to avoid contact with water and surface scum. Toxin levels tested

above the threshold for recreational water use at the lagoon boat launch.

### **Lake Erie (2014)**

In August 2014, Pennsylvania increased testing of water quality along Lake Erie shores. A spokesman for the Department of Environmental Protection stated monitors were looking for harmful algal blooms (HAB) after contaminated drinking water supplies were found in Ohio. Monitoring efforts indicated no HAB events.

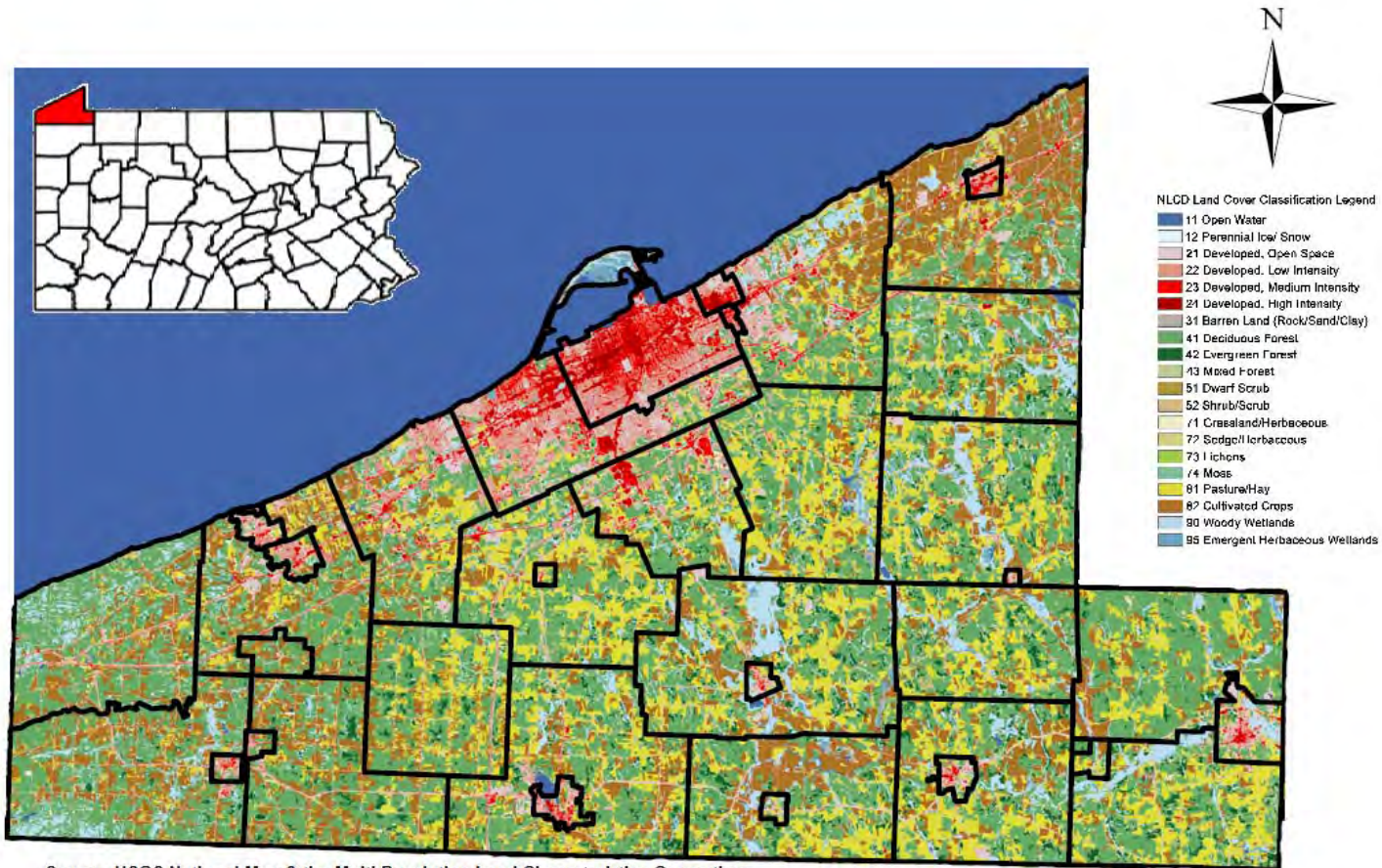


Personnel conducting water quality testing.

#### 4.3.5.4 Future Occurrence

In the land cover map below, all areas except those in shades of red are vulnerable to invasive species.

# ERIE COUNTY LAND COVER MAP



Source: USGS National Map & the Multi-Resolution Land Characteristic Consortium



4.3.5.5 Vulnerability Assessment

TABLE 4.3.5.5.A INVASIVE SPECIES VULNERABILITY ASSESSMENT			
<i>Probability</i>		<i>Severity</i>	<i>Risk</i>
PROBABLE		MARGINAL	MODERATE
There are already invasive species in Erie County that will continue to spread if not controlled or eliminated	+	Direct costs of invasive species in Erie County are not readily available. However, invasive species have the potential to damage or contaminate critical infrastructure such as source water which could lead to public health concerns	=
			A combination of probable occurrence and critical level of severity puts this hazard at moderate risk to Erie County



### 4.3.6 Landslide

Landslides include sinking, settling, or other lowering of parts of the crust of the Earth (Keller & DeVecchio, 2015).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
At any time throughout the year. Increased chance following long periods of heavy rain, snowmelt or construction activity.	Days / Weeks / Months	LOW

#### 4.3.6.1 Location and Extent

Landslides are natural hazards that can have significant economic, social and health impacts. They occur when areas of relatively dry rock, soil or debris move uncontrollably down a slope. Landslides may be localized or massive in size and can move at high rates of speed. They are often secondary effects of heavy storms or earthquakes.

#### 4.3.6.2 Range of Magnitude

The geography of the county creates an area that is vulnerable to landslides. Moderate to steep slopes, like those found along the coast of Lake Erie have a medium risk for landslides while the rest of the county is low (Baker, 2013). Landslides can cause damage to infrastructure including transportation, buildings, utilities, dams, etc. Fatalities and injuries due to landslides are rare in Pennsylvania. Almost all occurred along highways and involved vehicles (Delano & Wilshusen, 2000).

### PUBLIC HEALTH

Direct impacts of landslides include trauma and suffocation by entrapment. Landslides usually have high mortality and few injuries. Short and long-term mental health effects are also possible (WHO, 2017). Landslide morbidity is associated with untreated wounds, traumatic injuries, and disruption of water, sanitation shelter and the food supply. Those with chronic medical conditions are also of concern as loss of healthcare infrastructure, in the path of a slide, means patients may go untreated (Luber & Lemery, 2015).



## SOCIAL VULNERABILITY

Although there have not been any instances of large, catastrophic landslides in Erie County, there is a potential for damage. Landslides can cause death, injuries, trauma and suffocation from entrapment. Short and long-term mental health effects have been observed. Depending on the location, these events could cause loss or damage to homes, infrastructure and critical facilities and block whole communities off. There is a potential for loss of property value, livestock and crops (WHO).

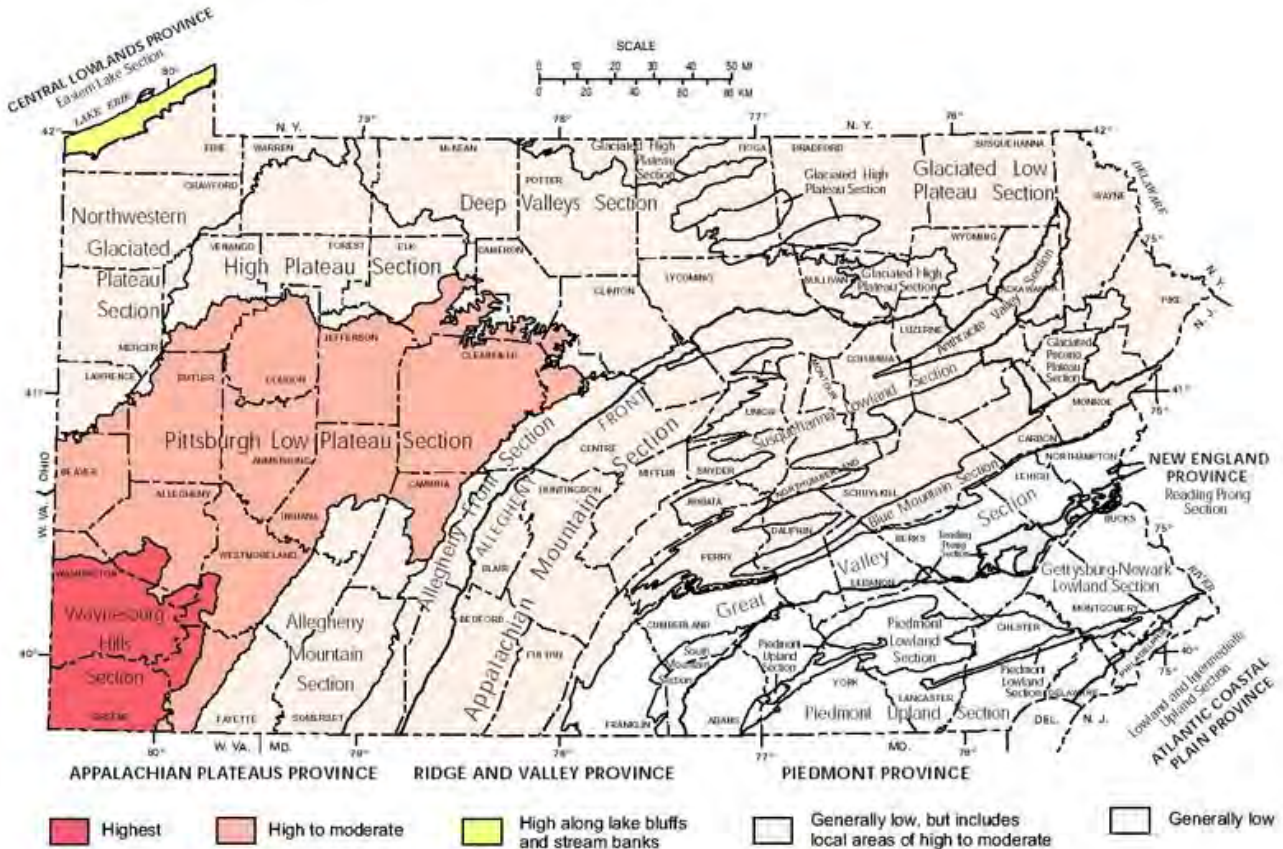
### 4.3.6.3 Past Occurrence

As there is no agency – federal, state, or local – tasked with formally documenting landslide occurrences, the only recorded incidents are the bluff recession and retreats covered in Section 4.3.1, Coastal Erosion. PennDOT District 1 provided ten years of records that showed multiple occurrences for other counties in the district, but none within Erie County. PADCNR also reported they had no information on incidents in the county.

### 4.3.6.4 Future Occurrence

The PADCNR rates the lake bluffs and stream banks as high and the rest of the county as low with local areas of high to moderate as shown in the map below.





Source: Pennsylvania Department of Conservation and Natural Resources

**4.3.6.5 Vulnerability Assessment**

TABLE 4.3.6.5.A LANDSLIDE VULNERABILITY ASSESSMENT			
Probability		Severity	Risk
IMPROBABLE		MARGINAL	LOW
Neither PennDOT nor PADCNR were able to provide any records of previous landslide events in Erie County.	+	Due to bluff recession and retreats being covered as a separate hazard, streambanks are the only high probability area. A landslide on streambank should not cause property damage or any significant injuries.	= With an improbable and marginal combination, the risk of landslides is low.





### 4.3.7 Tornado and Windstorm

<p>"A rapidly rotating vortex or funnel of air extending groundward from a cumulo-nimbus cloud, exhibiting wind speeds of up to 300 mph" (Haddow, Bullock, &amp; Coppola, 2014).</p> <p>A severe wind event is a storm marked by high wind with little or no precipitation (Merriam-Webster, 2017).</p>		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
Anytime, though primarily in summer months	Minutes to Days	HIGH

#### 4.3.7.1 Location and Extent

Tornadoes are typically associated with the strongest thunderstorms and are capable of causing tremendous damage. Since 2007, tornadoes are measured on the Enhanced Fujita Scale (EF Scale) in the U.S., which categorizes them based on wind speed. There are six categories in the EF Scale, from EF0 through EF5. An EF0 tornado will cause some minor damage, while an EF5 can cause massive destruction. Prior to the introduction of the Enhance Fujita scale, the Fujita Scale was used. The EF scale has the same basic principles as the Fujita Scale but expands the degrees of damage and better accounts for variables such as differences in construction quality of structures (tornadofacts.net, 2017).

Table 4.3.7.1.A

ENHANCED FUJITA SCALE	
	Wind Speed
EF-0	65-85 mph
EF-1	86-110 mph
EF-2	111-135 mph
EF-3	136-165 mph
EF-4	166-200 mph
EF-5	>200 mph

Table 4.3.7.1.B

FUJITA SCALE	
	Wind Speed
F-0	40-72 mph
F-1	73-112 mph
F-2	113-157 mph
F-3	158-206 mph
F-4	207-260 mph
F-5	261-318 mph

Tornadoes are historically very difficult to predict. The storms that may produce a tornado can be forecasted, but not every storm with that potential will spawn a tornado. Predicting where and when that will happen is incredibly challenging. Historical trends show that some areas of the country, such as the Midwest plain states, have a higher probability of tornado occurrence. However, tornadoes can and have struck many other areas.

Wind storms may or may not be accompanied by precipitation and typically have speeds exceeding 34 miles per hour. Wind damage can be attributed to gusts



or longer periods of stronger sustained winds (Pielke, 2012). These storms include straight-line winds, downdrafts, downbursts, microbursts, gust fronts, and derechos.

Straight-line winds are damaging winds typically 60 mph or greater. They travel in a uniform direction as they spread across an area. Straight-line winds have the potential to be so destructive they have been mistaken for tornadoes. Straight-line winds inflict damage on a large area, however, unlike tornadoes that are usually localized. Straight-line winds account for approximately 50% of all severe wind reports during a given year (Trambley, 2017).

The Beaufort Scale of Wind Force is used to measure wind speed relative to observed conditions. The scale ranges from zero to 12, with “12” being the strongest winds. There are two versions of the scale: one for use on land (pictured below) and one for use at sea. Since the scale is based on observed conditions, it is considered to be subjective (NWS, 2017).



 <b>Beaufort Scale of Wind Force</b>				
Beaufort Force	Description	When You See or Feel This Effect	Wind (mph)	Wind (km/h)
0	Calm	Smoke goes straight up	less than 1	less than 2
1	Light air	Wind direction is shown by smoke drift but not by wind vane	1-3	2-5
2	Light breeze	Wind is felt on the face; leaves rustle; wind vanes move	4-7	6-11
3	Gentle breeze	Leaves and small twigs move steadily; wind extends small flags straight out	8-12	12-19
4	Moderate breeze	Wind raises dust and loose paper; small branches move	13-18	20-29
5	Fresh breeze	Small trees sway; waves form on lakes	19-24	30-39
6	Strong breeze	Large branches move; wires whistle; umbrellas are difficult to use	25-31	40-50
7	Moderate gale	Whole trees are in motion; walking against the wind is difficult	32-38	51-61
8	Fresh gale	Twigs break from trees; walking against the wind is very difficult	39-46	62-74
9	Strong gale	Buildings suffer minimal damage; roof shingles are removed	47-54	75-87
10	Whole gale	Trees are uprooted	55-63	88-101
11	Violent storm	Widespread damage	64-72	102-116
12	Hurricane	Widespread destruction	73+	117+

*Engineer Diary (www.strleng.blogspot.com)*

#### 4.3.7.2 Range of Magnitude

Tornadoes can occur in any area, depending on the storm from which they spawn. Generally, however, tornadoes tend to be more common in flat areas. Tornadoes are highly localized, with damage being limited to their paths. Severe wind events affect the entire county equally.

#### PUBLIC HEALTH

Most injuries and fatalities during a tornado occur due to the victim or a solid object becoming airborne or structural collapses. The most common injuries are



contaminated lacerations, fractures, blunt trauma and head injuries. Most fatalities occur at the scene and result from trauma such as head, spine or crushing injuries (Weir, 2000).

Individuals are most frequently injured by flying debris during wind storms, much like tornadoes. Falling trees and motor vehicle accidents are also common dangers during wind storms. Post-event injuries and fatalities can be due to power outages leading to electrocution, fires and burns and carbon monoxide poisoning from gasoline-powered generators. Exacerbation of chronic illnesses is a risk during both tornadoes and wind storms.

Many injuries and illnesses occur during cleanup after the disaster. Inexperienced people using equipment such as chainsaws and the use of electrical tools in standing water can lead to serious injury. Standing water also attracts insects that can carry diseases as well as stray animals looking for water to drink (CDC, 2014). Injuries can occur when residents re-enter their damaged homes before inspections have been completed. Homeowners also fail to wear proper safety equipment such as goggles and work gloves (CDC, 2014).

Open wounds are of serious concern as they can become infected, leading to serious complications. Spores of tetanus bacteria are found in the environment, including soil, dust, and manure, all of which are stirred up during tornadoes and wind storms and found in sitting water. The risk of tetanus can be minimized by survivors, responders, and relief workers following standard immunization recommendations and providing proper wound care (CDC, 2015).

## SOCIAL VULNERABILITY

Anyone living in thunderstorm-prone areas are considered at risk since thunderstorms produce straight-line winds. Those living in mobile homes are especially at risk for injury and death as even an anchored mobile home can be seriously damaged when wind gusts exceed 80 mph (NOAA, 2017).

Countywide, there are over 6,900 addressable structures in mobile home parcels. All municipalities have at least one addressable structure within the mobile home classification; however, Edinboro Borough, Elgin Borough, McKean Borough and North East Borough have five structures or less. It is expected that these municipalities will not be as vulnerable to wind impacts. At the other end of the spectrum, Millcreek Township has over 1,300 addressable structures in mobile home



parcels. Additionally, Girard Township, McKean Township, North East Township, and Summit Township all have over 500 addressable structures in mobile home parcels. These townships may be more vulnerable to tornado and wind storm events.

Table 4.3.7.2.A

<b>MOBILE HOMES IN ERIE COUNTY</b>			
Municipality	# Mobile Homes (located in parks)	# Mobile Homes (not located in parks)	Total
Albion Borough	21	40	61
Amity Township	8	38	46
Concord Township	39	42	81
Conneaut Township	81	91	172
Corry City	110	16	126
Cranesville Borough	26	22	48
Edinboro Borough	0	4	4
Elgin Borough	0	5	4
Elk Creek Township	21	65	86
Erie City	0	28	28
Fairview Township	45	16	61
Franklin Township	8	37	45
Girard Borough	50	22	72
Girard Township	612	82	694
Greene Township	93	32	125
Greenfield Township	15	67	82
Harborcreek Township	92	63	155
Lake City Borough	64	16	80
Lawrence Park Township	88	1	89
LeBoeuf Township	15	62	77
McKean Borough	0	4	4
McKean Township	485	38	523
Mill Village Borough	9	17	26
Millcreek Township	1108	201	1309
North East Borough	0	3	3
North East Township	457	72	529
Platea Borough	5	23	28
Springfield Township	178	175	353
Summit Township	661	80	741
Union City Borough	52	39	91
Union Township	7	47	54
Venango Township	49	50	99
Washington Township	142	48	190
Waterford Borough	43	9	52
Waterford Township	309	125	434
Wattsburg Borough	0	11	11
Wayne Township	58	48	106
Wesleyville Borough	246	10	256
<b>TOTAL</b>	<b>5197</b>	<b>1749</b>	<b>6946</b>



Individuals who lack shelter during a tornado or wind event are highly vulnerable. The homeless population and those who may be traveling by vehicle or on foot when an event occurs are at greater risk for injury or death. Those in vehicles are at risk of flying debris, other vehicles being pushed into lanes of traffic, and falling trees and utility poles. Vehicles such as SUVs and those pulling trailers are at a high risk of being pushed or flipped over by winds (defensivedriving.com, 2014).

The homeless population is at risk as notification methods used for other populations such as radio, television, and service providers may not be available. They also face a lack of transportation and the inability to evacuate an area without assistance (Edgington, 2009).

#### 4.3.7.3 Past Occurrence

##### **Southwestern Erie County PA**

According to the NCEI, on the evening of May 31, 1985, a “major tornado” formed in Ohio before traveling through Albion to three miles northeast of Cranesville. This F4 tornado was responsible for 12 fatalities and 82 injuries. Property damage was reported as \$25 million. It was one of three tornadoes in Erie County and 43 total tornadoes that struck the northeastern United States and Canada on that date.



##### **Union City, PA**

On the evening of August 16, 1997, a tornado touched down for several minutes. The F2 tornado destroyed a block building, one mobile home and damaged twenty other mobile homes and three houses. There were no reported injuries but the incident caused \$500,000 in property damage.

##### **Erie, PA**

On July 26, 2005, a line of thunderstorms moved off Lake Erie and into Northern Erie County. Winds of 60 to 70 mph accompanied the storm. A concert at

Perry Landing Docks in Erie was evacuated. There were reports of damage to structures and downed trees. One home was cut in half by a tree. There were no reported injuries but the incident was responsible for approximately \$250,000 in property damage.

## Pennsylvania

On June 29, 2012, an intense line of storms moved rapidly from the Midwest to the Mid-Atlantic coast, narrowly missing Erie County. This violent and long-lived wind storm, a derecho, caused over \$2 billion in property damage, 22 fatalities, and left millions of customers with long-term utility outages. The National Weather Service's Map of Derecho Climatology, shown below, predicts a derecho storm effecting Erie County once every two years.



**Union City, PA**

On May 28, 2013, the second of two tornadoes touched down two miles north of Edinboro and traveled east to Union City. Although the tornado only appeared to have been on the ground intermittently, it was almost 18 miles long and 150 yards wide. Multiple trees were uprooted with damage to residences reported (i.e., lost siding and roofing). Peak winds were around 105 mph. The incident resulted in two minor injuries and \$300,000 in property damage.



**Millcreek Township, PA**

Around 8 p.m. on May 11, 2015, severe thunderstorms moved into the western portion of Erie County. Many trees and power lines fell, causing significant damage to a mobile home park in Millcreek Township. Evacuations were necessary due to a gas leak. A structure fire at a mobile home was a direct result of a downed power line.

A list of tornado events that have occurred in Erie County between 1950 and 2016 is shown in the table below. It contains a Fujita Tornado Scale magnitude for events prior to 2007 and an Enhanced Fujita Tornado Scale magnitude for events beginning in 2007. There have been a total of 20 tornadoes in Erie County. Outside the injuries and fatalities reported during the storms on May 31, 1985, there have been limited injuries and zero fatalities as a result of tornadoes in Erie County.

Table 4.3.7.3.A

PREVIOUS TORNADO EVENTS BETWEEN 1950 AND 2016 (NCEI, 2017)							
Location	Date	Estimated Length	Estimated Width	Magnitude	Deaths	Injuries	Estimated Property Damage
Erie County	7/19/1952	5.6 miles	27 yards	F2	0	0	\$2,500
Erie County	11/22/1953	2 miles	67 yards	F2	0	2	\$25,000
Erie County	7/29/1954	-	33 yards	F1	0	0	\$250
Erie County	9/21/1957	0.3 miles	200 yards	F1	0	3	\$25,000



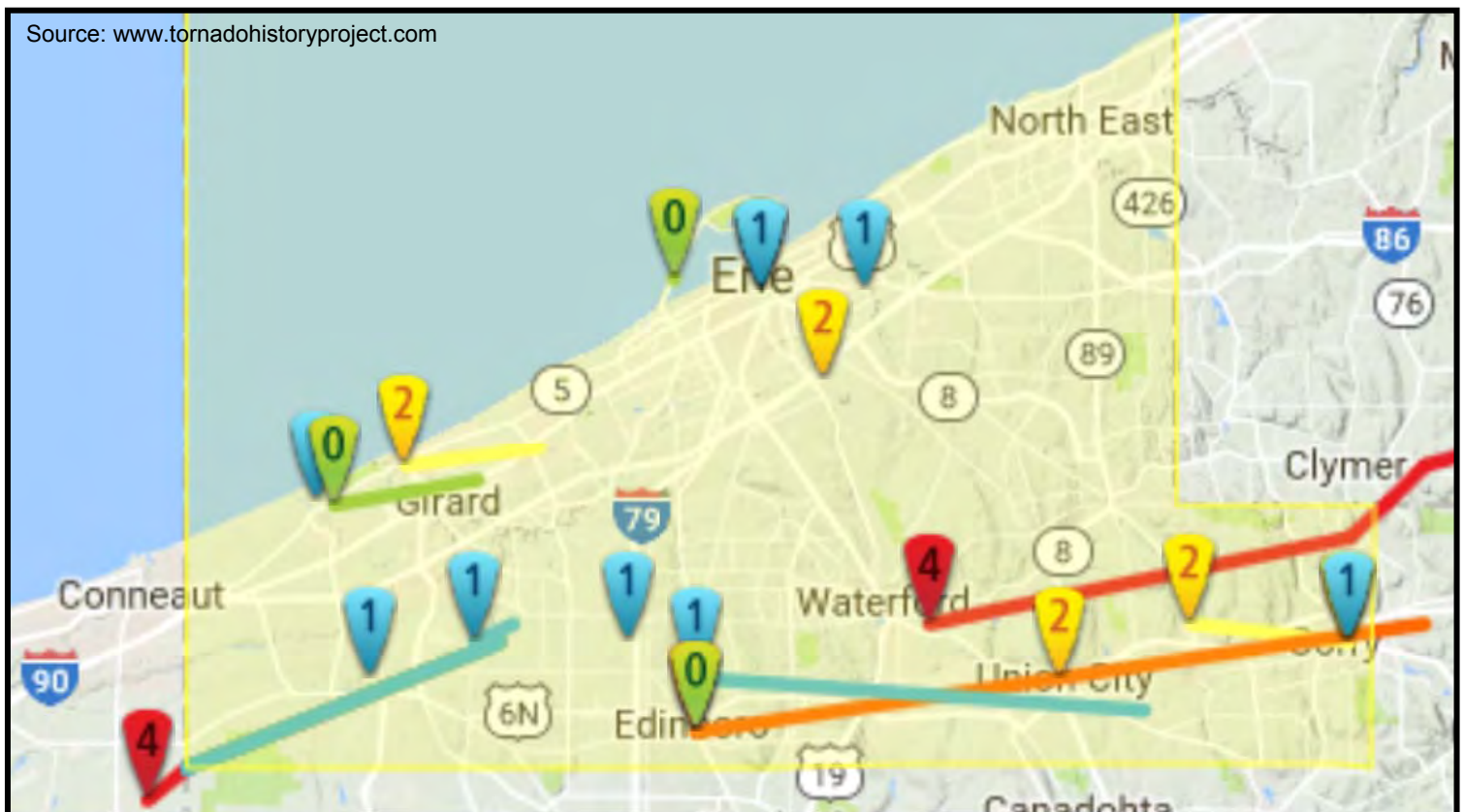


Table 4.3.7.3.A

**PREVIOUS TORNADO EVENTS BETWEEN 1950 AND 2016 (NCEI, 2017)**

Location	Date	Estimated Length	Estimated Width	Magnitude	Deaths	Injuries	Estimated Property Damage
Erie County	7/31/1961	0.3miles	7 yards	F1	0	0	\$25,000
Erie County	5/16/1965	-	33 yards	F1	0	1	\$25,000
Erie County	7/15/1970	0.5 miles	167 yards	F1	0	0	\$25,000
Erie County	6/2/1971	29.3 miles	33 yards	F3	0	0	\$25,000
Erie County	9/18/1977	4.5 miles	33 yards	F2	0	7	\$2,500,000
Erie County	9/24/1977	-	33 yards	F1	0	2	\$250,000
Erie County	5/2/1983	1 mile	33 yards	F2	0	0	\$250,000
Erie County	7/21/1983	0.2 miles	10 yards	F1	0	0	\$250,000
Erie County	5/31/1985	12 miles	400 yards	F4	12	82	\$25,000,000
Erie County	5/31/1985	16 miles	300 yards	F4	0	0	-
Erie County	5/31/1985	2 miles	300 yards	F4	0	0	-
Union City	8/16/1997	2 miles	100 yards	F2	0	0	\$500,000
Springfield Station	6/6/2010	5.8 miles	50 yards	EF0	0	0	\$200,000
Waldameer Park	6/27/2010	0.16 miles	75 yards	EF0	0	0	\$120,000
Ivarea	5/28/2013	1.69 miles	50 yards	EF1	0	5	\$75,000
Edinboro	5/28/2013	17.83 miles	150 yards	EF1	0	2	\$300,000
<b>TOTAL</b>	-	-	-	-	<b>12</b>	<b>104</b>	<b>\$29,597,750</b>

The map below roughly depicts the locations of these tornadoes.



NCEI has seven wind storm categories: high wind, strong wind, thunderstorm wind, hurricane, marine high wind, marine strong wind, and marine thunderstorm wind. A list of significant wind storms occurring between 1950 and 2016 is shown in the table below. These events had winds greater than 60 knots, property damage of at least \$5,000, and/or a direct injury or death. (The list is not exhaustive.) There have been a total of 402 wind storm events in this time period. These events have resulted in a total of 19 direct injuries (with 12 of them occurring during one event on April 12, 1996) and one reported fatality from a wind storm in Erie County. NCEI reports total property damage of \$13,596,000.

Table 4.3.7.3.B

SIGNIFICANT WINDSTORM EVENTS 1950-2016 (NCEI, 2017)						
Location	Date	Event Type	Wind Speed in Knots	Deaths	Injuries	Property Damage
Erie County	6/23/1956	Thunderstorm Wind	61	0	0	0
Erie County	11/1/1959	Thunderstorm Wind	70	0	0	0
Erie County	6/19/1964	Thunderstorm Wind	62	0	0	0
Erie County	4/11/1965	Thunderstorm Wind	70	0	0	0
Erie County	9/15/1965	Thunderstorm Wind	70	0	0	0
Erie County	9/15/1965	Thunderstorm Wind	73	0	0	0
Erie County	2/15/1967	Thunderstorm Wind	60	0	0	0
Erie County	6/15/1982	Thunderstorm Wind	65	0	0	0
Erie County	9/6/1983	Thunderstorm Wind	69	0	0	0
Erie County	10/13/1983	Thunderstorm Wind	66	0	0	0
Erie County	7/30/1988	Thunderstorm Wind	-	0	4	0
Erie County	8/22/1989	Thunderstorm Wind	-	0	1	0
Erie County	8/22/1989	Thunderstorm Wind	-	0	1	0
Erie	8/4/1994	Thunderstorm Wind	-	0	0	\$5,000
West Springfield	8/12/1994	Thunderstorm Wind	-	0	0	\$5,000
Erie	8/13/1994	Thunderstorm Wind	-	0	0	\$5,000
Corry	8/14/1994	Thunderstorm Wind	-	0	0	\$5,000
Western Erie County	7/13/1995	Thunderstorm Wind	-	0	0	\$15,000
Elgin	7/15/1995	Thunderstorm Wind	-	0	0	\$45,000
Northern Erie County	1/18/1996	High Wind	50	0	0	\$5,000
Northern Erie County	2/11/1996	High Wind	63	0	0	\$3,000
Erie County	4/12/1996	Thunderstorm Wind	61	0	12	\$800,000
Erie County	8/8/1996	Thunderstorm Wind	-	0	0	\$5,000
Erie County	8/15/1996	Thunderstorm Wind	-	0	0	\$100,000



Table 4.3.7.3.B

SIGNIFICANT WINDSTORM EVENTS 1950-2016 (NCEI, 2017)						
Location	Date	Event Type	Wind Speed in Knots	Deaths	Injuries	Property Damage
Erie County	8/15/1996	Thunderstorm Wind	50	0	0	\$5,000
Northern Erie County	9/4/1996	Strong Wind	-	0	0	\$5,000
Edinboro	2/22/1997	Thunderstorm Wind	60	0	0	\$5,000
Erie	5/6/1997	Thunderstorm Wind	55	0	0	\$20,000
Wattsburg	6/25/1997	Thunderstorm Wind	-	0	0	\$50,000
Edinboro	7/2/1997	Thunderstorm Wind	-	0	0	\$15,000
Erie	8/16/1997	Thunderstorm Wind	-	0	0	\$50,000
Edinboro	8/16/1997	Thunderstorm Wind	-	0	0	\$5,000
Northern Erie County	3/8/1998	High Wind	-	0	0	\$50,000
Corry	5/29/1998	Thunderstorm Wind	-	0	0	\$5,000
Girard	6/16/1998	Thunderstorm Wind	-	0	0	\$5,000
Erie County	7/21/1998	Thunderstorm Wind	-	0	0	\$25,000
Union City	7/21/1998	Thunderstorm Wind	-	0	0	\$10,000
Erie County	8/24/1998	Thunderstorm Wind	52	0	0	\$30,000
Erie County	11/10/1998	Thunderstorm Wind	-	0	0	\$10,000
Northern Erie County	3/17/1999	High Wind	-	0	0	\$10,000
Corry	6/10/1999	Thunderstorm Wind	-	0	0	\$25,000
Erie County	7/9/1999	Thunderstorm Wind	-	0	0	\$120,000
Erie County	7/31/1999	Thunderstorm Wind	-	0	0	\$60,000
Erie County	9/29/1999	Thunderstorm Wind	-	0	0	\$70,000
Erie	10/13/1999	Thunderstorm Wind	-	0	0	\$20,000
Erie County	10/13/1999	Thunderstorm Wind	-	0	0	\$25,000
Erie County	5/17/2000	Thunderstorm Wind	-	0	0	\$75,000
Erie	5/18/2000	Thunderstorm Wind	-	0	0	\$15,000
Edinboro	5/31/2000	Thunderstorm Wind	-	0	0	\$5,000
Girard	6/14/2000	Thunderstorm Wind	-	0	0	\$10,000
Waterford	6/24/2000	Thunderstorm Wind	64	0	0	\$25,000
Erie	8/2/2000	Thunderstorm Wind	-	0	0	\$10,000
Erie	8/2/2000	Thunderstorm Wind	-	0	0	\$5,000
Erie County	9/20/2000	Thunderstorm Wind	-	0	0	\$10,000
Erie	10/4/2000	Thunderstorm Wind	-	0	0	\$100,000
Southern Erie County	12/12/2000	High Wind	-	0	0	\$150,000
Northern Erie County	12/12/2000	High Wind	-	0	0	\$200,000
Northern Erie County	2/9/2001	High Wind	-	0	0	\$100,000
Southern Erie County	2/9/2001	High Wind	-	0	0	\$20,000
Southern Erie County	2/25/2001	High Wind	-	0	0	\$15,000
Northern Erie County	2/25/2001	High Wind	-	0	0	\$20,000



Table 4.3.7.3.B

**SIGNIFICANT WINDSTORM EVENTS 1950-2016 (NCEI, 2017)**

Location	Date	Event Type	Wind Speed in Knots	Deaths	Injuries	Property Damage
North East	7/10/2001	Thunderstorm Wind	-	0	0	\$500,000
Erie	8/26/2001	Thunderstorm Wind	57	0	0	\$50,000
Erie	8/31/2001	Thunderstorm Wind	-	0	0	\$15,000
Northern Erie County	10/16/2001	High Wind	-	0	0	\$20,000
Southern Erie County	10/16/2001	High Wind	-	0	0	\$10,000
Erie County	10/25/2001	Thunderstorm Wind	-	0	0	\$15,000
Northern Erie County	10/25/2001	High Wind	-	0	0	\$25,000
Southern Erie County	10/25/2001	High Wind	-	0	0	\$20,000
Northern Erie County	2/1/2002	High Wind	-	0	0	\$35,000
Southern Erie County	2/1/2002	High Wind	-	0	0	\$25,000
Northern Erie County	3/9/2002	High Wind	-	0	0	\$250,000
Southern Erie County	3/9/2002	High Wind	-	0	0	\$150,000
Erie International Airport	4/28/2002	Thunderstorm Wind	55	0	0	\$250,000
Erie County	4/28/2002	Thunderstorm Wind	-	0	0	\$250,000
Corry	5/9/2002	Thunderstorm Wind	-	0	0	\$100,000
Albion	6/5/2002	Thunderstorm Wind	-	0	0	\$10,000
Union City	6/14/2002	Thunderstorm Wind	-	0	0	\$5,000
Corry	7/27/2002	Thunderstorm Wind	-	0	0	\$30,000
Erie County	7/28/2002	Thunderstorm Wind	-	0	0	\$20,000
Corry	7/28/2002	Thunderstorm Wind	-	0	0	\$5,000
Union City	7/28/2002	Thunderstorm Wind	-	0	0	\$10,000
Erie	7/29/2002	Thunderstorm Wind	-	0	0	\$5,000
Northern Erie County	10/4/2002	High Wind	-	0	0	\$75,000
Southern Erie County	10/4/2002	High Wind	-	0	0	\$25,000
Northern Erie County	2/4/2003	Strong Wind	46	0	0	\$250,000
Southern Erie County	2/4/2003	Strong Wind	43	0	0	\$50,000
Northern Erie County	2/12/2003	High Wind	53	0	0	\$50,000
Southern Erie County	2/12/2003	High Wind	50	0	0	\$35,000
Northern Erie County	5/5/2003	Strong Wind	41	0	0	\$75,000
Northern Erie County	5/11/2003	Strong Wind	38	0	0	\$50,000
Southern Erie County	5/11/2003	Strong Wind	35	0	0	\$25,000
Girard	8/5/2003	Thunderstorm Wind	50	0	0	\$5,000
North East	8/16/2003	Thunderstorm Wind	50	0	0	\$50,000
Erie	8/16/2003	Thunderstorm Wind	50	0	0	\$10,000
Lake City	8/26/2003	Thunderstorm Wind	50	0	0	\$25,000
Northern Erie County	10/14/2003	Strong Wind	35	0	0	\$50,000
Southern Erie County	10/14/2003	Strong Wind	35	0	0	\$30,000



Table 4.3.7.3.B

SIGNIFICANT WINDSTORM EVENTS 1950-2016 (NCEI, 2017)						
Location	Date	Event Type	Wind Speed in Knots	Deaths	Injuries	Property Damage
Northern Erie County	11/12/2003	High Wind	63	0	0	\$500,000
Southern Erie County	11/12/2003	High Wind	52	0	0	\$150,000
Southern Erie County	3/5/2004	High Wind	50	0	0	\$75,000
Northern Erie County	3/5/2004	High Wind	50	0	0	\$75,000
Corry	5/8/2004	Thunderstorm Wind	50	0	0	\$6,000
Elgin	5/20/2004	Thunderstorm Wind	50	0	0	\$75,000
North East	5/21/2004	Thunderstorm Wind	50	0	0	\$10,000
Erie County	6/14/2004	Thunderstorm Wind	50	0	0	\$50,000
Northern Erie County	9/9/2004	Strong Wind	41	0	0	\$50,000
Southern Erie County	9/9/2004	Strong Wind	35	0	0	\$25,000
Northern Erie County	12/1/2004	High Wind	52	0	0	\$35,000
Southern Erie County	12/1/2004	High Wind	50	0	0	\$20,000
Southern Erie County	12/7/2004	High Wind	50	0	0	\$15,000
Northern Erie County	12/7/2004	High Wind	50	0	0	\$25,000
Erie County	7/24/2005	Thunderstorm Wind	50	0	0	\$50,000
Erie County	7/26/2005	Thunderstorm Wind	53	0	0	\$250,000
Northern Erie County	11/6/2005	High Wind	55	0	0	\$35,000
Southern Erie County	11/6/2005	High Wind	50	0	0	\$20,000
Northern Erie County	2/17/2006	High Wind	52	0	0	\$75,000
Southern Erie County	2/17/2006	High Wind	50	0	0	\$35,000
Northern Erie County	3/10/2006	Strong Wind	43	0	0	\$15,000
Southern Erie County	3/10/2006	Strong Wind	43	0	0	\$10,000
Southern Erie County	3/13/2006	High Wind	50	0	0	\$8,000
Northern Erie County	3/13/2006	High Wind	50	0	0	\$5,000
Northern Erie County	10/28/2006	High Wind	60	0	0	\$200,000
Northern Erie County	12/1/2006	High Wind	50	0	0	\$15,000
Southern Erie County	12/1/2006	High Wind	50	0	0	\$25,000
North East	6/8/2007	Thunderstorm Wind	74	0	0	0
Lake City	6/8/2007	Thunderstorm Wind	50	0	0	\$3,000
Erie	6/8/2007	Thunderstorm Wind	50	0	0	\$75,000
Erie	6/19/2007	Thunderstorm Wind	50	0	0	\$20,000
Southern Erie County	12/23/2007	High Wind	50	0	0	\$15,000
North East	1/9/2008	Thunderstorm Wind	56	0	0	\$15,000
Southern Erie County	1/9/2008	High Wind	55	0	0	\$10,000
Northern Erie County	1/9/2008	High Wind	73	0	0	\$15,000
Northern Erie County	1/30/2008	High Wind	55	0	0	\$30,000
Southern Erie County	1/30/2008	High Wind	55	0	0	\$20,000



Table 4.3.7.3.B

<b>SIGNIFICANT WINDSTORM EVENTS 1950-2016 (NCEI, 2017)</b>						
<b>Location</b>	<b>Date</b>	<b>Event Type</b>	<b>Wind Speed in Knots</b>	<b>Deaths</b>	<b>Injuries</b>	<b>Property Damage</b>
Southern Erie County	5/11/2008	Strong Wind	35	0	0	\$8,000
Wattsburg	6/26/2008	Thunderstorm Wind	61	0	0	\$3,000
Swanville	7/8/2008	Thunderstorm Wind	65	0	0	0
Erie	7/8/2008	Thunderstorm Wind	60	0	0	0
Union City	7/23/2008	Thunderstorm Wind	50	0	0	\$10,000
Northern Erie County	9/14/2008	High Wind	60	0	0	\$1,000,000
Southern Erie County	9/14/2008	High Wind	60	0	0	\$1,000,000
Erie	12/28/2008	Thunderstorm Wind	50	0	0	\$6,000
Northern Erie County	2/12/2009	High Wind	61	0	0	\$250,000
Southern Erie County	2/12/2009	High Wind	52	0	0	\$200,000
Waterford	8/10/2009	Thunderstorm Wind	50	0	0	\$120,000
Erie	8/20/2009	Thunderstorm Wind	50	0	0	\$25,000
Southern Erie County	10/7/2009	Strong Wind	39	0	0	\$50,000
Northern Erie County	10/7/2009	Strong Wind	47	0	0	\$100,000
Northern Erie County	12/9/2009	High Wind	54	0	0	\$750,000
Southern Erie County	12/9/2009	High Wind	65	0	0	\$250,000
Erie	5/7/2010	Thunderstorm Wind	50	0	0	\$35,000
Edinboro	5/7/2010	Thunderstorm Wind	50	0	0	\$15,000
Northern Erie County	5/8/2010	High Wind	56	0	0	\$200,000
Southern Erie County	5/8/2010	High Wind	50	0	0	\$75,000
Edinboro	5/31/2010	Thunderstorm Wind	50	0	0	\$10,000
North Springfield	6/6/2010	Thunderstorm Wind	52	1	0	\$150,000
Erie	6/6/2010	Thunderstorm Wind	50	0	0	\$10,000
Corry	6/6/2010	Thunderstorm Wind	50	0	0	\$5,000
Erie County	6/23/2010	Thunderstorm Wind	50	0	0	\$10,000
Waldameer Park	6/27/2010	Thunderstorm Wind	50	0	0	\$35,000
Mill Creek	6/27/2010	Thunderstorm Wind	50	0	0	\$5,000
Erie County	6/28/2010	Thunderstorm Wind	50	0	0	\$100,000
Erie	7/23/2010	Thunderstorm Wind	50	0	0	\$15,000
Edinboro	7/28/2010	Thunderstorm Wind	50	0	0	\$15,000
Wattsburg	9/7/2010	Thunderstorm Wind	50	0	0	\$30,000
Northern Erie County	4/16/2011	High Wind	50	0	0	\$7,000
Union City	4/27/2011	Thunderstorm Wind	50	0	0	\$10,000
Southern Erie County	4/28/2011	High Wind	50	0	0	\$30,000
Northern Erie County	4/28/2011	High Wind	63	0	0	\$75,000
Erie	5/23/2011	Thunderstorm Wind	50	0	0	\$5,000
Wattsburg	5/23/2011	Thunderstorm Wind	50	0	0	\$10,000



Table 4.3.7.3.B

SIGNIFICANT WINDSTORM EVENTS 1950-2016 (NCEI, 2017)						
Location	Date	Event Type	Wind Speed in Knots	Deaths	Injuries	Property Damage
Edinboro	5/23/2011	Thunderstorm Wind	50	0	0	\$10,000
Albion	5/26/2011	Thunderstorm Wind	50	0	0	\$50,000
Erie	6/4/2011	Thunderstorm Wind	50	0	0	\$5,000
Waterford	6/4/2011	Thunderstorm Wind	50	0	0	\$30,000
Waterford	6/4/2011	Thunderstorm Wind	50	0	0	\$25,000
Albion	9/4/2011	Thunderstorm Wind	50	0	0	\$10,000
Erie	1/17/2012	Thunderstorm Wind	50	0	0	\$25,000
Northern Erie County	1/17/2012	High Wind	50	0	0	\$75,000
Northern Erie County	2/24/2012	High Wind	50	0	0	\$25,000
Southern Erie County	2/24/2012	High Wind	50	0	0	\$25,000
Northern Erie County	3/3/2012	High Wind	50	0	0	\$5,000
Southern Erie County	3/3/2012	High Wind	50	0	0	\$10,000
North Springfield	7/3/2012	Thunderstorm Wind	50	0	0	\$5,000
Edinboro	7/3/2012	Thunderstorm Wind	50	0	0	\$15,000
Edinboro	7/3/2012	Thunderstorm Wind	50	0	0	\$50,000
Edinboro	7/26/2012	Thunderstorm Wind	50	0	0	\$10,000
Northern Erie County	10/30/2012	High Wind	50	0	0	\$250,000
Southern Erie County	10/30/2012	High Wind	50	0	0	\$50,000
Erie	7/10/2013	Thunderstorm Wind	50	0	0	\$12,000
Edinboro	7/23/2013	Thunderstorm Wind	50	0	0	\$8,000
Lake City	8/12/2013	Thunderstorm Wind	50	0	0	\$8,000
Waldameer Park	8/13/2013	Thunderstorm Wind	50	0	0	\$8,000
Erie County	8/30/2013	Thunderstorm Wind	60	0	0	\$20,000
Northern Erie County	10/31/2013	Strong Wind	43	0	0	\$25,000
Southern Erie County	4/29/2014	High Wind	50	0	0	\$20,000
Northern Erie County	4/29/2014	High Wind	50	0	1	\$30,000
Erie	6/18/2014	Thunderstorm Wind	50	0	0	\$25,000
Erie	6/24/2014	Thunderstorm Wind	50	0	0	\$10,000
LeBeouf	7/1/2014	Thunderstorm Wind	50	0	0	\$8,000
Corry	7/8/2014	Thunderstorm Wind	50	0	0	\$15,000
Erie County	7/8/2014	Thunderstorm Wind	50	0	0	\$14,000
Southern Erie County	11/24/2014	High Wind	52	0	0	\$100,000
Northern Erie County	11/24/2014	High Wind	52	0	0	\$100,000
Northern Erie County	12/24/2014	High Wind	50	0	0	\$15,000
Southern Erie County	12/24/2014	Strong Wind	43	0	0	\$10,000
Northern Erie County	4/20/2015	Strong Wind	44	0	0	\$12,000
Waldameer Park	5/11/2015	Thunderstorm Wind	56	0	0	\$220,000



Table 4.3.7.3.B

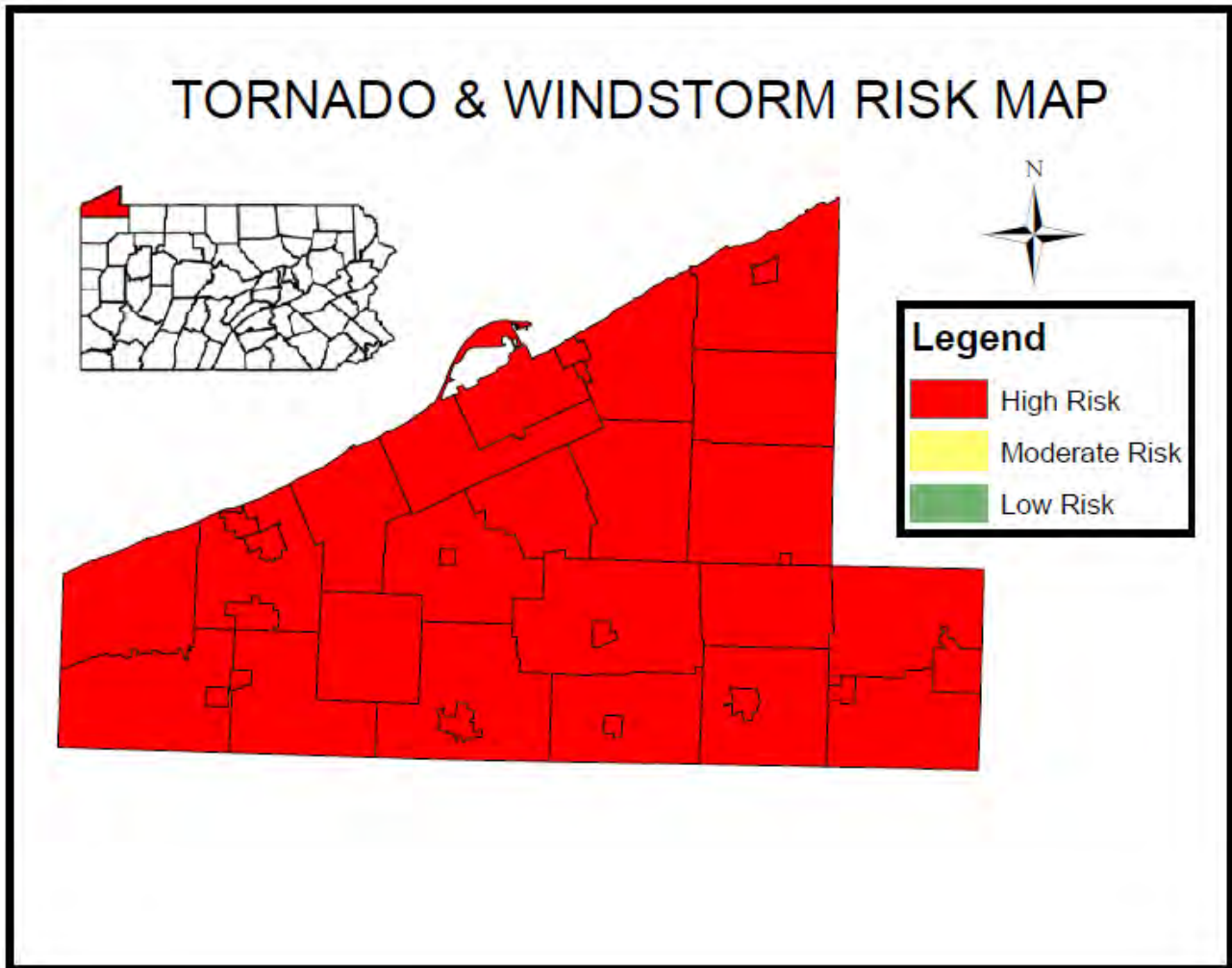
SIGNIFICANT WINDSTORM EVENTS 1950-2016 (NCEI, 2017)						
Location	Date	Event Type	Wind Speed in Knots	Deaths	Injuries	Property Damage
Erie	6/12/2015	Thunderstorm Wind	50	0	0	\$50,000
Union City	6/14/2015	Thunderstorm Wind	50	0	0	\$5,000
Corry	9/4/2015	Thunderstorm Wind	50	0	0	\$40,000
Mill Village	9/4/2015	Thunderstorm Wind	50	0	0	\$5,000
Northern Erie County	10/28/2015	High Wind	50	0	0	\$150,000
Northern Erie County	11/18/2015	High Wind	50	0	0	\$50,000
Cranesville	6/5/2016	Thunderstorm Wind	50	0	0	\$25,000
Union City	6/5/2016	Thunderstorm Wind	52	0	0	\$100,000
Erie County	7/13/2016	Thunderstorm Wind	50	0	0	\$10,000
Erie	7/13/2016	Thunderstorm Wind	50	0	0	\$20,000
Erie County	9/8/2016	Thunderstorm Wind	50	0	0	\$10,000
Mill Village	9/10/2016	Thunderstorm Wind	50	0	0	\$12,000
Wattsburg	9/10/2016	Thunderstorm Wind	50	0	0	\$15,000
<b>TOTAL</b>	-	-	-	<b>1</b>	<b>19</b>	<b>\$13,481,000</b>

4.3.7.4 Future Occurrence

The risk map below graphically depicts areas potentially susceptible to tornadoes and windstorms.







4.3.7.5 Vulnerability Assessment

TABLE 4.3.7.5.A TORNADO & WINDSTORM VULNERABILITY ASSESSMENT					
<i>Probability</i>		+	<i>Severity</i>	=	<i>Risk</i>
FREQUENT			CATASTROPHIC		HIGH
Events	422	+	Death and/or major structural loss can occur during tornadoes and wind storms.	=	A combination of frequent occurrence and critical level of severity puts this hazard at high risk to Erie County.
Years	67				
There is likely a chance that a tornado or wind storm event will occur several times throughout the years.					



### 4.3.8 Winter Storm

Winter storms “occur when extremely cold atmospheric conditions coincide with high airborne moisture content, resulting in rapid and heavy precipitation of snow and/or ice.” (Haddow, Bullock, & Coppola, 2014).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
Winter months. Most common between November and March.	Days / Weeks	HIGH

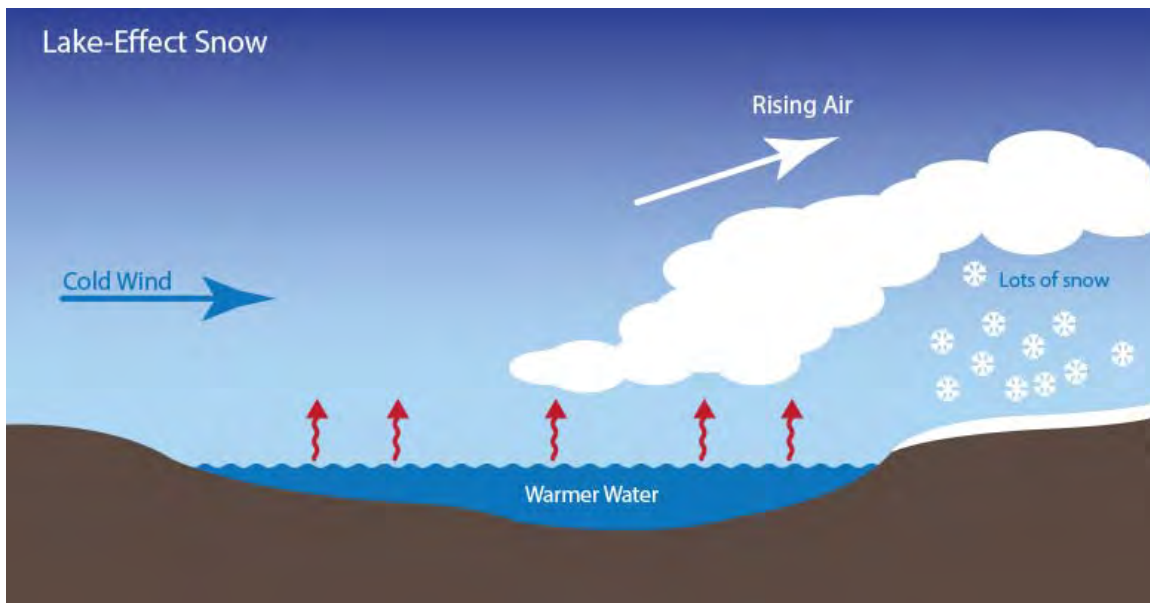
#### 4.3.8.1 Location and Extent

The National Center for Environmental Information (NCEI) compiles data on a five different types of winter weather events. **Blizzards** are defined as a winter storm which produces sustained winds or frequent gusts 30 knots (35 mph) or greater and falling or blowing snow that reduces visibility to less than ¼ mile, in a widespread or localized basis. **Heavy snow** is snow accumulation meeting or exceeding locally/regionally-defined 12 and/or 24 hour warning criteria, on a widespread or localized basis (i.e., values meeting or exceeding four, six or eight inches in a 12-hour period or six, eight or 10 inches in 24 hours). **Ice storms** are characterized by ice accretion meeting or exceeding locally/regionally-defined warning criteria (the typical value is ¼ or ½ in or more), on a widespread or localized basis. A **winter storm** is an event that has more than one significant hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice) and meets or exceeds regionally-defined 12 and/or 24-hour warning criteria for at least one of the precipitation elements on a widespread or localized basis. **Winter weather** is a winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation but does not meet locally/regionally-defined warning criteria.

Erie County is susceptible to lake effect snow. **Lake effect snow** occurs when a very cold air mass moves over a large, relatively warmer body of water. As illustrated in the below picture, heat and moisture from the warm lake rise into the arctic air, where it then cools and condenses into snow clouds. As the clouds begin to move from the smooth surface of the lake to the shore, the clouds slow down and pile up at the downwind shore, causing additional lift, propelling the storm over land. As the clouds move downwind and lift, they develop into snow showers and squalls, sometimes accompanied by thunder and lightning. Because the arctic air usually associated with lake effect snow blows from the west or northwest, the snow itself is



expected on the east or southeast sides of the lake, exactly where Erie County lies in relation to Lake Erie. The volume of snowfall associated with a lake effect snow event is dependent on the direction and duration of the winds and the magnitude of the temperature differential between the water and the air; the greater the differential, the more snow that is expected. Lake effect snows are enhanced when the moistened air mass is forced over the hilly terrain of northwestern Pennsylvania (Gelber, 2002).



According to the National Weather Service (NWS), blizzards are a combination of blowing snow and wind that result in very low visibility. Blizzards are often accompanied by heavy snow, but heavy snow is not required for a storm to be categorized as a blizzard. While the NWS does not have a category for "lake effect blizzards," NWS Cleveland describes many lake effect snow events to be blizzard-like with heavy snow, blowing snow, and winds resulting in low visibility.

The Sperry-Piltz Ice Accumulation (SPIA) Index is an ice accumulation and ice damage prediction index. The index uses standard parameters and when combined with the NWS forecast data, can predict the projected footprint, total ice accumulation, and potential damage from ice storms. Prior to this index, no scale was used to predict potential damage to overhead utility systems or utility outage duration possibilities. The SPIA Index uses the following parameters:

- Storm total rainfall, converted to ice accumulation,

- Wind, and
- Temperatures during the event period.

Table 4.3.8.1.A

THE SPERRY-PILTZ ICE ACCUMULATION INDEX	
Ice Damage Index	Damage and Impact Descriptions
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1-5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5-10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

#### 4.3.8.2 Range of Magnitude

Winter storms events are generally countywide events as weather systems move in line through the state. The NCEI breaks Erie County into two regions, Northern Erie and Southern Erie. Interstate 90 is typically the dividing line, with the weather patterns of each frequently differing widely from one another (local sources). The NCEI storm events database has 182 events listed for Erie County. Fifty-two percent (52%) of those events effected both regions, 39% effected only the southern region, and nine percent effected only the northern region.

Winter weather is an annual, common occurrence in Pennsylvania. According to the *2013 Pennsylvania Statewide Hazard Mitigation Plan*, Erie County saw an average of 91-100 inches of snow annually between 1981 and 2010 (Baker, 2013). Small winter events that accumulate no more than a few inches can cause problems and cascading events throughout the county, especially on transportation, but are generally considered nuisance events. Large scale events that produce large amounts of snow have a significant impact.

The Weather Channel listed an ice storm from November of 1921 as the sixth worst ice storm in the nation’s history. The storm lasted for four days with over three



inches of ice accumulating. Damage was estimated at \$20 million (over \$250 million in 2017 adjusted for inflation). This storm, while not directly affecting Erie County, is an exemplar case of what could occur as ice storms travel through the prominent ice storm alley of northern Pennsylvania, central and upstate New York into New England.

## PUBLIC HEALTH

Direct exposure to cold temperatures and wet conditions can cause hypothermia and frostbite. Winter weather is also associated with increased rates of respiratory illnesses and heart disease, with a concomitant increase in mortality (McGeehin & Mirabelli, 2001). Winter storms also bring indirect public health concerns such as injuries and/or fatalities from automobile accidents on icy roads, heart attacks while shoveling snow, or slipping and falling on icy walkways, roadways, or steps. These types of illnesses and injuries can be avoided by staying inside during extreme cold temperatures and winter storms; however, carbon monoxide poisoning then becomes a concern. Whether due to a power failure or a heating system being inadequate to warm a structure, the need to use a generator and/or fireplace increases the risk of CO poisoning and structure fires (CDC, 2015).

The potential risk of injury from chainsaw use increases after natural disasters and storms. Chainsaws are widely used to remove fallen or partially fallen trees and limbs. Each year, over 36,000 people are treated for chainsaw injuries in emergency departments across the nation. Many of these injuries come from not wearing appropriate protective equipment, cutting trees and limbs touching powerlines, and cutting limbs that have tension in them that subsequently snap back as the tension is released by being cut (CDC, 2014).

## SOCIAL VULNERABILITY

Infants and the elderly are the most susceptible to the cold and wet conditions of a winter storm. Conditions that may be uncomfortable or inconvenient to the general population can easily become life-threatening to them (NOAA, 2017). The homeless have a much higher risk than the general population of developing exposure-related conditions (nationalhomeless.org, 2010). The inability to provide adequate, dry clothing, shelter and heat accompanied by malnutrition, decreased



body fat, underlying infection, lack of fitness and fatigue make homeless individuals much more vulnerable to winter storms (O'Connell, 2004).

Tourists to the area or those not familiar with driving in snow and ice are not only a danger to themselves but also to other drivers on the road. Although roads may look clear, braking distance can be increased significantly during and after a snow or ice storm. An unfamiliar driver may panic if the vehicle begins to slide. Unfortunately, braking can make a vehicle continue to slide or, if the vehicle comes to a stop, the driver may become stuck and unable to move the vehicle. These drivers may also drive below the minimum speed limit, which can be just as dangerous as speeding for other drivers (AAA, n.d.).

#### 4.3.8.3 Past Occurrence

##### **Erie County, PA**

On the morning of March 7, 2008, snow began to fall across the county. Initially, snow was light in the morning, but by evening, six inches had accumulated in some areas. Snow continued through the eighth before ending on March 9. During the storm, wind gusts of up to 30 mph were measured causing snow drifts and low visibility. By the end of the storm, some areas had seen up to 25 inches of snow. Property damage was estimated at \$12,800,000.

##### **Erie County, PA**

Between November 9 and 15, 1996, Erie County experienced an early heavy lake effect snow. Edinboro had an accumulation of 55 inches by the end of the storm. Numerous trees, limbs, power lines, and telephone lines were downed and multiple structures collapsed. By storm end, property damage was estimated at \$3 million.

##### **Erie County, PA**

As temperatures fluctuated on January 2, 1999, precipitation changed from snow to freezing rain to rain and back to snow again. Temperatures dropped into the teens and the six inches of snow began to freeze causing slick roadways, bridges and sidewalks. The storm led to school closings, nine related injuries and \$60,000 in property damage.



**Erie County, PA**

Snow spread into the northwestern Pennsylvania just before daybreak on February 1, 2015. Snow was initially light, accumulating at about a tenth of an inch an hour. However, by mid-morning the snow intensified and visibility was less than a half mile; snow fell at a rate of an inch or more per hour. Late in the evening, the snow lessened but continued through the evening hours of February 2. Wind gusts of 25 mph caused considerable blowing and drifting. Accumulations of 10 to 15 inches were common throughout Erie County. Cranesville reported 17.5 inches. Travel was disrupted with roads in rural areas being nearly impassable at times. Most of the area schools were closed on February 2. Property damage was estimated at \$400,000.

**Erie County, PA**

On December 8, 2016, cold winds blowing across Lake Erie caused lake effect snow showers to develop. Initially, winds were close to being parallel to the south shoreline of the lake, keeping the heavy snow, accumulations of six or more inches, to the south shore areas. During the evening hours, the wind changed to a westerly direction pushing heavier snow inland. The wind continued in a west to northwest direction for two more days, causing lake effect snow to persist. The three day snow totals included 26 inches in North East, 25 inches at Edinboro, 24 inches in Corry, 15.3 inches in Amity, and 13.4 inches in Mill Creek. There were vehicle accidents reported and school closings throughout northwest Pennsylvania. Property damage for the event was estimated at \$550,000.

In addition to the events described above, other winter storm events are listed in the following table. The majority of the event types listed in the table are *heavy snow*, which is defined by the National Weather Service as snowfall of six inches or more in 12 hours or less, or eight inches in 24 hours or less.

Table 4.3.8.3.A

WINTER STORM EVENTS IMPACTING ERIE COUNTY SINCE 1996 (NCEI)		
Location	Date	Type
Erie County	1/2/1996	Heavy Snow
Southern Erie County	1/9/1996	Heavy Snow
Erie County	3/2/1996	Heavy Snow



Table 4.3.8.3.A

WINTER STORM EVENTS IMPACTING ERIE COUNTY SINCE 1996 (NCEI)		
Location	Date	Type
Northern Erie County	11/2/1996	Heavy Snow
Erie County	11/9/1996	Heavy Snow
Erie County	12/8/1996	Heavy Snow
Northern Erie County	12/20/1996	Heavy Snow
Erie County	12/24/1996	Heavy Snow
Erie County	1/6/1997	Heavy Snow
Erie County	1/16/1997	Heavy Snow
Erie County	1/26/1997	Heavy Snow
Erie County	2/16/1997	Heavy Snow
Erie County	3/6/1997	Heavy Snow
Southern Erie County	10/22/1997	Heavy Snow
Northern Erie County	11/12/1997	Heavy Snow
Southern Erie County	11/14/1997	Ice Storm
Erie County	11/15/1997	Heavy Snow
Southern Erie County	11/23/1997	Heavy Snow
Erie County	12/5/1997	Heavy Snow
Southern Erie County	12/10/1997	Heavy Snow
Southern Erie County	12/30/1997	Heavy Snow
Southern Erie County	3/10/1998	Heavy Snow
Southern Erie County	3/14/1998	Heavy Snow
Northern Erie County	3/21/1998	Heavy Snow
Southern Erie County	12/16/1998	Heavy Snow
Southern Erie County	12/21/1998	Heavy Snow
Erie County	12/30/1998	Heavy Snow
Erie County	1/2/1999	Winter Storm
Erie County	1/8/1999	Winter Storm
Erie County	1/10/1999	Heavy Snow
Erie County	1/13/1999	Winter Storm
Erie County	1/14/1999	Heavy Snow
Erie County	1/16/1999	Heavy Snow
Southern Erie County	2/12/1999	Heavy Snow
Southern Erie County	3/1/1999	Heavy Snow
Southern Erie County	3/3/1999	Heavy Snow
Erie County	3/5/1999	Heavy Snow
Southern Erie County	11/3/1999	Heavy Snow
Erie County	12/23/1999	Heavy Snow
Southern Erie County	12/27/1999	Heavy Snow





Table 4.3.8.3.A

<b>WINTER STORM EVENTS IMPACTING ERIE COUNTY SINCE 1996 (NCEI)</b>		
<b>Location</b>	<b>Date</b>	<b>Type</b>
Southern Erie County	1/20/2000	Heavy Snow
Southern Erie County	1/21/2000	Heavy Snow
Northern Erie County	2/11/2000	Winter Storm
Northern Erie County	2/13/2000	Winter Storm
Erie County	3/11/2000	Winter Storm
Northern Erie County	11/15/2000	Heavy Snow
Southern Erie County	11/17/2000	Heavy Snow
Erie County	11/20/2000	Heavy Snow
Erie County	11/21/2000	Heavy Snow
Southern Erie County	12/5/2000	Heavy Snow
Erie County	12/6/2000	Heavy Snow
Erie County	12/13/2000	Winter Storm
Southern Erie County	12/19/2000	Heavy Snow
Northern Erie County	12/22/2000	Heavy Snow
Erie County	12/24/2000	Heavy Snow
Erie County	12/27/2000	Heavy Snow
Southern Erie County	12/31/2000	Heavy Snow
Southern Erie County	2/2/2001	Heavy Snow
Southern Erie County	3/5/2001	Heavy Snow
Northern Erie County	3/26/2001	Heavy Snow
Southern Erie County	12/20/2001	Heavy Snow
Erie County	12/28/2001	Heavy Snow
Northern Erie County	12/31/2001	Heavy Snow
Southern Erie County	1/18/2002	Heavy Snow
Southern Erie County	2/4/2002	Heavy Snow
Erie County	2/27/2002	Heavy Snow
Erie County	3/3/2002	Heavy Snow
Erie County	3/10/2002	Heavy Snow
Erie County	3/22/2002	Heavy Snow
Erie County	3/24/2002	Winter Storm
Erie County	11/22/2002	Heavy Snow
Erie County	11/27/2002	Heavy Snow
Southern Erie County	11/30/2002	Heavy Snow
Southern Erie County	12/1/2002	Heavy Snow
Erie County	12/24/2002	Heavy Snow
Southern Erie County	1/10/2003	Heavy Snow
Northern Erie County	1/11/2003	Heavy Snow



Table 4.3.8.3.A

<b>WINTER STORM EVENTS IMPACTING ERIE COUNTY SINCE 1996 (NCEI)</b>		
<b>Location</b>	<b>Date</b>	<b>Type</b>
Southern Erie County	1/15/2003	Heavy Snow
Northern Erie County	1/26/2003	Heavy Snow
Erie County	2/24/2003	Heavy Snow
Erie County	12/17/2003	Heavy Snow
Erie County	1/6/2004	Heavy Snow
Erie County	1/14/2004	Winter Storm
Southern Erie County	1/19/2004	Heavy Snow
Erie County	1/27/2004	Winter Storm
Southern Erie County	3/12/2004	Heavy Snow
Erie County	3/16/2004	Heavy Snow
Southern Erie County	4/4/2004	Heavy Snow
Erie County	12/13/2004	Heavy Snow
Erie County	12/22/2004	Winter Storm
Erie County	1/5/2005	Winter Storm
Erie County	1/22/2005	Winter Storm
Erie County	3/1/2005	Winter Storm
Erie County	4/2/2005	Winter Storm
Erie County	11/17/2005	Heavy Snow
Southern Erie County	11/24/2005	Winter Storm
Erie County	12/1/2005	Heavy Snow
Erie County	12/6/2005	Heavy Snow
Southern Erie County	12/19/2005	Heavy Snow
Southern Erie County	1/24/2006	Heavy Snow
Erie County	2/5/2006	Winter Storm
Southern Erie County	11/2/2006	Lake-Effect Snow
Southern Erie County	12/7/2006	Lake-Effect Snow
Southern Erie County	1/9/2007	Lake-Effect Snow
Southern Erie County	1/19/2007	Lake-Effect Snow
Erie County	1/24/2007	Lake-Effect Snow
Southern Erie County	1/28/2007	Lake-Effect Snow
Erie County	1/30/2007	Lake-Effect Snow
Northern Erie County	2/5/2007	Lake-Effect Snow
Erie County	2/13/2007	Winter Storm
Southern Erie County	2/22/2007	Lake-Effect Snow
Erie County	3/16/2007	Heavy Snow
Southern Erie County	4/4/2007	Lake-Effect Snow
Southern Erie County	11/6/2007	Lake-Effect Snow



Table 4.3.8.3.A

<b>WINTER STORM EVENTS IMPACTING ERIE COUNTY SINCE 1996 (NCEI)</b>		
<b>Location</b>	<b>Date</b>	<b>Type</b>
Erie County	12/5/2007	Lake-Effect Snow
Erie County	12/15/2007	Winter Storm
Erie County	1/1/2008	Winter Storm
Erie County	1/24/2008	Lake-Effect Snow
Erie County	2/12/2008	Winter Storm
Northern Erie County	2/19/2008	Lake-Effect Snow
Erie County	2/26/2008	Winter Storm
Erie County	3/4/2008	Winter Storm
Erie County	3/7/2008	Winter Storm
Southern Erie County	10/28/2008	Lake-Effect Snow
Erie County	11/9/2008	Lake-Effect Snow
Erie County	11/16/2008	Lake-Effect Snow
Erie County	11/20/2008	Lake-Effect Snow
Southern Erie County	12/5/2008	Lake-Effect Snow
Southern Erie County	12/6/2008	Lake-Effect Snow
Erie County	12/19/2008	Winter Storm
Erie County	12/21/2008	Lake-Effect Snow
Erie County	1/18/2009	Lake-Effect Snow
Erie County	1/27/2009	Winter Storm
Southern Erie County	2/19/2009	Lake-Effect Snow
Erie County	12/10/2009	Lake-Effect Snow
Erie County	12/27/2009	Lake-Effect Snow
Southern Erie County	1/1/2010	Lake-Effect Snow
Northern Erie County	1/7/2010	Lake-Effect Snow
Erie County	2/9/2010	Winter Storm
Southern Erie County	2/25/2010	Winter Storm
Southern Erie County	12/4/2010	Lake-Effect Snow
Southern Erie County	12/12/2010	Lake-Effect Snow
Southern Erie County	1/6/2011	Lake-Effect Snow
Erie County	1/11/2011	Winter Storm
Erie County	2/1/2011	Winter Storm
Erie County	2/20/2011	Winter Storm
Erie County	3/10/2011	Winter Storm
Southern Erie County	1/1/2012	Lake-Effect Snow
Erie County	1/12/2012	Lake-Effect Snow
Southern Erie County	2/10/2012	Lake-Effect Snow
Southern Erie County	4/23/2012	Lake-Effect Snow



Table 4.3.8.3.A

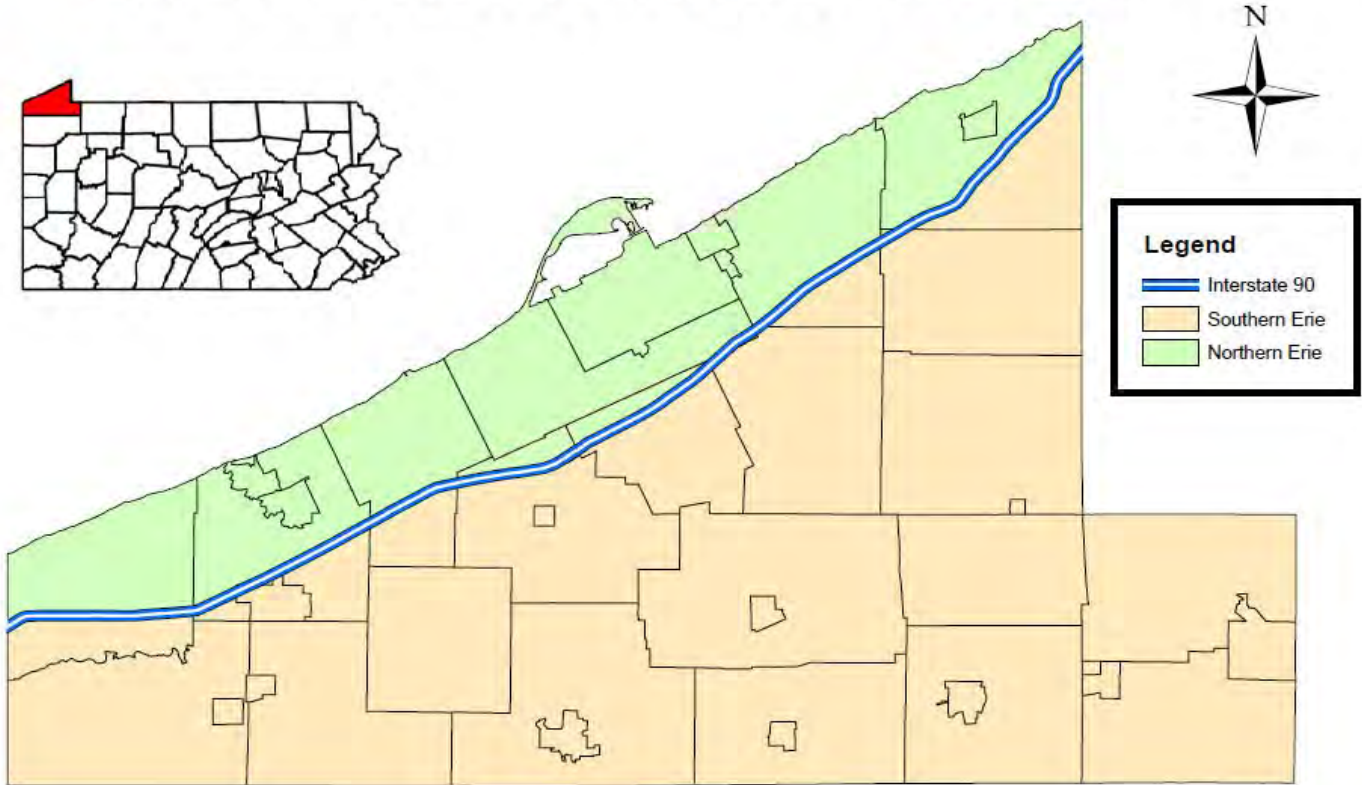
WINTER STORM EVENTS IMPACTING ERIE COUNTY SINCE 1996 (NCEI)		
Location	Date	Type
Southern Erie County	12/21/2012	Winter Storm
Erie County	12/26/2012	Winter Storm
Erie County	1/21/2013	Winter Storm
Southern Erie County	2/1/2013	Winter Storm
Erie County	2/3/2013	Winter Storm
Erie County	2/19/2013	Winter Storm
Southern Erie County	3/18/2013	Winter Storm
Southern Erie County	3/20/2013	Lake-Effect Snow
Southern Erie County	11/23/2013	Lake-Effect Snow
Southern Erie County	11/26/2013	Winter Storm
Southern Erie County	12/10/2013	Lake-Effect Snow
Erie County	12/14/2013	Heavy Snow
Southern Erie County	12/15/2013	Lake-Effect Snow
Erie County	12/24/2013	Lake-Effect Snow
Southern Erie County	12/31/2013	Lake-Effect Snow
Erie County	1/2/2014	Heavy Snow
Erie County	2/4/2014	Winter Storm
Erie County	3/12/2014	Winter Storm
Erie County	11/13/2014	Lake-Effect Snow
Southern Erie County	12/11/2014	Winter Storm
Erie County	1/6/2015	Lake-Effect Snow
Southern Erie County	1/8/2015	Lake-Effect Snow
Erie County	2/1/2015	Winter Storm
Southern Erie County	12/18/2015	Lake-Effect Snow
Southern Erie County	1/11/2016	Lake-Effect Snow
Erie County	1/17/2016	Lake-Effect Snow
Erie County	2/9/2016	Lake-Effect Snow
Erie County	2/15/2016	Heavy Snow
Southern Erie County	11/19/2016	Lake-Effect Snow
Northern Erie County	12/8/2016	Lake-Effect Snow
Southern Erie County	12/14/2016	Lake-Effect Snow

**4.3.8.4 Future Occurrence**

The risk map below graphically depicts areas potentially susceptible to winter storms. The areas labeled “Northern Erie” are slightly more vulnerability given lake effect snow potential.



# ERIE COUNTY WEATHER REGIONS



### 4.3.8.5 Vulnerability Assessment

TABLE 4.3.8.5.A WINTER STORM VULNERABILITY ASSESSMENT					
Probability		+	Severity	=	Risk
FREQUENT					CRITICAL
Events	133		The potential property damage, injury and death puts this hazard at critical severity		A combination of frequent occurrence and critical level of severity puts this hazard at high risk to Erie County
Years	21				
There is a likely a chance that a winter storm will occur several times throughout the year					



### 4.3.9 Dam Failure

"A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Failure of these structures results in an uncontrolled release of impounded water" (PEMA, 2013).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
At any time throughout the year	None to Years	MODERATE

#### 4.3.9.1 Location and Extent

Infrastructure encompasses a wide variety of categories including dams and levees. Every four years, the American Society of Civil Engineers (ASCE) issues a report card for America's infrastructure. The ASCE offers a letter grade in 16 categories. Evaluations are based on capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation. The ASCE report for Pennsylvania in 2014 had an overall grade of C- (the ASCE does not offer individual county reports).

The Pennsylvania Department of Environmental Protection defines a dam as "any artificial barrier, such as an earthen embankment or concrete structure, built for the purpose of impounding or storing water or another fluid or semi-fluid" (PADEP, 2015). The PADEP, Division of Dam Safety is required to assure proper planning, design review, construction review, maintenance monitoring, and supervision of dams (PADEP, 2017).

Dam failures are usually the result of poor design, improper construction, improper operation, inadequate maintenance, or a combination of these factors. The PADEP divides dam failures into the following three categories: hydraulic failure, seepage failure, and structural failure.

- **Hydraulic Failures:** Failures resulting from the erosive action of the uncontrolled flow of water adjacent to the dam and its foundation. Earth dams are particularly susceptible to hydraulic failure since earth erodes when subjected to flows at relatively low gradients.
- **Seepage Failures:** Failures resulting from seepage being uncontrolled in velocity and amount. Seepage may occur both through the dam as well as under and around the dam in the foundation and abutment materials. Seepage, if uncontrolled, can erode material starting at the downstream slope or foundation and working back toward the upstream slope to form a "pipe" which leads to a complete failure of the structure. This phenomenon, known



as piping, is defined as the progressive development of internal erosion. It can also contribute to destabilizing movements of the embankment such as slides or sloughs.

- **Structural Failures:** Involve the rupture of the dam or its foundation. This is a particularly important hazard on large dams and on those built of low-strength clays, silts and other materials such as slag and fly ash (PADEP, 2012, pg. 3).

Dam failures generally result from a complex interrelationship of several failure modes. Uncontrolled seepage may weaken the soil and lead to a structural failure. Structural failure may shorten the seepage path and lead to a piping failure. Surface erosion may lead to structural or piping failures. The PADEP classifies dams into four hazard categories.

- **Category 1:** A high-hazard dam that could cause substantial loss of life, excessive economic loss, or substantial public inconvenience by its sudden failure.
- **Category 2:** A high-hazard dam that, in the event of operational or structural failure, could result in the loss of a few lives, appreciable economic loss and moderate public inconvenience.
- **Category 3:** A non-high-hazard dam that would not likely endanger human life, but could result in appreciable property damage or short-duration public inconvenience.
- **Category 4:** A non-high-hazard dam that would not likely endanger human life, cause minimal property damage and have no significant public damage.

The National Performance of Dams Program (NPDP) from Stanford University maintains a database of dams in the United States and identifies 13 in Erie County; four of those are classified as “high hazard” dams, four are classified as “significant hazard” dams, two are classified as “low hazard” dams, and three are unknown.

Using the U.S. Army Corps of Engineers (ACE) National Inventory of Dams and the National Performance of Dams Program (NPDP) Dams Directory, a list of the dams in Erie County is presented below.



Table 4.3.9.1.A

ERIE COUNTY DAMS				
Dam Name	Purpose	Hazard	Emergency Action Plan	Built
Siegel Marsh	Recreation	Significant	Yes	1958
Eaton Reservoir	Water Supply	High	Yes	1939
Smith Reservoir	Water Supply	Significant	Yes	1925
Edinboro Lake	Recreation	High	Yes	1909
Union City Reservoir	Water Supply	High	Yes	1935
Grahamville Reservoir	Water Supply	High	Yes	1906
Union City Dam	Flood Control	High	Yes	1971
Lakeshore Dam	Recreation	Significant	No	1932
David Strongs	Recreation	Low	Not reported	Unknown
Sweny Dam	Unknown	Low	Not reported	1983
West 17 <sup>th</sup> St. Detention	Flood Control	Unknown	Yes	2001
McDowell Detention Basin	Flood Control	Unknown	Yes	2004
Zelina	Recreation	Unknown	Yes	1974

#### 4.3.9.2 Range of Magnitude

Infrastructure decay is a countywide issue as it occurs anywhere there are bridges, dams, levees, rails, roads, etc. Infrastructure is the backbone of the economy and a necessary input to every economic output. It is critical to prosperity and the public’s health and welfare. Deteriorating infrastructure, long known to be a public safety issue, has a cascading impact on the economy, impacting business productivity and competitiveness, employment, and personal income (ASCE, 2016).

“Dam safety risk assessment is like a stool that stands on three legs. These legs quantify the likelihood that various initiating events (hydrologic, seismic, structural/internal, mechanical, or human error) will occur; the likelihood that the dam would fail given these initiating events; and the likelihood that, given a failure, the resulting flood wave would result in various levels of damage. The meaningful quantification of risk depends on credible estimates of the damages that would result from each significant failure scenario. Loss of human life is generally accepted as the most important consequence so it often dominates dam-safety decisions. Unfortunately, the confidence with which life loss can currently be estimated is low. This high level of uncertainty applies to both statistical confidence limits and to expert opinion. As such, this single limitation is a critical hindrance to the credibility and value of dam-safety risk assessment results. Indeed, some would like to push the stool over on its weak leg and abandon probabilistic risk assessment altogether” (USACE, 2002).





## PUBLIC HEALTH

The cascading effects that occur after a dam failure are of more concern to public health than the failure itself. The effect on public health is potentially the same as that of a flood event. Stagnant water poses multiple health risks including infectious disease, wound infections, injuries, and other health effects. As the water recedes the priority is to disinfect property, dispose of items that cannot be properly disinfected and practice good hygiene. It is important to keep open wounds and rashes from becoming exposed to stagnant water to avoid infection (CDC, 2014).

During the initial release fast-flowing water carrying debris, such as boulders and fallen trees leading to injury or death. Death can be caused by drowning, trauma, and hypothermia. Water purification and sewage disposal systems may be disrupted affecting public health.

As with flooding, mold becomes a concern after a dam failure. Mold exposures usually occur during cleanup when it is disturbed and easily transfers from surface to surface. Some items can be cleaned but porous materials (i.e., rugs, composite wood furniture, HVAC filters, etc.) should be disposed (FEMA, 2010).

## SOCIAL VULNERABILITY

As there is usually limited time for warning, those living in close proximity of a dam are considered especially vulnerable to dam failure. Dam failures themselves do not pose a threat to public health; the cascading effects that occur after a failure are more concerning. When a dam fails, it results in downstream flooding that can cause death, injury, and illnesses relating to water-borne diseases and standing water. The consequences of flooding from a dam failure can include damage to buildings and transportation infrastructure and power outages. People may be displaced from their homes.

### 4.3.9.3 Past Occurrence

The table below shows incidents involving dams reported to the Pennsylvania Emergency Incident Reporting System (PEIRS). PEIRS is a voluntary reporting database, as such some incidents may not be reported. The Stanford University National Performance of Dams Program did not list any incidents on its database.



Table 4.3.9.3.A

DAM INCIDENTS IN ERIE COUNTY (PEIRS, 2017)		
Date	Municipality	Details of Incident
September 9, 2004	Edinboro Borough	A dam failure near Edinboro Borough crested and was in danger of failure. Residents evacuated downstream.
May 26, 2005	Edinboro Borough	A private dam was found to have erosion. The owner was asked to lower the water levels in the dam.

4.3.9.4 Future Occurrence

Risk map not included for security concerns.

4.3.9.5 Vulnerability Assessment

TABLE 4.3.9.5.A DAM FAILURE VULNERABILITY ASSESSMENT				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
REMOTE		CRITICAL		MODERATE
Though plausible, the lack of historical occurrences and the presence of routine inspection programs places dam failure as a remote probability	+	Should an incident occur, it could have devastating effects on downstream communities; however, these impacts could be geographically limited	=	A combination of remote occurrence and critical level of severity puts this hazard at moderate risk to Erie County



#### 4.3.10 Environmental Hazards

"Environmental hazards are hazards that pose threats to the natural environment, the building environment, and public safety through the diffusion of harmful substances, materials, or products" (PEMA, 2013).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
At any time throughout the year	None / Hours	HIGH

##### 4.3.10.1 Location and Extent

The use of hazardous materials is common in numerous industries and products, including agriculture, medicine and research (Hadow, Bullock, & Coppola, 2014). The Emergency Planning and Citizens Right-to-Know Act (EPCRA) of 1984 requires facilities to report on-site chemicals and quantities. The act also requires local governments to formulate emergency plans.

The Pipeline and Hazardous Materials Safety Administration (PHMSA), a division of the U.S. Department of Transportation, tracks hazardous material incidents that occur during transport. Between 2010 and 2016, PHMSA recorded 49 hazardous materials incidents during transport in Erie County. Of those, 48 occurred on highways. Spills of hazardous materials during transportation are the most difficult for which to plan. While commodity flow studies give local jurisdictions a snapshot of what materials may travel through an area on any given day, responders will not know what materials, if any, are involved until an incident occurs.

The U.S Department of Transportation (DOT) also maintains records of hazardous materials incidents that occur during transport at the state level. According to the DOT, there were 777 incidents in Pennsylvania in 2016, resulting in five injuries and \$1.35 million in damage. The majority of these incidents involved highway transportation vehicles (2017).

The Right-to-Know Network (RTK Net) maintains data, per reports from the U.S. Coast Guard's National Response Center, on incidents that involve a hazardous material release. In Erie County, there were 149 incidents between 2010 and 2016. These resulted in one fatality, 15 hospitalizations, and 16 injuries. Fifty-eight percent (58%) of these incidents (87 incidents) involved a vehicle, while 19.5% were at fixed sites.

A CSX "density report" showed 25 products accounted for 80,009 rail carloads in Erie County in 2015. These carloads represented 96% of all hazardous material carloads handled. Petroleum crude oil and alcohol n.o.s., both flammable



substances made up 76.16% of the carloads handled. Norfolk Southern reported that materials from DOT Class 9 were shipped the most. Norfolk Southern also reported four shipments of radioactive materials.

Table 4.3.10.1.A

**CSX<sup>1</sup> TOP 25 HAZARDOUS MATERIALS CARLOADS HANDLED (2015)**

Commodity	Hazard Class	Carload %
Petroleum Crude Oil 4910191	3	58.98%
Alcohol N.O.S.	3	17.18%
Liquefied Petroleum Gases	2.1	4%
Propane	2.1	3.54%
Elevated Temperature Liquid	9	1.75%
Petroleum Crude Oil 4910165	3	1.6%
Chlorine	2.3	1.43%
Sodium Hydroxide Solution	8	1.16%
Freight All Kinds (may include Hazardous Materials)	-	<1%
Hazardous Waste, Solid, N.O.S.	9	<1%
Hydrochloric Acid	8	<1%
Ethanol	3	<1%
Polychlorinated Biphenyls, Solid	9	<1%
Environmentally Hazardous Substances Solid, N.O.S.	9	<1%
Hypochlorite Solutions	8	<1%
Butane	2.1	<1%
Sulfuric Acid	8	<1%
Hydrocarbons, Liquid, N.O.S.	3	<1%
Environmentally Hazardous Substances, Liquid, N.O.S.	9	<1%
Petroleum Distillates, N.O.S.	3	<1%
Potassium Hydroxide, Solution	8	<1%
Carbon Dioxide Refrigerated Liquid	2.2	<1%
Engines, Internal Combustion	9	<1%
Toluene	3	<1%
Elevated Temperature Liquid, Flammable, N.O.S.	3	<1%
<b>Total</b>		<b>96%</b>

Table 4.3.10.1.B

**NORFOLK SOUTHERN<sup>2</sup> TOP 10 HAZARDOUS MATERIALS CARLOADS HANDLED (2015)**

Commodity	Hazard Class	Shipments
Freight All Kinds (may include Hazardous Materials)	-	4,947
Freight All Kinds (may include Hazardous Materials)	-	3,391
Elevated Temperature	9	2,141
Petroleum Gases	2.1	865
Elevated Temperature	9	864
Sulfuric Acid	8	649
Freight All Kinds (may include Hazardous Materials)	-	577
Alcohols, N.O.S.	3	494
Phenol, Molten	6.1	472
Petroleum Crude Oil	3	269
<b>Totals</b>		<b>14,669</b>

<sup>1</sup> Data provided by CSX Transportation in response to a request for the density report from ECDPS. Data shown is for Erie County only.

<sup>2</sup> Data provided by NSRR in response to a request for commodity information from ECDPS. Data shown is for Erie County only.



Erie County completed a commodity flow study in 2016. During traffic counts, 2,817 transportation vehicles were identified that could haul hazardous materials. Only 7.4% were placarded. Class 3 flammable liquids comprised the most placards. All hazard classes, except radioactive, were identified during the study. However, county officials are aware of radioactive materials being transported through the county.

Table 4.3.10.1.C

VEHICLES BY TYPE WITH NO PLACARD DURING COMMODITY FLOW STUDY					
Vehicle Type	I-79 North End	I-79 South End	I-90 East End	I-90 West End	Totals
Mixed Loads	182	229	1289	563	2263
Cryogenic Liquid Tank	0	0	1	0	1
Compressed Gas Tube	0	0	0	0	0
High Pressure Tank	0	0	2	0	2
Non-Pressure Liquid Tank	0	5	1	4	10
Low-Pressure Chemical Tank	10	17	47	38	112
Corrosive Liquid Tank	1	1	0	1	3
Dry Bulk Cargo Trailer	3	20	13	12	48
Vacuum Loaded Tank	0	0	0	0	0
Municipal Waste Haulers	2	0	1	0	3
Other Types of commercial haulers not identified	22	0	314	0	336
Charter Buses	1	0	38	0	39
School Buses	0	0	0	0	0
<b>Totals</b>	<b>221</b>	<b>272</b>	<b>1706</b>	<b>618</b>	<b>2817</b>

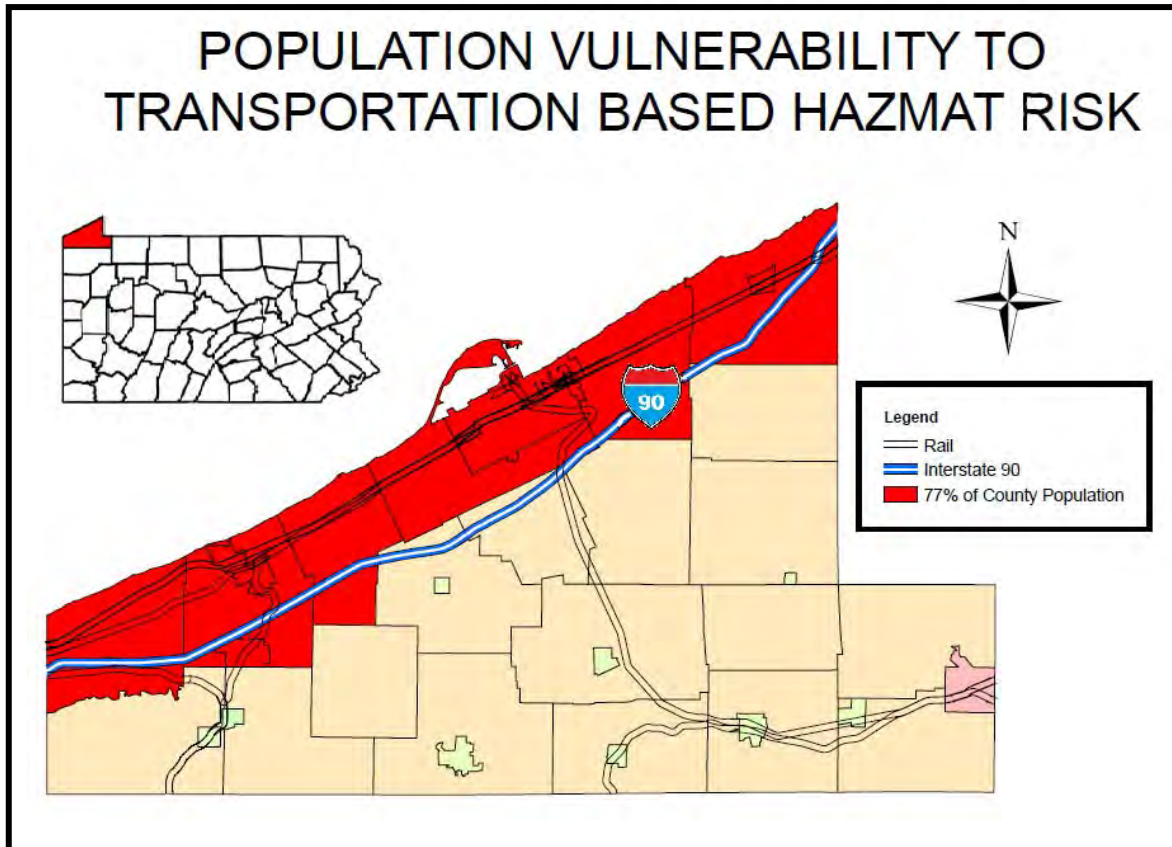
#### 4.3.10.2 Range of Magnitude

According to data from the RTK Net, 32 municipalities have had an incident reported to the National Response Center. This hazard is a countywide hazard, with the City of Erie having the highest risk due to a concentration of industrial facilities that utilize combustible hazardous materials. Highways and railways used to transport hazardous materials are also concentrated in the city.

Between 2010 and 2016, 22 municipalities experienced some type of hazardous material event. There were 149 events during this time period, with the majority occurring in the City of Erie (70%). These events included reports of one fatality and 16 injuries. Motor vehicles account for the most incidents in the county: 87 of the 149 recorded events (58.4%). Incidents at fixed facilities were the second most common, accounting for 29 incidents (19.5%). An “unknown sheen on water” comprised 12.8% of all incidents.



CSX Railroad operates 92 miles of rail line in Erie County; Norfolk Southern operates 46 miles of rail line. These rail lines pass through industrial and residential areas and run along and over creeks and streams, as shown in the risk map below. A spill or release could contaminate sources of drinking water and cause damage to the ecosystem. The longest stretch of CSX line runs north of and parallel to Interstate 90. This same area comprises approximately 77% of the county's population.



The *Erie County Commodity Flow Study* (ECDPS, 2016) identified 2,817 total transportation vehicles. Only 209 of those vehicles had visible placards. None of the vehicle were placarded as radioactive; however, as noted by the Radiological Incidents profile, the U.S. Department of Energy has approved a plan that allows nuclear waste to travel across Interstate 90 and down Interstate 79 through Erie County. The chart below is a summary of the hazardous materials identified by placard during traffic counts.

Table 4.3.10.2.A

<b>COMMODITY FLOW STUDY SUMMARY OF TRANSPORTED HAZARDOUS MATERIALS BY CLASS</b>	
<b>Class #</b>	<b>Totals</b>
Class 1: Explosives	5
Class 2: Gases	35
Class 3: Flammable Liquids	69
Class 4: Flammable Solids	3
Class 5: Oxidizing Substances and Organic Peroxides	10
Class 6: Toxic Substances and Infectious Substances	11
Class 7: Radioactive Materials	0
Class 8: Corrosive Substances	44
Class 9 Miscellaneous Hazardous Materials	30
DANGEROUS	2
<b>Totals</b>	<b>209</b>

Some fixed facilities, due to the nature of their businesses, have a higher chance of a hazmat incident, especially Tier II reporting facilities. However, hazmat incidents during transport are the most difficult for which to plan since they can occur at any time, at any place, and involve a wide variety of materials. In contrast, incidents at facilities typically involve known materials. While leaks, spills and accidents occur in specific locations, the effects of these have the potential to affect distant regions.

The *Erie County Commodity Flow Study* (ECDPS, 2016) lists 263 SARA facilities in the county. The City of Erie and Millcreek Township combine for 43% of these facilities. The table below lists each municipality with the numbers of Superfund Amendments and Reauthorization Act (SARA) and extremely hazardous substance (EHS) facilities.

Table 4.3.10.2.B

<b>COMMODITY FLOW STUDY SUMMARY OF SARA AND EHS FACILITIES BY MUNICIPALITY</b>		
<b>Municipality</b>	<b>SARA Facilities</b>	<b>EHS Facilities</b>
Albion Borough	3	2
Amity Township	0	0
Concord Township	1	0
Conneaut Township	1	0
City of Corry	13	6
Cranesville Borough	0	0
Edinboro Borough	6	4
Elgin Borough	1	0
Elk Creek Township	4	0
City of Erie	54	41
Fairview Township	15	4
Franklin Township	1	0



Table 4.3.10.2.B

**COMMODITY FLOW STUDY SUMMARY OF SARA AND EHS FACILITIES BY MUNICIPALITY**

Municipality	SARA Facilities	EHS Facilities
Girard Borough	2	1
Girard Township	2	0
Greene Township	0	0
Greenfield Township	1	1
Harborcreek Township	11	5
Lake City Borough	4	1
Lawrence Park Township	4	2
LeBoeuf Township	0	0
McKean Borough	1	1
McKean Township	1	0
Mill Village Borough	0	0
Millcreek Township	35	13
North East Borough	9	6
North East Township	7	7
Platea Borough	0	0
Springfield Township	1	1
Summit Township	15	7
Union Township	0	0
Union City Borough	3	1
Venango Township	0	0
Washington Township	2	0
Waterford Borough	1	1
Waterford Township	0	0
Wattsburg Borough	0	0
Wayne Township	2	0
Wesleyville Borough	1	0

There are three pipeline groups transporting products through Erie County: Emkey Gathering, LLC, National Fuel, and Kinder Morgan. According to the *Erie County Commodity Flow Study* (ECDPS, 2016), all three groups transport UN# 1971, natural gas.

In Erie County, there are several sites that are qualified as superfunds or brownfields. Any land that has been contaminated by hazardous waste and identified by the EPA because of its risk to human health and/or the environment is known as a “superfund” site. Some superfunds are on the National Priorities List (NPL), which is “the list of hazardous waste sites in the U.S. eligible for long-term remedial action (cleanup) financed under the federal Superfund program.” Congress created the Superfund program in 1980 to pay for the cleanup of the country's most hazardous waste sites

Table 4.3.10.2.C

Type of Site	Totals
Superfunds	134
Active NPL	2
Active Non-NPL	5
Archived	127
Brownfields	1
Tanks & Spills	439
<b>Totals</b>	<b>574</b>





(Homefacts.com). Brownfields are defined as property locations where “the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant” (Homefacts.com). Table 4.3.10.2.C lists the quantities of superfunds, brownfields, and tanks and spills listed by the EPA. There are a total of 134 superfunds and one brownfield in Erie County.

## PUBLIC HEALTH

When looking at public health concerns during and following a hazmat incident, there are four primary mechanisms to examine (WHO, 2009).

- **Fire:** Produces injuries through heat and exposure to toxic substances
- **Explosion:** Produces traumatic injuries through resultant shockwaves, fragments and projectiles
- **Toxicity:** Results when humans come in contact with a chemical release and cause harm in a wide array of mechanisms including chemical burns, asphyxiation, and neurotoxicity
- **Mental Health Effects:** Produced by exposure to the event, not the hazardous material itself

Spills into waterways and those that reach groundwater are of particular concern due to the threat imposed. The public (via drinking water) and the flora and fauna of an area are all vulnerable. Depending on the nature of a chemical release, there may not be a clear hazmat scene or enough patient surge to indicate an incident has occurred. Public health surveillance and epidemiological investigations often detect and identify that an incident and exposure have occurred.

## SOCIAL VULNERABILITY

Children, pregnant women, the elderly, hospital patients, and those with low socioeconomic status have a greater inherent risk of suffering adverse health effects from hazmat incidents. These groups may have lower exposure thresholds, reduced mobility hindering evacuation, and/or the inability to protect themselves (WHO, 2009).



4.3.10.3 Past Occurrence

**Erie, Pennsylvania**

On February 11, 2013, there was a report of hydrogen cyanide released inside a plating facility. Findings revealed that sulfuric acid was accidentally added to a copper sodium cyanide tank, thereby causing a chemical reaction. Two injuries required hospitalization.

**Erie, Pennsylvania**

Firefighters and the hazmat team responded to a chemical spill on September 26, 2016. A package containing hydrochloric acid spilled onto the concrete inside a local business causing a reaction. The chemical reaction created a vapor cloud, which took approximately 30 minutes to dissipate. No injuries were reported.

**Northeast, Pennsylvania**

On September 9, 2015, citric degreaser from a food processing plant was released into Sixteen Mile Creek, a tributary of Lake Erie. A 100 x 40-foot white sheen could be seen in the creek.

**Corry, Pennsylvania**

On June 22, 2017, a two-vehicle collision on State Route 6 was the cause of a hazardous materials spill. Approximately 2,000 gallons of milk and another 200 gallons of



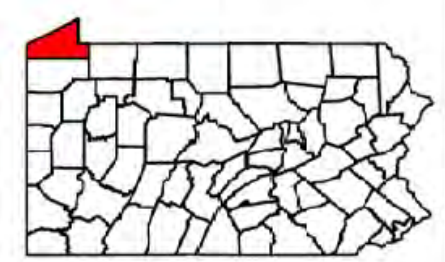
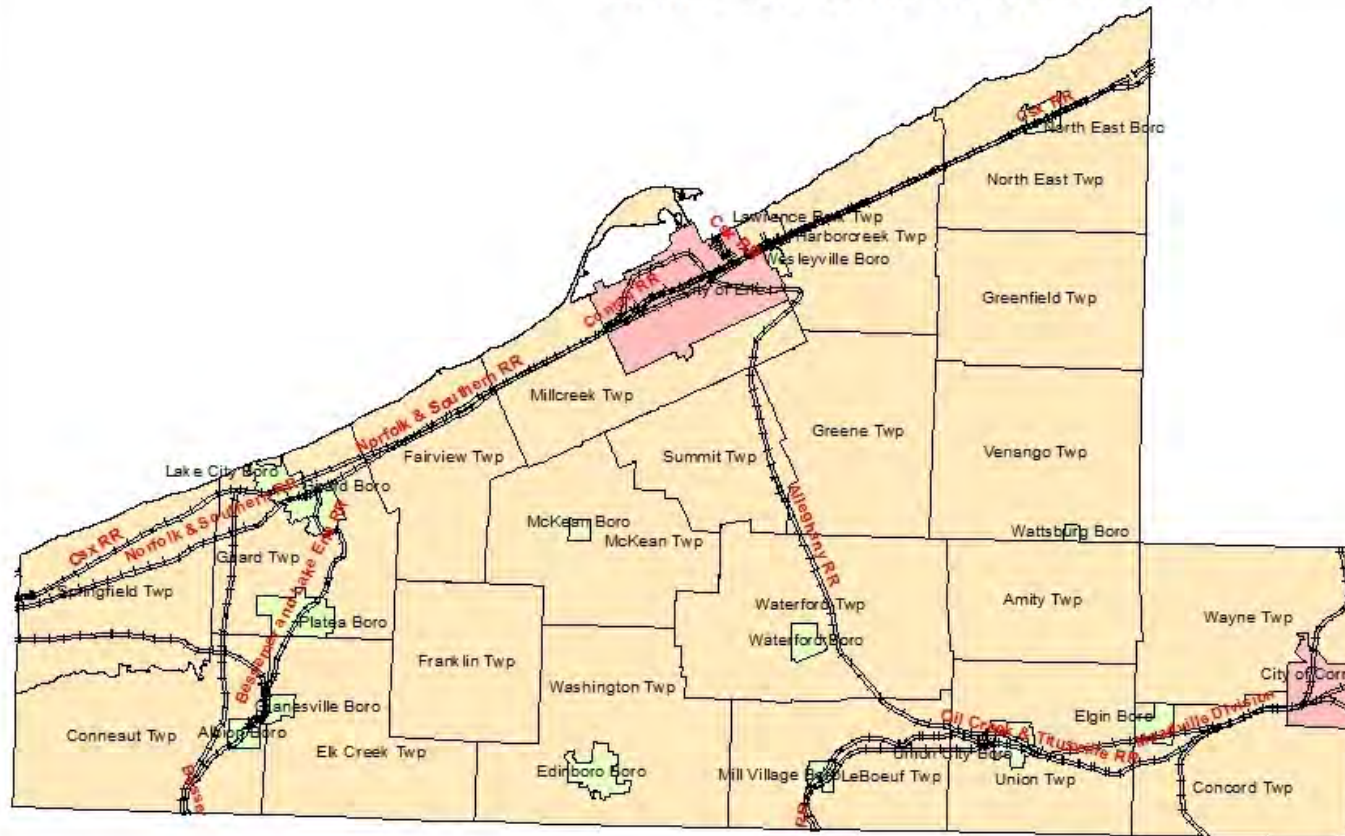
diesel fuel spilled in the roadway and grass median. It took almost an hour for the spills to be contained. One of the vehicle occupants was injured and flown to a trauma center.

4.3.10.4 Future Occurrence

The risk map below graphically depicts areas potentially susceptible to environmental hazards.



# ERIE COUNTY RAIL LINES

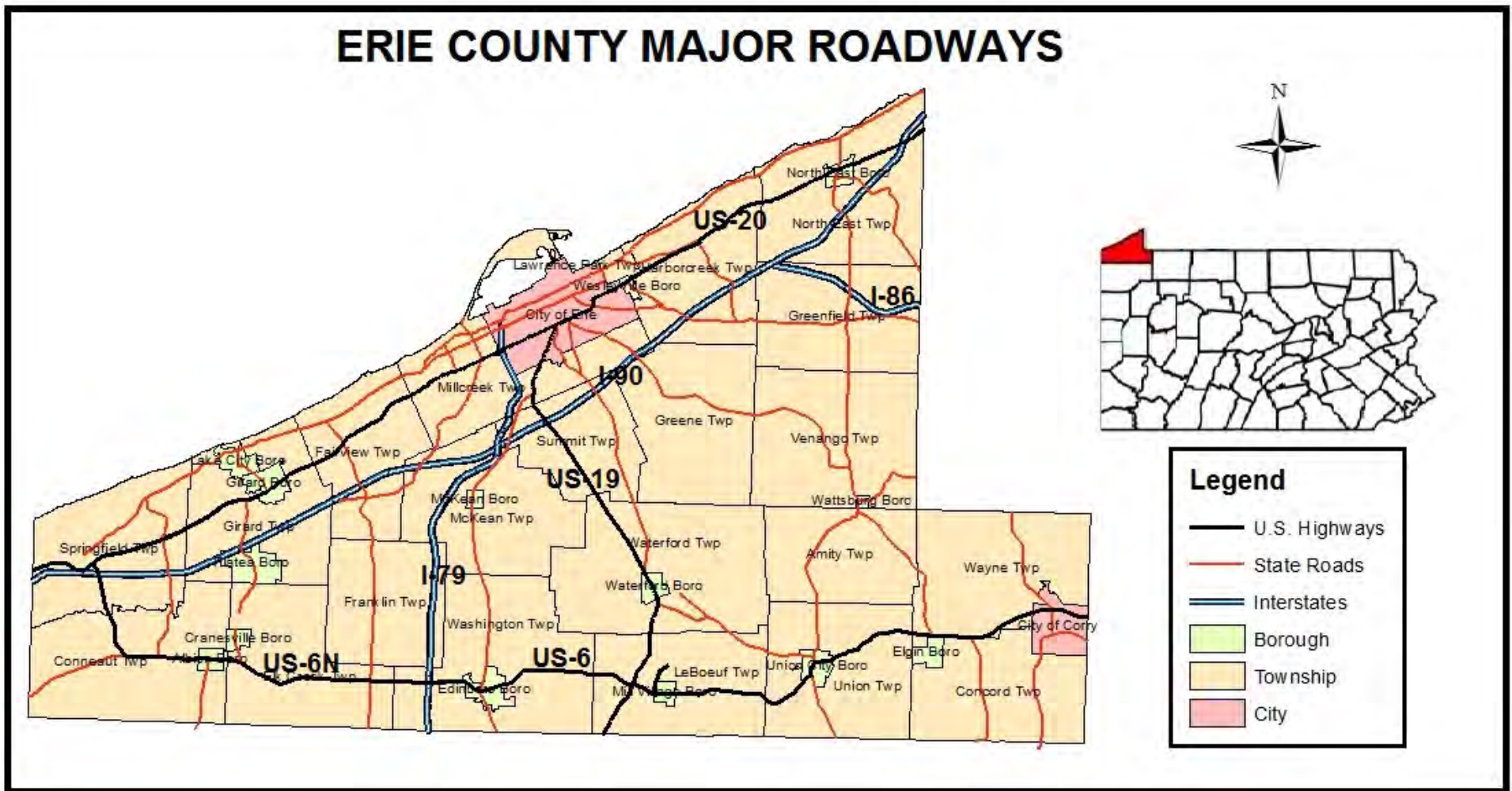


**Legend**

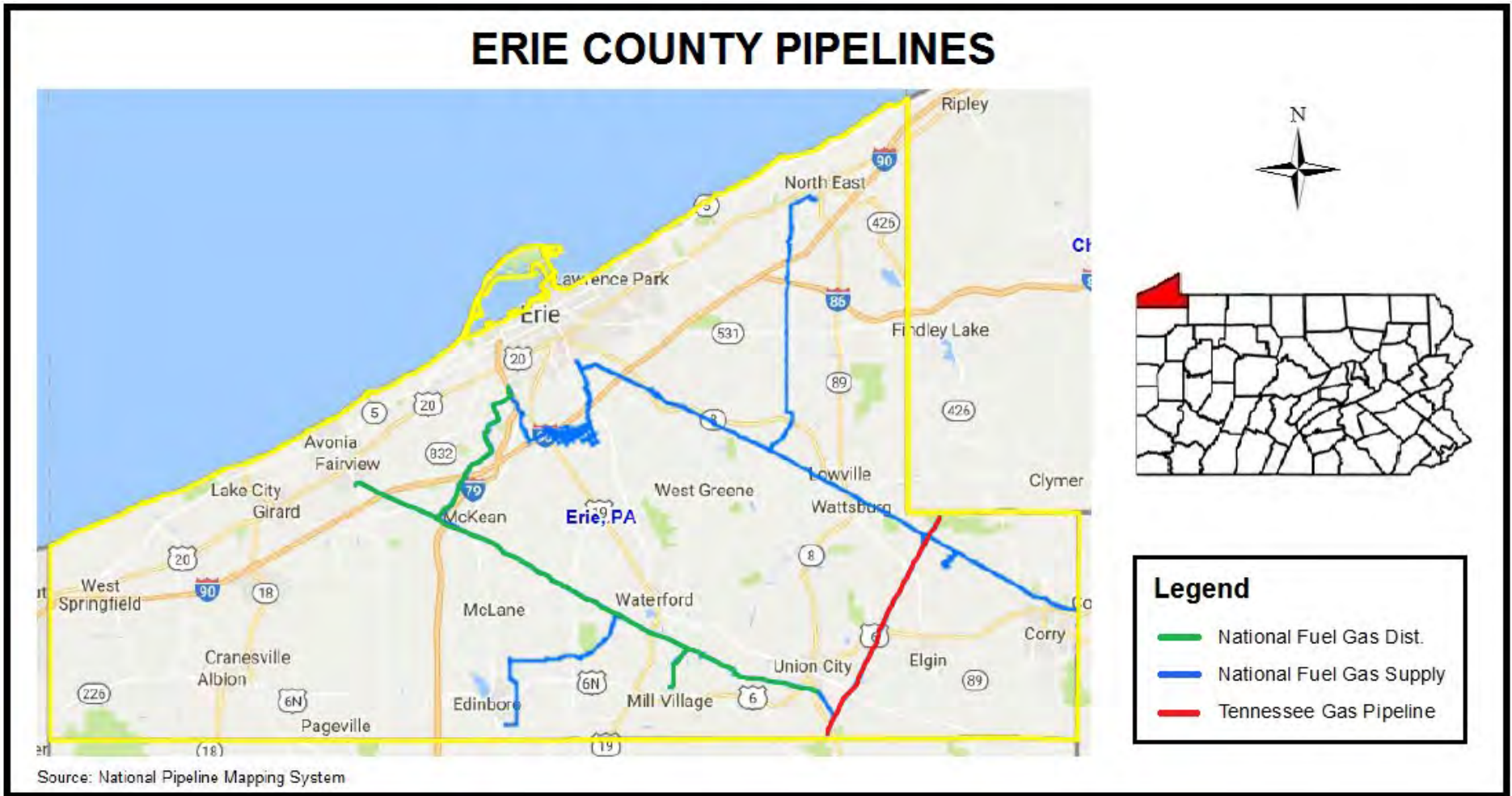
- Rail Line
- Borough
- Township
- City



## ERIE COUNTY MAJOR ROADWAYS



## ERIE COUNTY PIPELINES



4.3.10.5 Vulnerability Assessment

TABLE 4.3.10.5.A ENVIRONMENTAL HAZARDS VULNERABILITY ASSESSMENT				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
<b>FREQUENT</b>		<b>CRITICAL</b>		<b>HIGH</b>
Erie County historically experiences approximately 29 hazardous material events per year	+	The loss estimate has a monetary value that could be considered negligible. However due the risk to life and infrastructure the severity should be classified as critical	=	A combination of frequent occurrence and critical level of severity puts this hazard at high risk to Erie County



### 4.3.11 Radiological Incident

"Radiation is any form of energy that travels through space or matter. The radiation emitted by many radioactive isotopes contains enough energy to change the physical state of the material through which it passes. A radiological emergency is an incident that poses an actual or potential hazard to public health or safety or loss of property" (FEMA, n.d.).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
At any time throughout the year	Hours / Days / Months	<b>MODERATE</b>

#### 4.3.11.1 Location and Extent

Erie County is home to a radiopharmaceutical manufacturer. Radiopharmaceuticals contain radioisotopes used for diagnosis and therapy. Facilities that manufacture radiopharmaceuticals are subject to licensing by national and regional authorities (WHO, 2008). Erie County is also in close proximity to the Perry Nuclear Power Plant (PNPP) located in North Perry, Ohio. The PNPP is operated by First Energy Nuclear Operating Corporation and has one active water reactor; PNPP began operation in November of 1987. A second reactor was in the process of being built but was cancelled in 1994 (Lake County Ohio, 2017). On February 22, 2017, First Energy announced they will be leaving the competitive power plant business and will sell or close PNPP. The sale of PNPP would have little effect on its operation, and closing would take several years (Funk, 2017).

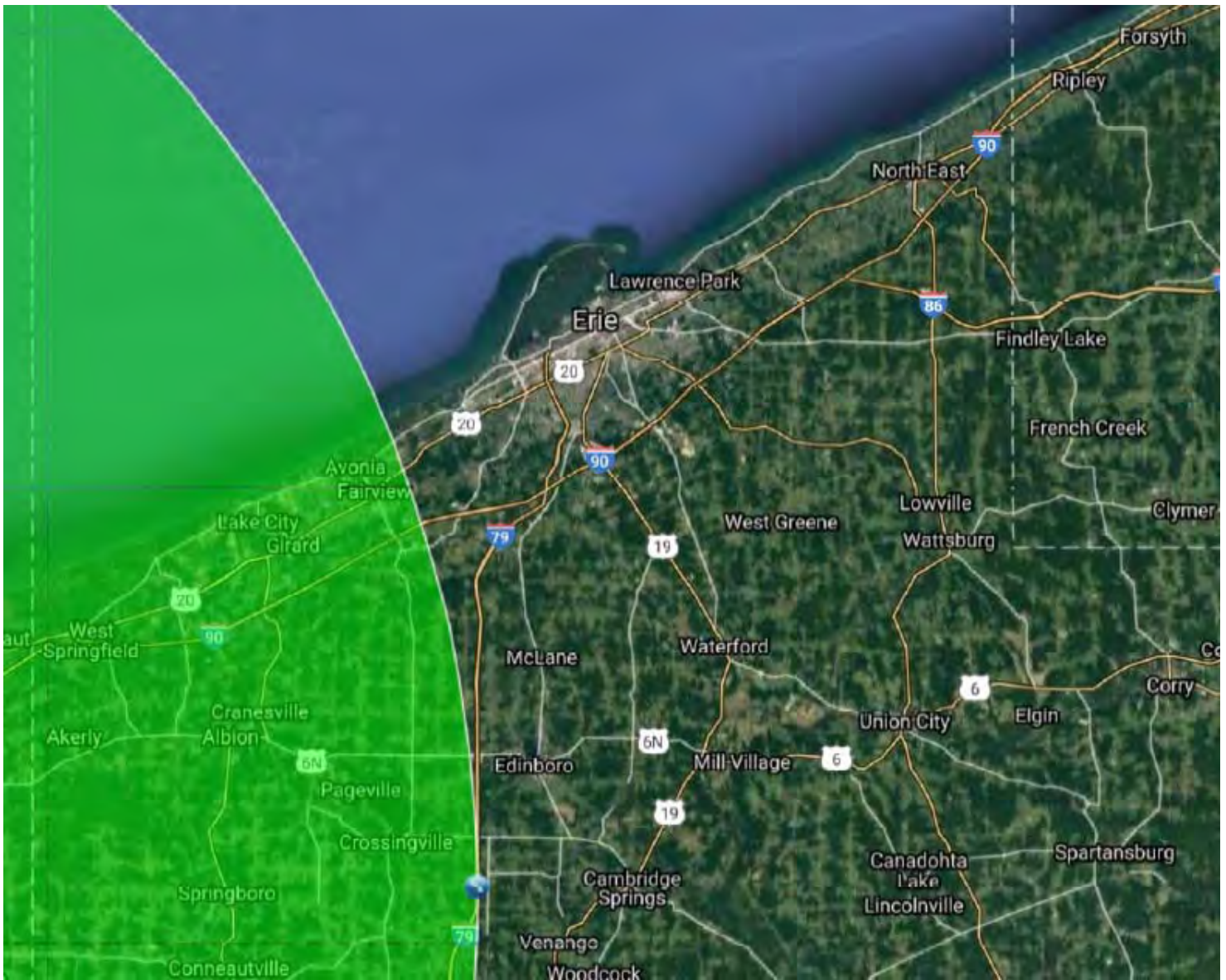
Erie County does not have a nuclear power plant within its borders; however, the area west of Interstate 79 falls within the 50-mile radius of the Perry Nuclear Power Plant located on Lake Erie in Lake County, Ohio. Health and safety risks for those in the 50-mile radius include whole body and thyroid injury from ingestion of radiologically-contaminated water and food (FEMA, 1996). Under federal regulations, PNPP has comprehensive emergency plans and participates in federally evaluated, full-scale exercises, at minimum, once every two years (NEI, 2016). According to the 2010 census 43,910 Erie County residents live within the 50-mile radius (DAP, 2016).

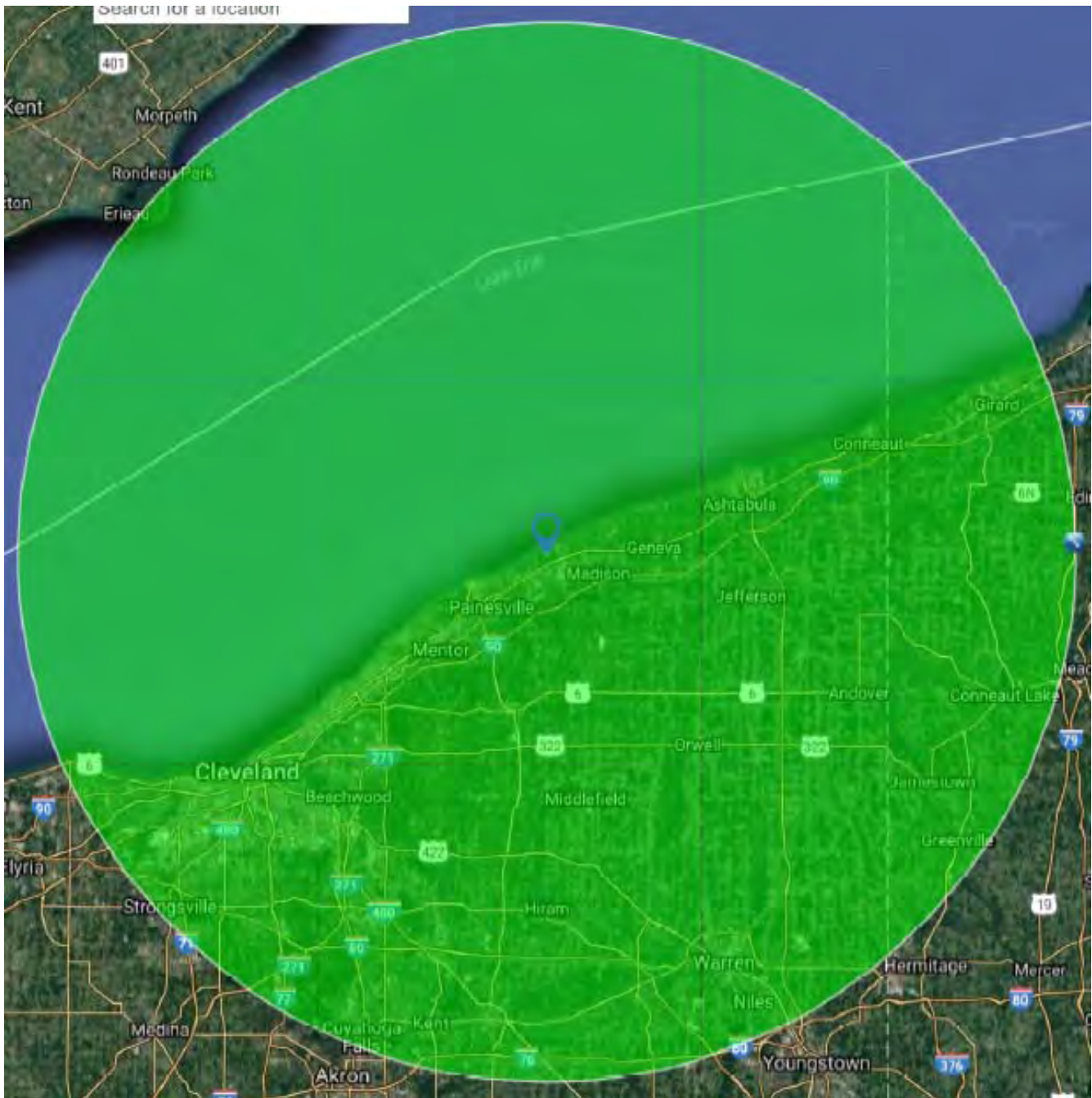
Table 4.3.11.1.A MUNICIPALITIES IN 50-MILE INGESTION PATHWAY PLANNING ZONE		
Albion Borough	Conneaut Township	Cranesville Borough
Elk Creek Township	Fairview Township	Franklin Township
Girard Borough	Girard Township	Lake City Borough
McKean Township	Platea Borough	Springfield Township
	Washington Township	





Erie County Municipalities in 50-Mile Ingestion Pathway





50-Mile Radius from Perry Nuclear Power Plant

4.3.11.2 Range of Magnitude

There are four levels of emergency classifications for nuclear power plants: (a) notification of unusual event, (b) alert, (c) site area emergency, and (d) general emergency.



- **Notification of Unusual Event:** Events that are in progress or have occurred, which indicate a potential degradation of the level of safety of the plant or that a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring would not be expected unless further degradation of safety systems occurs.
- **Alert:** Events that are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of hostile action. Any releases are expected to be limited to small fractions of the U.S. Environmental Protection Agency (EPA) protective action guides (PAG).
- **Site Area Emergency:** Events that are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile action that results in intentional damage or malicious acts (a) toward site personnel or equipment that could lead to likely failure or (b) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG levels beyond the site boundary.
- **General Emergency:** Events that are in progress or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or hostile action that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Each level requires messages to be sent out to specific government agencies, commissions, and local officials. If any of the four levels are declared, state and local agencies must be notified within 15 minutes of the declaration. Should a site area emergency or general emergency be declared, once notified, state and local authorities should begin to issue EAS messages, potential protective measures (e.g., evacuate, shelter in place, etc.), and provide phone numbers for public inquiry (FEMA, 2013).



The U.S. Department of Energy has approved a plan that would allow liquid nuclear waste, uranyl nitrate, to travel from Canada down Interstate 79 through Erie County. The plan is to move 6,000 gallons of the substance from Ontario, Canada to South Carolina using tractor-trailers traveling in convoys. Each tractor-trailer will carry 61.4 gallons, and there are approximately 100-150 trips planned over four years (Palattella, 2017).

This plan faced several challenges in court from environmental

groups. The lawsuits argued that the Department of Energy provided an insufficient environmental impact study that was based on outdated research; that weapons-grade, highly enriched uranium has not historically been shipped this way; and that the government's containers are dangerous and untested having only previously transported solid nuclear waste (Gebelein, 2017). Seven environmental advocacy organizations presented written filings and oral arguments to U.S. District Court in mid-January. However, on February 2, 2017, a federal judge ruled in favor of the Department of Energy allowing for the transportation of the waste material to begin (Taylor, 2017).



Photo of radioactive waste being transported on Interstate 79 northbound in Edinboro

## PUBLIC HEALTH

The U.S. Nuclear Regulatory Commission (USNRC) allows members of the public to get 100 millirems or mr (1 milliSievert or mSv) per year of radiation in addition to background radiation. The BEIR VII report (page 500, Table 12-9) estimates that this level will result in approximately one (1.142) cancer in every 100 people exposed at 100 mr per year, which includes one fatal cancer in every 175 people so exposed (5.7 in 1000). BEIR VII estimates that 11.42 people will get cancer if 10,000 are each exposed to a rem (1,000 millirems or 10 mSv). The U.S. Environmental Protection Agency Federal Guidance Report 13 estimates that 8.46 people will get cancer if 10,000 are each exposed to a rem. According to the USNRC, the average American receives a radiation dose of about 0.62 rem (620 millirems) each year.

Table 4.3.11.2.A

RADIATION DOSE CONVERSION TABLE	
Unit	Dose
Microsievert ( $\mu$ Sv)	1
Millirem (mr)	0.1
MilliSievert (mSv)	0.001
REM	0.0001
Sievert (Sv)	0.000001

## SOCIAL VULNERABILITY

The most vulnerable populations to radiation are those living within a 10-mile radius of a nuclear power plant. Those living within or whose food and/or water supply come from within a 50-mile radius are also vulnerable to the effects of a nuclear incident (CNN, 2017).

Infants, children, the elderly, pregnant women, and those with compromised immune systems are more vulnerable to the effects of radiation exposure than healthy adults (CDC, 2016). Another vulnerable group are first responders. First responders have little to no experience with radiological materials as they are rare. Further, during transport, responders may not know a radioactive material is involved until they are on scene (IAEA, 2015).



4.3.11.3 Past Occurrence

The historical occurrences listed below are included due to municipalities west of Interstate 79 being in the 50-mile ingestion pathway of Perry Nuclear Power Plant

**North Perry, Ohio**

In January of 2014, employees found radioactive water in the groundwater outside a building with a tritium leak. The water had not made its way into the plant's under-drain system, meaning it had not left the facility. Radiation was not found in any other groundwater sites or Lake Erie.

**North Perry, Ohio**

On April 22, 2011, PNPP was evacuated due to high radiation levels being detected. While the plant was shutting down for refueling, workers removed a monitor that measures nuclear reactions and radiation levels began to rise. A spokesperson for the plant reported that the radiation exposure to workers was equivalent to two or three chest x-rays.

In addition to the events described above, the table below includes incidents occurring during transportation of radiological materials on Pennsylvania highways.

Table 4.3.11.3.A  
**HIGHWAY RADIOLOGICAL INCIDENTS IN PENNSYLVANIA BETWEEN 1971 AND 2016 (PHMSA, 2017)**

Location	Date	UN Number	Damages
Leechburg, PA	9/10/1971	UN2911	-
Myerstown, PA	3/10/1974	UN2982	-
Lebanon, PA	12/17/1974	UN2982	-
Towanda, PA	1/17/1975	UN2976	-
Pittsburgh, PA	8/16/1975	UN2982	-
Pittsburgh, PA	8/16/1975	UN2982	-
New Columbia, PA	6/13/1977	UN2982	-
W. Mifflin, PA	8/2/1977	UN2912	-
Shippingport, PA	9/13/1977	UN2982	-
W. Mifflin, PA	11/28/1978	UN2982	-
Stroudsburg, PA	12/3/1978	UN2982	-
Camp Hill, PA	9/26/1981	UN2976	-



Table 4.3.11.3.A

**HIGHWAY RADIOLOGICAL INCIDENTS IN PENNSYLVANIA BETWEEN 1971 AND 2016 (PHMSA, 2017)**

Location	Date	UN Number	Damages
York, PA	4/13/1982	UN2910	-
Philadelphia, PA	12/17/1986	UN2982	-
Cheswick, PA	5/4/1990	UN2912	-
Oil City, PA	5/24/1991	UN2982	\$9,490
Tobyhanna, PA	3/6/1994	UN2982	\$5,000
Madison, PA	9/22/1995	UN2982	-
Leechburg, PA	2/9/1998	UN2982	\$5,000
Conway, PA	5/25/1999	UN2912	\$100
Conway, PA	12/3/2003	UN2912	\$10,000
Wampum, PA	6/19/2007	UN2910	-
Wampum, PA	12/5/2014	UN2913	-
Wampum, PA	7/22/2015	UN2912	-
Wampum, PA	7/22/2015	UN2913	-

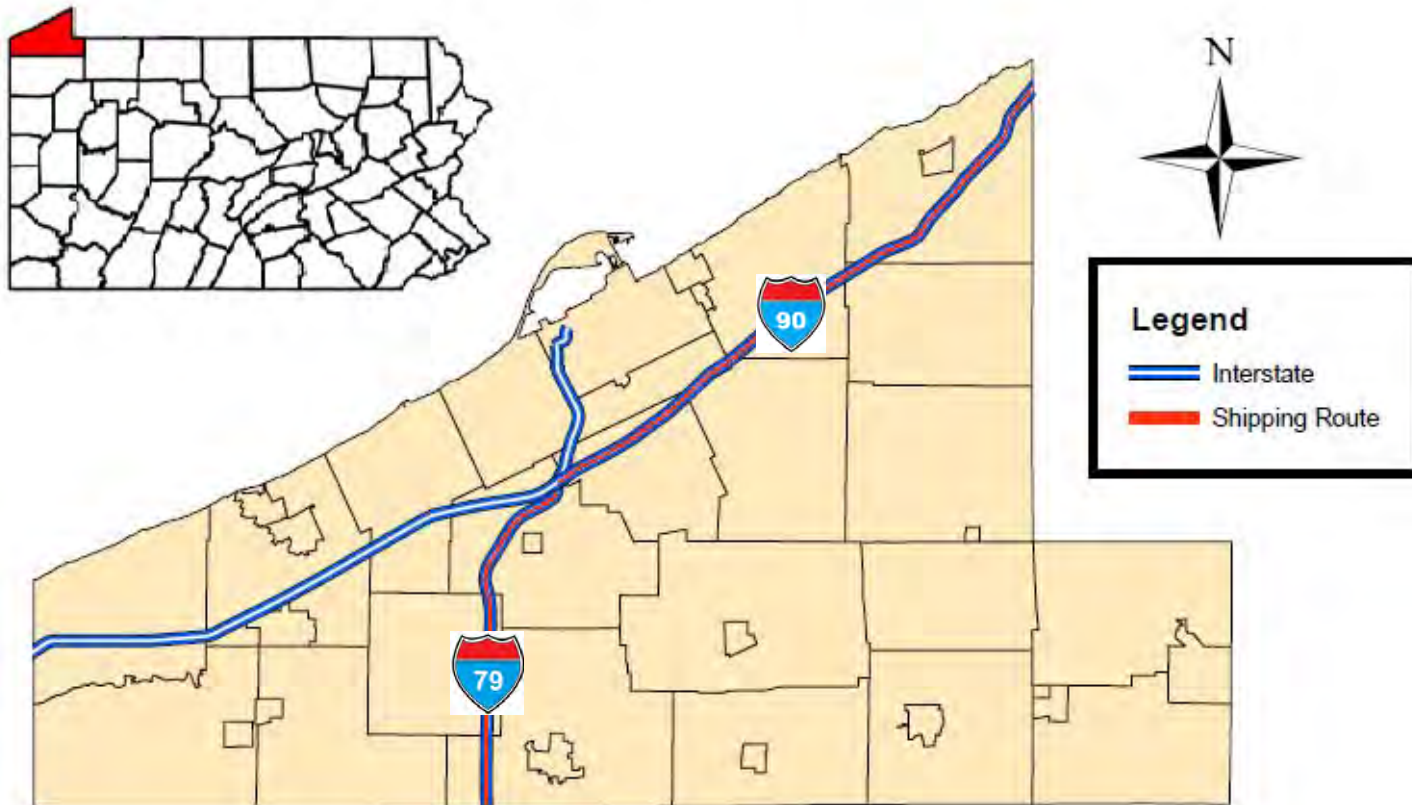
4.3.11.4 Future Occurrence

The U.S. Nuclear Regulatory Commission analyzed the possibilities of an earthquake causing a catastrophic failure to all 104 nuclear power plants (NPP) across the nation. The factors used were the chance of a serious earthquake and design of the NPP. Perry ranked 39<sup>th</sup> in “chance each year of core damage from an earthquake” with a 1 in 47,619 chance. This was an increase in risk of 2,371% from the 1989 study. These estimates are based on peak ground acceleration, a unit that measures how violently the ground shakes, caused by depth of and distance from the epicenter and frequencies of waves generated.

The risk maps below graphically depict areas potentially susceptible to radiological incidents.



# RADIOACTIVE CARGO TRANSPORTATION MAP





# PERRY NUCLEAR POWER PLANT INGESTION PATHWAY



4.3.11.5 Vulnerability Assessment

TABLE 4.3.11.5.A RADIOLOGICAL INCIDENT VULNERABILITY ASSESSMENT				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
REMOTE		CRITICAL		MODERATE
With a NPP within 50 miles of Erie County and nuclear cargo being transported through the county, the probability is remote	+	If a significant incident occurred at the NPP the impact to Erie County could be critical	=	A remote possibility of occurrence combined with a critical severity poses a moderate threat to Erie County



### 4.3.12 Urban Fire and Explosion

<p>"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" (PEMA, 2013).</p>		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
Can occur at any time	At any time	HIGH

#### 4.3.12.1 Location and Extent

According to the U.S. Fire Administration (USFA), structure fires comprise 39.2% of all fires in the United States with residential structures making up 78.5% of those structure fires. Residential fires are also the leading property type for fire fatalities (75%), fire injuries (78%) and financial loss (52%) (USFA, 2014). According to the National Fire Protection Association, due to increased synthetic fuel loads and new construction materials, failure time has decreased, which can speed the rate of fire growth (2016).

There is also an increase in terrorists using fire as a weapon (Byrne, 2017). The potential for causing large-scale damage with little to no cost or technical expertise makes arson particularly appealing (Department of Homeland Security, 2012). An explosion is a complex process with many variables. The type of delivery, device used, amount and type of explosive materials, whether it is intentional or accidental, and whether it occurs indoors or outside are just a few of the major factors.

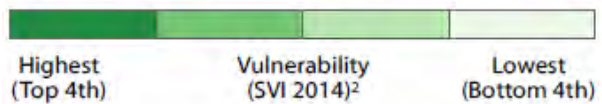
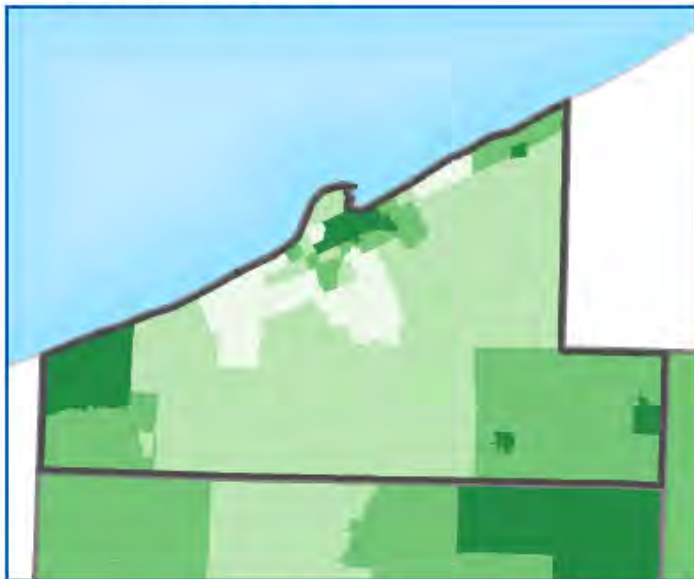
Fire and explosions can occur anywhere there are structures. In heavily populated areas, where buildings are closer together, the potential for greater loss of life and property is present. Areas with lower socioeconomic characteristics have an increased fire risk. Crowded dwellings also cause an increased vulnerability to fire. These crowded units may also contain room partitions which can impede firefighter movement, potentially leading to injury or death. Mobile homes are not held to the same standard as homes built on-site. Residents of mobile



homes often store flammable liquids such as gasoline or propane in the space beneath the home. In mobile home parks, structures are in very close proximity of one another. As such, a mobile home fire can become catastrophic very quickly. The map below shows areas of increased overcrowded dwellings along with mobile homes (Lowry, 2002). The maps below show socioeconomic and housing areas in Erie County.

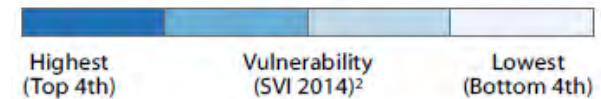
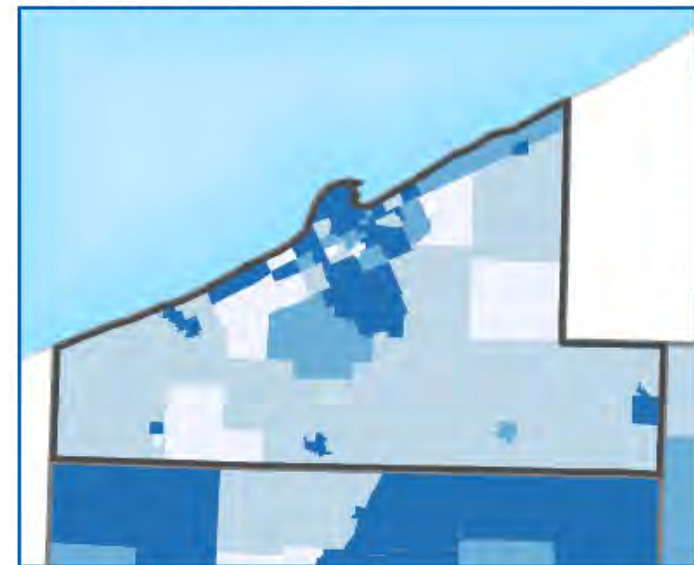


### Socioeconomic Status



Socioeconomic Status: Poverty, Unemployed, Per Capita, Income, High Schol Diploma (Source: CDC.gov)

### Housing/Transportation



Housing/Transportation: Multi-Unit, Mobile Homes, Crowding, No Vehicle, Group Quarters (Source: CDC.gov)



#### 4.3.12.2 Range of Magnitude

Homes that are close together, such as Lawrence Park Township duplex row homes (pictured on the right), can see fires spread through them quickly as units are adjoined by a wall. The rapid spread of fire increases the risk of extensive damage, injuries and even death.



Significant explosions are most common in densely populated areas and at industrial facilities that utilize combustible hazardous materials. Explosions can also occur in conjunction with automobile, boat, and rail accidents. All such explosions can turn into fires, spreading to nearby structures (NFPA, 2017).

## PUBLIC HEALTH

A structure fire may involve the destruction of plastics, foams, fabrics, carpets, wood, and asbestos-containing materials. Soot in smoke usually contains what is burned and may also contain byproducts of items burned (i.e., hydrogen cyanide is a byproduct of burning wool). The Phoenix Fire Department studied the exposure of soot on firefighters after a fire was extinguished. Their findings indicated that chlorinated products become attached to soot and can enter the lungs (Bolstad-Johnson, 2010). Breathing in this soot can cause acute issues such as coronary artery disease, asthma, bronchitis, and many other respiratory illnesses (Keefe, 2013).

Blast injuries from explosions are categorized into four categories primary, secondary, tertiary, and quaternary injuries. Primary injuries result from the shockwave produced by an explosion and can cause severe damage to air-filled organs such as the lungs, the sinuses, the middle ear, and the digestive system. Secondary injuries consist of penetrating wounds caused by fragments flying from blast. There are two categories of fragments: (a) primary, which are built into an explosive as part of a weapon, and (b) secondary, which is debris generated by the explosion. Tertiary injuries are wounds sustained by an individual thrown by the

blast. These injuries usually include blunt traumatic injuries and fractures. Quaternary injuries are composed of any injury that does not meet the criteria of the other three categories. These injuries usually consist of burns, crush injuries and breathing problems from smoke and dust inhalation (Clements, 2009).

## SOCIAL VULNERABILITY

Research indicates that the risk of a fire in the home is not the same for everyone. Studies of socioeconomic characteristics have shown that lower levels of income are either directly or indirectly tied to an increase risk of fire (FEMA 1997). Other considerations in urban areas are the growing number of older adults and people with disabilities (NFPA, 2017).

First responders are vulnerable at scenes of intentional explosions. As responders arrive, a secondary device targeting emergency personnel may detonate in an attempt to maximize responder injury and damage emergency infrastructure (Thompson, Rehn, Lossius, & Lockey, 2014).

### 4.3.12.3 Past Occurrence

#### **Corry, Pennsylvania**

On March 29, 1970, the Corry Volunteer Fire Department responded to a box alarm for a fire in a Sherman Williams Paint Company store. While trying to suppress the fire, an explosion occurred and part of the building collapsed, fatally injuring five firefighters and injuring 14 others.

#### **Albion, Pennsylvania**

On February 9, 2017, fire crews responded to an apartment fire in Albion. The fire was determined to be arson and a suspect was arrested by authorities. All 65 units in the building had to be evacuated with residents having to be temporarily housed with family and friends, in hotels, or a shelter set up by the American Red Cross.



### **Millcreek, Pennsylvania**

An employee at the Safety-Kleen facility began warming a frozen pipe with a portable heater on the morning of January 30, 2014. The pipe, located in the same shed as 55-gallon drums filled with solvent, was within feet of 12,000 gallons of oil. Authorities reported an explosion in the shed. Flames could be seen shooting through the roof. The employee was hospitalized with severe burns.

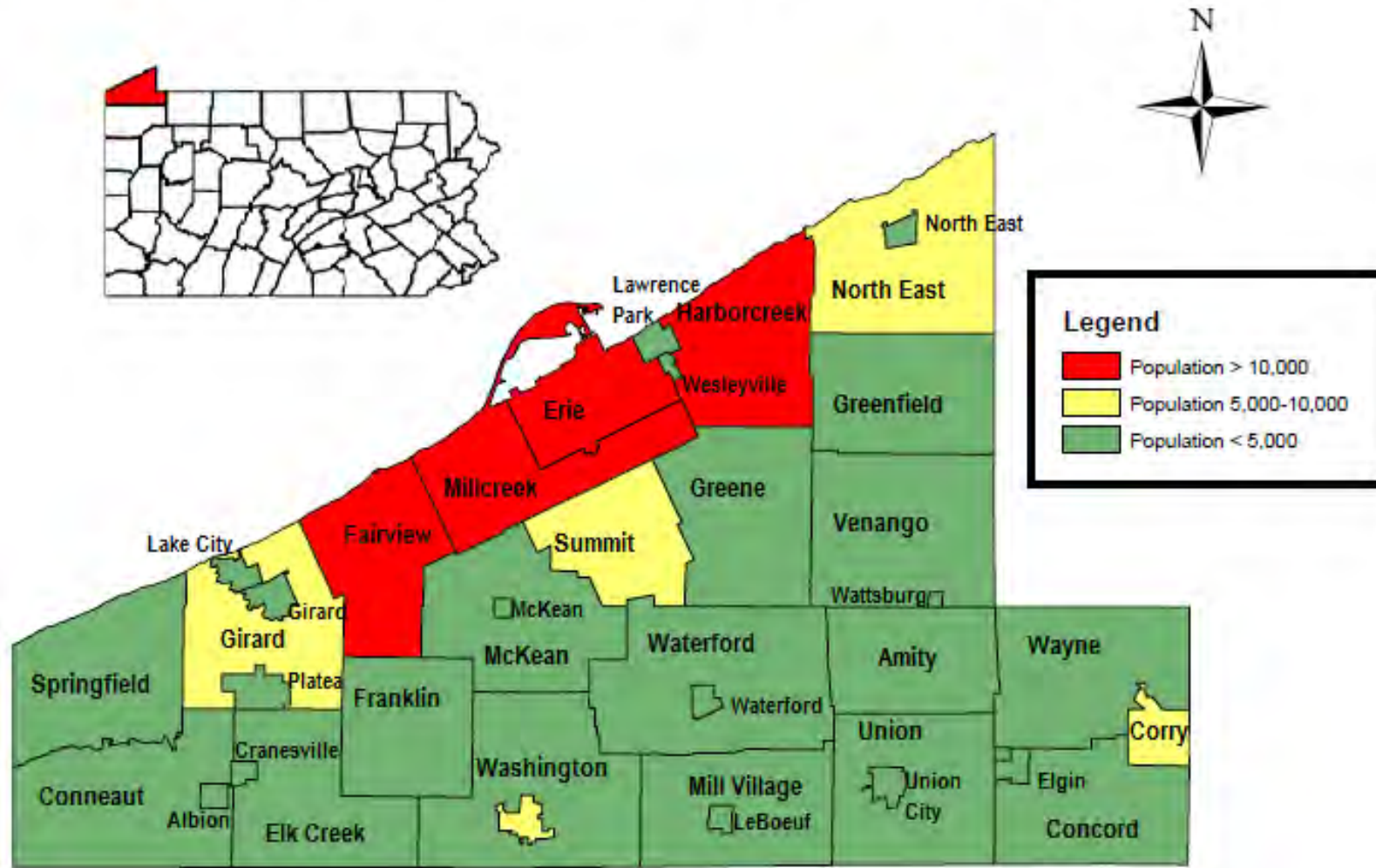


#### 4.3.12.4 Future Occurrence

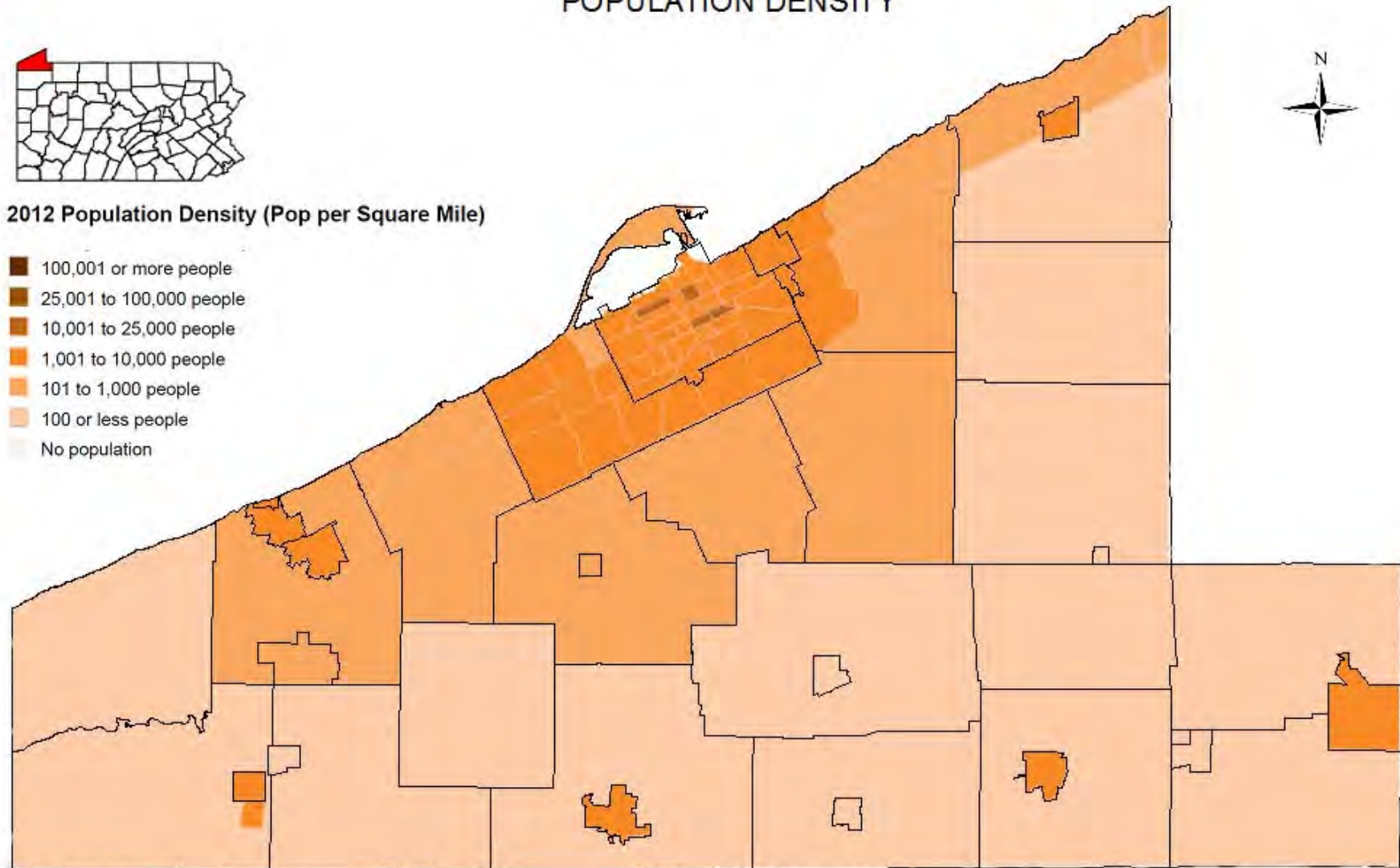
The risk maps below graphically depict areas potentially susceptible to urban fire and explosion. The maps show areas that are densely populated, given the often dense clusters of houses and other facilities that accompany those areas.



# MUNICIPALITIES BY POPULATION



## ERIE COUNTY POPULATION DENSITY



Source: ESRI



4.3.12.5 Vulnerability Assessment

TABLE 4.3.12.5.A URBAN FIRE AND EXPLOSION VULNERABILITY ASSESSMENT				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
<b>FREQUENT</b>		<b>CRITICAL</b>		<b>HIGH</b>
Fires in structures, although usually minor, occur quite frequently especially in older structures	+	An urban fire in Erie County, depending on the structures involved could cause severe injury and structural damage	=	With a frequent probability and critical severity there is a high risk for this hazard



### 4.3.13 Utility Interruption

"Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works, and information network sectors" (PEMA, 2013).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
At any time throughout the year	Years	MODERATE

#### 4.3.13.1 Location and Extent

Infrastructure encompasses a wide variety of categories including drinking water and energy transmission. Every four years, the American Society of Civil Engineers (ASCE) issues a report card for America's infrastructure. The ASCE offers a letter grade in 16 categories. Evaluations are based on capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation. The ASCE report for Pennsylvania in 2014 had an overall grade of C- (the ASCE does not offer individual county reports).

#### DRINKING WATER

According to the Pennsylvania Department of Environmental Protection (PADEP), Erie County has 45 community-type drinking water management systems. The PADEP, Bureau of Safe Drinking Water is charged with managing the federally-delegated drinking water program and implements the federal and state Safe Drinking Water Act and associated regulations. The Bureau of Safe Drinking Water oversees the Filter Plant Performance Evaluation Program (FPPE).

The availability of safe drinking water plays a critical role in the state's economy as it is a necessity for industries such as factories, food processors, restaurants, and many other businesses (PADEP, 2017). The PADEP has invested in the FPPE due to its importance to residents and water suppliers for disease prevention, economic and essential services, and potential population impact. The Commonwealth of Pennsylvania also uses the FPPE in the ranking system for low interest loans used for infrastructure improvements. (PADEP, 2017).

Throughout Pennsylvania, municipalities are faced with aging water infrastructure. The City of Corry began construction of the reservoir in 1864 and still operates portions of the system that date back to the 19<sup>th</sup> century. Areas with older infrastructure face a significant financial burden to maintain, repair and replace deficient parts of the system (City of Corry, 2011).



Stormwater systems are tools for managing the runoff from rainfall. In nature, stormwater would be absorbed into soil and flow to streams and rivers, etc. However, due to urban development, there has been a change to this natural process causing concern of pollutants flowing into source water.

## ENERGY

Reliable, affordable and environmentally-responsible energy use is essential to Erie County's economic growth and quality of life. Sufficient and resilient energy infrastructure must be in place to ensure that the county can prosper (Cadmus Group, 2013). The major components of electrical infrastructure are power generation stations and distribution lines. Erie County has no generating stations within county lines.

Perry Nuclear Power Plant (PNPP), located in North Perry, Ohio, is approximately 32 miles from western Erie County. PNPP provides zero-carbon electricity, preventing the emission of thousands of tons of air pollutants, and can produce energy 24-hours a day, unlike solar and wind, which can only generate electricity about half the time (Spitz, 2017). The Nuclear Regulatory Commission reports that PNPP's current license to operate expires in 2026, but the plant's operator, First Energy, has expressed interest in closing the plant (Horansky, 2017).

There are three major components to the natural gas infrastructure: the interstate pipeline system and storage facilities and distribution pipelines. There are two interstate pipelines that carry gas through Erie County and a gas storage facility located near the City of Erie. Pennsylvania has four classes of gas pipelines determined by building count, clustering, and boundaries of a class location unit (an onshore area that extends 220 yards on either side of the centerline of any continuous one-mile of pipeline).

- **Class 1:** An offshore area or any class location unit that has 10 or fewer buildings intended for human occupancy
- **Class 2:** Any class location unit that has more than 10 but fewer than 46 buildings intended for human occupancy
- **Class 3:** Any class location unit that has 46 or more buildings intended for human occupancy; or an area where the pipeline lies within 100 yards of either a building or a small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is



occupied by 20 or more persons on at least five days a week for 10 weeks in any 12 month period

- **Class 4:** Any class location unit where buildings with four or more stories above ground are prevalent

In 2011, the Pennsylvania Public Utility Commission was given the authority to inspect class two, three, and four pipelines, which includes over 1,200 miles of pipe in the state. Class one lines are in rural areas and do not fall under any local, state, or federal jurisdiction.

Taking steps toward a more efficient and renewable energy plan, both Canada's National Energy Board the United States' Federal Energy Regulatory Commission have approved the Lake Erie Connector Power Line Project (Reuters, 2017). ITC Holdings Corp. (ITC), the company that proposed the 73-mile project, plans to have the lines operational by 2019 (Moore, 2016). With three power plants closing in southwestern PA, ITC's plan could fill the gap without building a new plant. (Moore, 2016).

#### 4.3.13.2 Range of Magnitude

Utility interruption is a countywide issue as it occurs anywhere there are water and sewer lines, electricity lines, etc. Infrastructure is the backbone of the economy and a necessary input to every economic output. It is critical to prosperity and the public's health and welfare. Deteriorating infrastructure, long known to be a public safety issue, has a cascading impact on the economy, impacting business productivity and competitiveness, employment, and personal income (ASCE, 2016).

In urban settings, climate-related disruption of one infrastructure system will almost always result in cascading disruptions of one or more other systems. A loss of electrical service can affect water treatment, transportation, and public health services.

## PUBLIC HEALTH

Although waterborne outbreaks are low, the number of incidents have been on the rise. Poor water infrastructure can result in failure to meet water quality standards, which can lead to unsafe drinking water and public health hazards such as disease (ASCE, 2014). A CDC annual survey reported 431 cases of illness,



causing 102 hospitalizations and 14 deaths that may have been linked to crumbling water systems (Nixon, 2015).

## SOCIAL VULNERABILITY

Urban populations depend on extensive utility systems, making them more vulnerable to energy, water, wastewater, and public health failures. Many infrastructure systems are reliant on each other, such that electricity failures can affect water treatment and other services (NCA, 2014).

Thousands of people in the U.S. rely on electrically-powered durable medical equipment (DME). During power outages, these DMEs, including medical grade oxygen generators, power mobility devices, hospital beds, patient lifts, etc., require either a continuous alternate source of energy, such as a backup generator, or to be recharged after extended use. Without a way to keep these devices operational, a power outage can become deadly. Communities have begun to create registries for those that rely on devices and to assist in addressing their needs so hospitals do not become overwhelmed during a power outage (Lurie, 2014).

All residents and businesses in Erie County are potentially vulnerable to contaminated drinking water. Contaminated water causes diarrheal diseases including cholera and other serious illnesses such as dysentery. Contaminated drinking water can impact tourism, property values, recreational businesses, and hospitality businesses.

### 4.3.13.3 Past Occurrence

#### **Erie, Pennsylvania**

On the morning of December 10, 2013, Erie Water Works responded to three separate water main breaks. The first break occurred around 4:30 in the morning and caused road closures.

#### **Corry, Pennsylvania**

In October 2016, several major water main breaks caused the reservoir to lower and a disruption in water service lasting five days. The disruption left the fire department unable to use hydrants for fire suppression and relying on neighboring communities with water tankers. Schools and businesses closed. Approximately 3,200 water customers were affected by the disruption. Corry Memorial Hospital



used bottled water for consumption, disposable plates and utensils, and cancelled all elective surgeries until service was restored. Once the reservoir was at an adequate level, boil water warnings remained in effect until PADEP could test the water.

### Erie, Pennsylvania

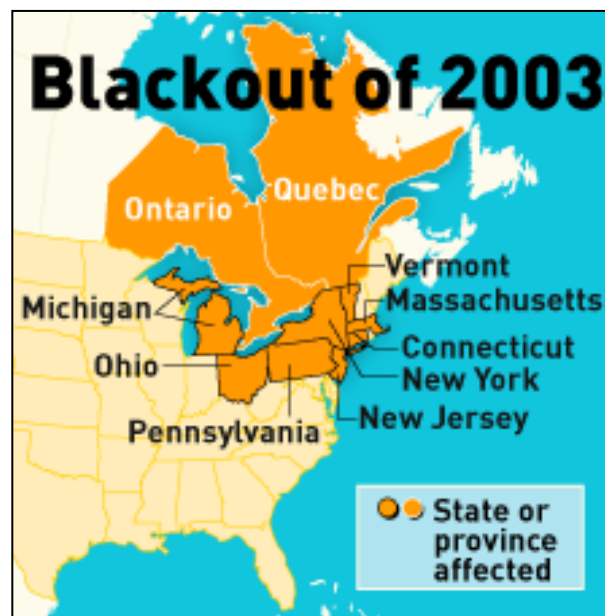
Local engineers think that a rainwater sewer pipe broke from heavy rain on Thursday, May 30, 2013. The ground under the intersection of 23<sup>rd</sup> Street and Myrtle Avenue was washed away, causing a five-by-four-foot sinkhole to open in the road. Both roads had to be closed for one block in each direction and detours put in place (Matson, 2013).



Personnel examining the Erie sinkhole

### Northeastern United States

On August 14, 2003, due to unnoticed failed lines in Ohio, electricity surged into open lines causing them to overload. The result left approximately 50 million people without power (Wald, 2013). Seven counties in northwest Pennsylvania, including Erie, were affected. In total, at least parts of seven U.S. states and Quebec and Ontario Canada were without power. The power outage began around 4 p.m. and led to Erie City police responding to a dozen motor vehicle collisions (Pittsburgh Post-Gazette, 2013).



Power was restored to southern Erie County by 6:30 p.m. Electricity was routed from the Indiana, PA grid to compensate for the downed Niagara grid. The Pennsylvania Emergency Management Agency reported that the power outage was only causing minimal disruption and that “there are no unmet needs.” A major



concern for local authorities was residents on home oxygen and other medical devices. Some areas opened cooling shelters that also provided electricity for such devices via back-up generators (Pittsburgh Post-Gazette, 2013).

The blackout was directly responsible for at least 11 deaths (Walsh, 2013). However, some in the medical community say it was responsible for over 100 deaths in New York City alone, due to exacerbation of chronic illnesses including cardiac conditions and respiratory illnesses and trauma from motor vehicle accidents (Reuters, 2012). The power outage also cost the economy an estimated \$10 billion by the time power was completely restored to the region on August 16<sup>th</sup> (Walsh, 2013).

4.3.13.4 Future Occurrence

Utility maps are not provided for security reasons. Utility interruption, though, is plausible anywhere there are utilities. Erie County’s utility network is extensive; thus, the hazard is considered countywide in nature.

4.3.13.5 Vulnerability Assessment

TABLE 4.3.13.5.A UTILITY INTERRUPTION VULNERABILITY ASSESSMENT			
<i>Probability</i>		<i>Severity</i>	<i>Risk</i>
<b>FREQUENT</b>		<b>MARGINAL</b>	<b>MODERATE</b>
It is inevitable that utility systems will get older and begin to decay. The cost to maintain and repair these systems is much lower than replacing it	+	As long as the utilities are maintained and/or repaired as required, interruptions can be limited	=
			A combination of frequent occurrence and marginal level of severity puts this hazard at moderate risk to Erie County



#### 4.3.14 War and Criminal Activity

"An intentional use of force or power, against oneself, another person, or against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation" (WHO, n.d.).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
At any time throughout the year	None / Days / Weeks	MODERATE

##### 4.3.14.1 Location and Extent

As the nation has seen an upswing in violent acts (ABC, 2017), it is advisable to profile types of violence and the potential impacts they could have in Erie County. Acts of violence, for the purpose of this plan, encompass those acts that law enforcement does not consider routine. This profile will analyze the following topics:

- Terrorism/bioterrorism,
- Active shooter (including workplace and school shootings), and
- Civil unrest.

The Federal Bureau of Investigation (FBI) defines terrorism as “the unlawful uses of force or 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.” Shortly after the terrorist attacks on September 11, 2001, government officials, news agencies, and even private citizens began reporting the receipt of letters containing anthrax spores. Source water agencies also reported threats against their water supplies. Due to these events, bioterrorism became a significant threat to national security and was addressed through the Bioterrorism Preparedness and Response Act of 2002.

“The agreed upon definition of an active shooter by U.S. government agencies - including the White House, U.S. Department of Justice/FBI, U.S. Department of Education, and U.S. Department of Homeland Security/Federal Emergency Management Agency - is an individual actively engaged in killing or attempting to kill people in a confined and populated area” (FBI, 2013). In most cases, active shooters use firearms and there is no pattern or method to their selection of victims (Alice Training Institute, 2017).

Erie County has what could be considered targets for terrorism. Government buildings, industrial facilities, and mass gathering points are targets (USDHS, 2013). Race, economic diversity, and political injustice are leading causes of protests and



riots. Nationally, there are growing tensions over political ideology and perceived authoritative abuse of power (Tillman, 2016). While Erie County has not seen a rise in events per these tensions, many protestors travel out of state as seen in the 2016 riots in North Carolina. The Charlotte-Mecklenburg Fraternal Order of Police reported that approximately 70% of people arrested had out-of-state identifications.

There is no single cause of acts of violence. Typically, a non-rational, complicated, intertwined, series of events result in violence. In his article *Causes of Terrorism*, Nick Grothaus lays out the most common causes cited by leaders in the field of counterterrorism. These categories may apply to other types of violence not related to terrorism.

- **Ethno-Nationalism:** The desire of a population to break away from a government or ruling power and create a state of its own.
- **Alienation/Discrimination:** Individuals or groups face discrimination leading to feelings of isolation. These people may become jaded towards society and feel excluded.
- **Religion:** Religion as a part of terrorism has been mainly attributed to Islamic fundamentalism, although other religions have also had involvement in terrorist activities. For example, Christian Fundamentalists target abortion clinics, religious fundamentalists of many types may target Jews and minorities (Post, 2007, pp. 211-212).
- **Socio-Economic Status:** Individuals and groups may be driven by a sense of relative deprivation and lack of upward mobility within society.
- **Political Grievances:** A lack of political inclusiveness or grievances against a certain political order may cause individuals to join or create terrorist groups.

#### 4.3.14.2 Range of Magnitude

Acts of violence have the ability to affect a small area, such as a single business or government building, or an entire community (e.g., municipality, county, state), or even the entire nation. Due to the rise of workplace and school violence, “homegrown” and “lone-wolf” terrorists, and racially-motivated attacks, the entire county is at risk for acts of violence.

The U.S. Department of Labor Statistics shows in 2015, nationwide, there were 417 workplace homicides, with 354 involving a firearm (DOL, 2015). A Centers



for Disease Control (CDC) study on school-associated violent death found between 14 and 34 school-age children are victims of homicide on school grounds annually in the U.S. (CDC, 2010). Group protests, which have become more frequent in the current political climate, have the ability to become violent, close schools and businesses, and block roadways and access to buildings (Callahan, 2017).

Erie County is not immune to these national trends. As seen in Section 4.3.14.3, the county has experienced school violence as well as eco-terrorism attacks. During the 2016 presidential campaign, a Donald Trump rally at the Erie Insurance Arena drew over 8,000 supporters as well as hundreds of protesters. Law enforcement officials reported the protests remained peaceful; however, this was not the case during many political rallies during this campaign season.

Estimating the economic impact of an act of violence, especially a terrorist attack, is a difficult task. Initial impact can be measured in immediate costs such as response to the event and closed businesses. The full economic impact would include long-term costs.

A large-scale event could significantly affect industry and/or government and privately-owned infrastructure. An incident involving wastewater, drinking water, or chemical facilities could have long-term environmental effects. These variables make it difficult to quantify the cost of repair or replacement of infrastructure.

## PUBLIC HEALTH

Those victims directly affected by acts of violence will often suffer blunt trauma, gunshot wounds, puncture wounds, severe burns, or death. Injured survivors may face weeks or months in hospitals and may need multiple surgeries which increases the chance of infections and other secondary illnesses such as pneumonia and M.R.S.A.

Survivors of violence may also experience common stress reactions lasting several days to a few weeks. These reactions can include the following.

- **Emotional Reactions:** Shock, fear, grief, anger, guilt, shame, helplessness, numbness, sadness
- **Cognitive Reactions:** Confusion, indecisiveness, worry, shortened attention span, trouble concentrating
- **Physical Reactions:** Tension, fatigue, edginess, insomnia, body aches, easily startled, tachycardia, nausea, loss of appetite



- **Interpersonal Reactions:** Distrust, conflict, withdrawal, irritability, loss of intimacy, feeling abandoned

Some individuals may experience severe stress symptoms following a violent incident. Individuals experiencing the following are at a higher risk for post-traumatic stress disorder (Nation Center for PTSD, 2010).

- **Intrusive Re-Experiencing:** Terrifying memories, nightmares, and flashbacks
- **Extreme Emotional Numbing:** Inability to feel emotions, feeling empty
- **Extreme Attempts to Avoid Disturbing Memories:** Such as through substance abuse
- **Hyperarousal:** Panic attacks, rage, extreme irritability, intense agitation, acting out with violence
- **Severe Anxiety:** Debilitating worry, extreme helplessness, compulsions or obsessions
- **Severe Depression:** Loss of ability to feel hope, pleasure, or interest; feeling worthless; suicidal ideations or intent
- **Dissociation:** Fragmented thoughts, spaced out, unaware of surroundings, amnesia

Treatment and support are critical to recovery. For most, the memories will not go away, but survivors can learn to manage responses to their memories. There are several methods that can be used to help survivors cope, including psychotherapy, medication, support groups, and self-care (Riggs, 2017).

## SOCIAL VULNERABILITY

Deciding which groups are vulnerable is challenging. There will always be variation between groups and the people within them in relation to the risks they face (Brown, 2004). However, the elderly, children, homeless persons, people with disabilities, religious groups, and members of the LGBT community experience higher rates of exposure to violence (Phillips, Thomas, Fothergill, Blinn-Pike, 2010).

Between 2003 and 2013, the elderly reported 56% of all violent crimes (USDOJ, 2014). A 2009 study showed that almost 40% of all American children were victims of two or more violent acts (DOJ, 2009). In 2010, there were 113 violent acts



against the homeless, twenty-four of which were fatal (National Coalition for the Homeless, 2012). An analysis of the 2011 FBI hate-crime statistics showed “LGBT people are more than twice as likely to be the target of a violent hate-crime than Jews or black people” (Potok, 2011).

#### 4.3.14.3 Past Occurrence

##### **Edinboro, Pennsylvania**

On April 24, 1998, a 14 year-old James Parker Middle School student fatally shot a teacher, wounded another teacher, and wounded two students while attending a school function at a banquet hall. The incident ended when the establishment owner confronted the actor and held him at gunpoint. Parents, unaware of the events that had occurred, arrived to pick up their children, finding a crime scene with law enforcement, ambulances and television news crews. Concerned, parents rushed to find their children, making it difficult for police to maintain the integrity of the crime scene.

##### **Erie, Pennsylvania**

In March 2002, law enforcement responded to two acts of domestic eco-terrorism at the same construction site in Erie, PA. On March 18, police responded to a vandalism complaint and found “ELF, in the protection of mother earth” and “stop deforestation” spray-painted on equipment used to clear trees. Later that month, on March 24, a crane and generators were set on fire and hundreds of trees were spiked (inserting metal rods where a logger would cut the tree to cause injury to the logger and damage to equipment). Damage was estimated at approximately \$500,000. The Earth Liberation Front (E.L.F.) claimed responsibility for both acts. E.L.F. is also responsible for the burning of six vehicles at a Girard Township car dealership on January 1, 2003, as well as burning a mink farm in Harborcreek Township on November 26, 2002.

##### **Erie, Pennsylvania**

On January 19, 2017, the CareerLink office in Erie received two bomb threats. The office evacuated while police swept the building. Police did not locate

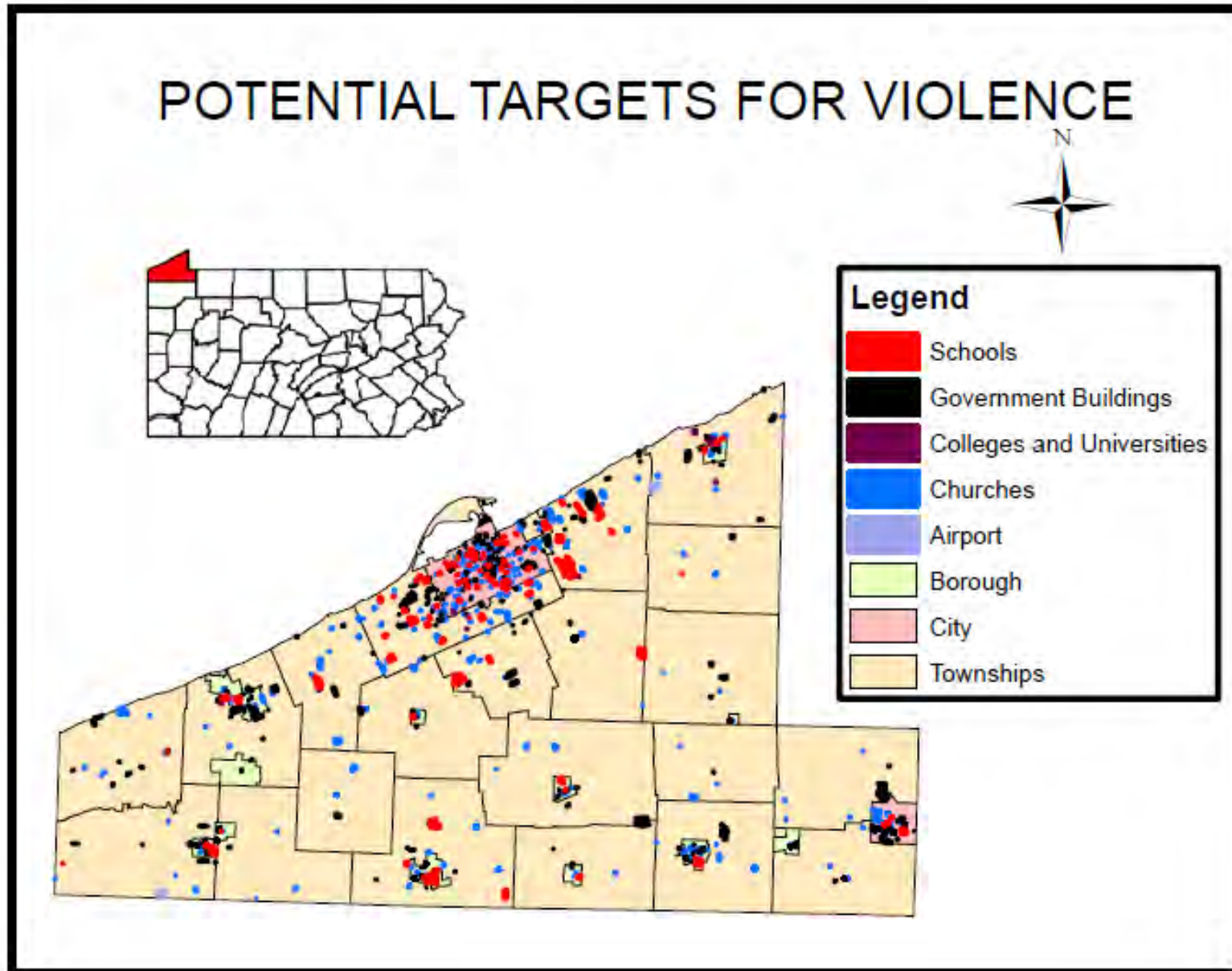


any devices. Police arrested a 44 year-old male, who stated he was upset he was not receiving more assistance from the office.

4.3.14.4 Future Occurrence

The risk map below graphically depicts areas potentially susceptible to war and criminal activity (primarily focusing on acts of violence).







4.3.14.5 Vulnerability Assessment

TABLE 4.3.14.5.A WAR & CRIMINAL ACTIVITY VULNERABILITY ASSESSMENT				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
REMOTE		CRITICAL		MODERATE
Erie County has had prior violent events however they have been very infrequent	+	Terrorist attacks have the potential to cause serious injury and structural damage. Protests can also turn violent causing serious injuries to the participants	=	A combination of remote occurrence and critical level of severity puts this hazard at a moderate risk to Erie County



### 4.3.15 Lake Hazards

"Coastal hazards are those natural hazards that occur at the interface between the lake and the shoreline, inclusive of the uplands that impact the lake throughout the coastal watershed" (Great Lakes Coastal Resilience, 2013).		
<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
May be introduced to the environment at any time.	None to years	MODERATE

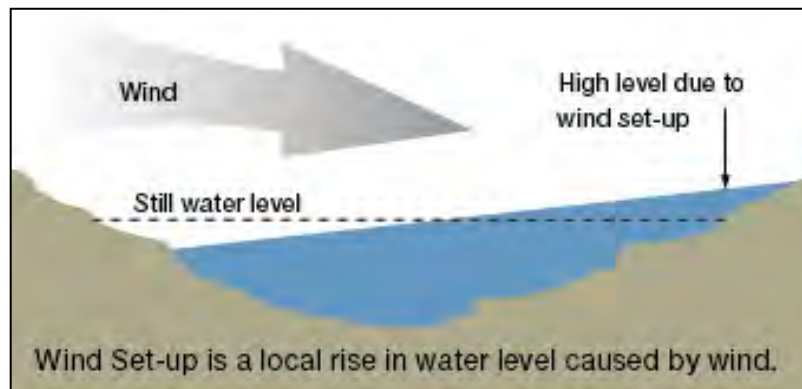
#### 4.3.15.1 Location and Extent

Coastal erosion and bluff recession are the most significant Lake Erie coastal hazards (FEMA, 2013). However, other lake hazards include high lake levels and seiche waves. Historically, seiche waves in Lake Erie have reached 22-feet, breached a 14-foot wall, and have been as high as 16 feet (as recently as 2008).

#### HIGH LAKE LEVELS

High lake levels are primarily caused by increased precipitation in the Great Lakes Watershed. During storm events, high lake levels can cause waves to break farther inshore allowing them to make contact with the base of bluffs and causing undercutting, which is a form of erosion (PADEP, 2002). High lake levels can benefit commercial shippers by allowing extra cargo per trip, but create smaller stretches of sand on the beaches and cause concern for lakeside property owners (Weiss, 2015).

Lake Erie is not regulated and outflows are not controlled. Water levels are directly related to the inflow from the upper lakes and Lake Erie's own basin. The U.S. Army Corps of Engineers has considered dredging the Niagara River, removing obstructions and fills, increasing outflows through Canadian and U.S. locks, and many other possibilities as ways to lower or maintain lower water levels. However, most



alternatives have been rejected by the 1993 *International Great Lake Levels Reference Study* (Conrad Jr., 1997).

Lake Erie water levels reached record highs in the mid-1980s and near record levels from 1996 through 1998, affecting shoreline residents and public utilities. These record high lake levels caused significant erosion events on the Lake Erie shoreline in 1985, 1986, and 1987 (Malone, 2010). Table 4.3.15.A shows the results of a damage assessment performed for the 1987 event by the Pennsylvania Coastal Resources Management Program.

Table 4.3.15.1.A

SUMMARY OF STATE DAMAGE ASSESSMENT (1987 EVENT)				
Item	Number Affected (Total)	No. Affected by Flooding	No. Affected by Shoreline Erosion	No. of People Affected
<b>PUBLIC FACILITIES</b>				
Water Plants	1	1	0	0
Sewage Plants	0	0	0	0
Marinas, Decks	12	12	0	300
Parks/Beaches	12	12	11	0
Roadways	6	6	0	0
Hospitals	0	0	0	0
Schools	0	0	0	0
Sewer Facilities Systems	3	3	0	0
Airports	0	0	0	0
Sanitary Landfills	0	0	0	0
<b>PRIVATE FACILITIES</b>				
Commercial	7	3	5	15
Industrial	0	0	0	0
Residential	180	136	144	474
Power Plants	0	0	0	0
<b>OTHER</b>				
Seasonal Residences	31	14	20	65
Boathouses	5	0	5	37
Bathhouse/Comfort Stations	3	3	0	0 (other facilities available)

High lake levels during 1997 led to municipalities, Pennsylvania Emergency Management Agency, Erie County Emergency Management, Erie County Department of Health, U.S. Army Corps of Engineers, the International Great Lakes Coalition for Shoreline Preservation, and other agencies to come together to create contingency plans due to the possibility of loss of critical infrastructure. Pumping stations in the City of Erie and Millcreek Township were subjected to potential flooding. Officials reported that the loss of the Sommerheim Station in Millcreek would leave 200,000 customers without water.

There were several issues concerning about the potential loss of the Sommerheim Station. The main concern was that the high voltage electrical switches



were seven inches from the ground floor, making them vulnerable to high water. Secondly, the station had already had flooding problems. The third issue was the three ways flood water can enter the building and the possibility of any or a combination of the three shutting down the pump (causing all Erie Water Authority customers to be without water for an extended period of time).

Officials designated high priority customers such as hospitals and nursing homes that would need immediate alternative water sources. Officials also engaged in a lengthy planning process in an attempt to mitigate the vulnerability, update emergency operations plans, and identify resources to be used in the event of a worst case scenario situation.

#### SEICHE WAVES

Seiche waves occur when strong winds push water along the length of the lake causing water levels to drop at one end and rise at the other. When the wind stops, the water rebounds to the other side of the lake. The water will continue back and forth for hours to days (NOAA, 2015). Seiches cause damage similar in nature to that from a tsunami or storm surge (Sousounis, 2014).

Lake Erie produces the largest seiches of the Great Lakes. This is due to its orientation and shallowness. Seiches are usually minor and are mistaken for tidal activity; however, the NWS begins to issue advisories when they are expected to be over two feet (Sousounis, 2014). Severe and deadly seiche events are rare on the Great Lakes. Minor seiches could cause damage to property right on the lakefront, including cottages and boats.

#### 4.3.15.2 Range of Magnitude

The county's 76.2 miles of coast line serves as the location of impacts from lake hazards. The nine municipalities located along the coast could be impacted by lake hazards. Wind speeds and barometric pressure are the largest variables to the size of an event in a lake basin (primary of seiche waves). However, the size and shape of the basin and water body also contributes to the magnitude of a seiche. Larger and shallower lakes like Lake Erie tend to increase the magnitude. Large seiches would have to be between 80 and 100 feet to cause significant damage to property or risk of life in Erie County.



Due to the varying types of lake hazards and the different impacts each can have, economic loss is challenging to assess. Seiche waves have the ability to breach walls and cause damage to structures and critical infrastructure including roadways and bridges. Seiche waves can also damage utility poles and lines causing phone, power, and broadband outages and associated financial costs to repair.

## PUBLIC HEALTH

Lake disasters can force a temporary instance of people living in crowded conditions with poor sanitation, poor management of human waste, and impoverished nutrition. They may also result in incidences of waterborne diseases, trauma resulting from the magnitude of the event, and low immunity or susceptibility to infectious diseases including pneumonia and cholera (De Moura, Roges, De Souza, Siciliano, & Rodrigues, 2012). Another concern is stress-related mental health issues such as PTSD (CDC, 2017).

## SOCIAL VULNERABILITY

Those who rely on the tourism industry are also at risk. Lake hazards can potentially devastate ecosystem, thus impacting the economies of communities that rely on commercial and sports fishing, boating and other recreational tourism. There is a potential for tens of billions in lost revenue with millions more spent on monitoring and response.

### 4.3.15.3 Past Occurrence

#### **Lake Erie**

From May through December 1996, above average snowmelt combined with higher than normal amounts of precipitation, producing above-average lake levels. High lake levels continued through 1997. The Presque Isle State Park Advisory Committee reported “severe loss of Lake Erie shoreline due to erosion contributed in no small part to the elevated lake levels.” The Erie County Emergency Management Agency documented 367 structures that were potentially at risk of damage or destruction from flooding.

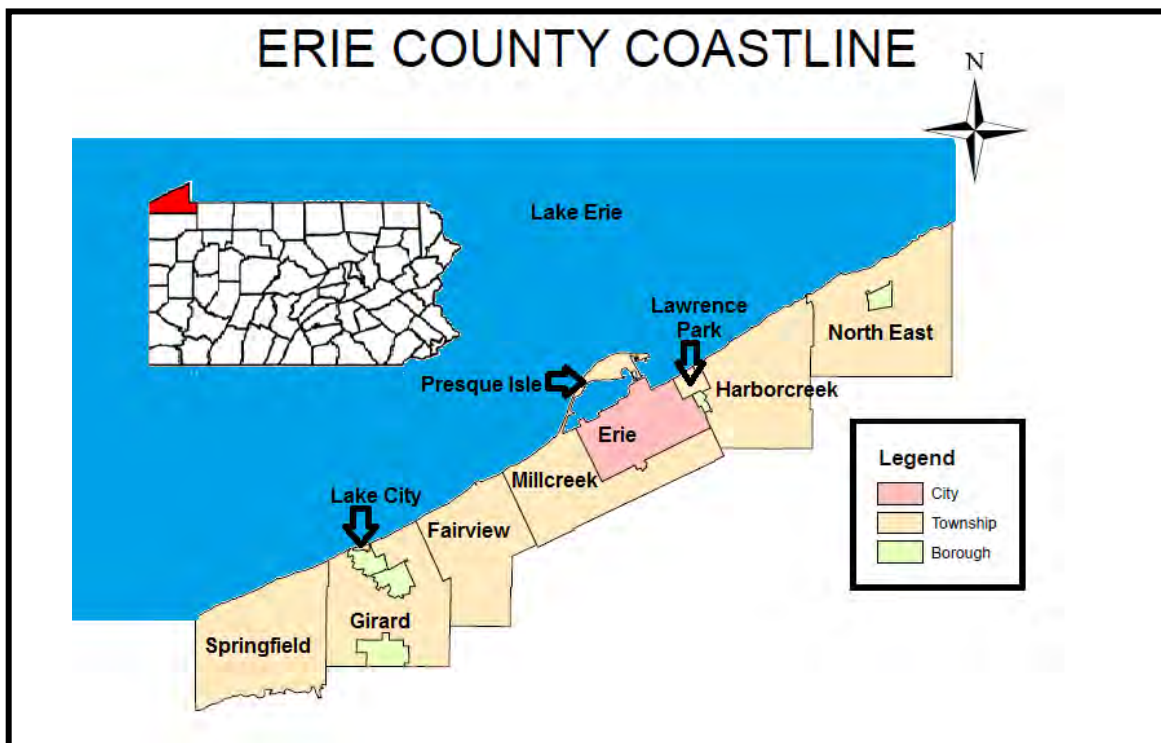


## Lake Erie

In June 2017, the U.S. Army Corps of Engineers reported that water levels in Lake Erie had risen seven inches. Presque Isle had increased erosion and concerns were raised of docks, boat ramps, and lakeside roadways going under water. Mill Road beaches and Beach 10 had above-normal erosion damage. Dunes were also affected by the high water levels. The Army Corps of Engineers reported that a warmer than normal January and February were partly responsible for the levels due to earlier peak runoff. Coastal residents in neighboring states reported items such as patio furniture being washed away from their property.

### 4.3.15.4 Future Occurrence

The risk map below graphically depicts areas potentially susceptible to lake hazards. The municipalities along the coast would be more vulnerable to the occurrence, and would be the site of any future occurrence. The areas of highest likelihood would be from the coastline to an area approximately 100 feet from the coast.



4.3.15.5 Vulnerability Assessment

TABLE 4.3.15.5.A LAKE HAZARDS VULNERABILITY ASSESSMENT				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
REMOTE		CRITICAL		MODERATE
There is historical precedent for both high lake levels and seiche waves	+	There is potential for structural damage and injury	=	A combination of occasional occurrence and marginal level of severity puts this hazard at moderate risk to Erie County



### 4.3.16 Transportation Infrastructure Decay

“Deteriorating infrastructure, long known to be a public safety issue, has a cascading impact on our nation’s economy, impacting business productivity, gross domestic product, employment, personal income, and international competitiveness” (ASCE, 2016). This profile focuses on the deterioration of the transportation infrastructure (i.e., roadways and bridges).

<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Risk Assessment</i>
At any time throughout the year	Years	MODERATE

#### 4.3.16.1 Location and Extent

Infrastructure encompasses a wide variety of categories including bridges, transportation, etc. Every four years, the American Society of Civil Engineers (ASCE) issues a report card for America’s infrastructure. The ASCE offers a letter grade in 16 categories. Evaluations are based on capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation. The ASCE report for Pennsylvania in 2014 had an overall grade of C- (the ASCE does not offer individual county reports).

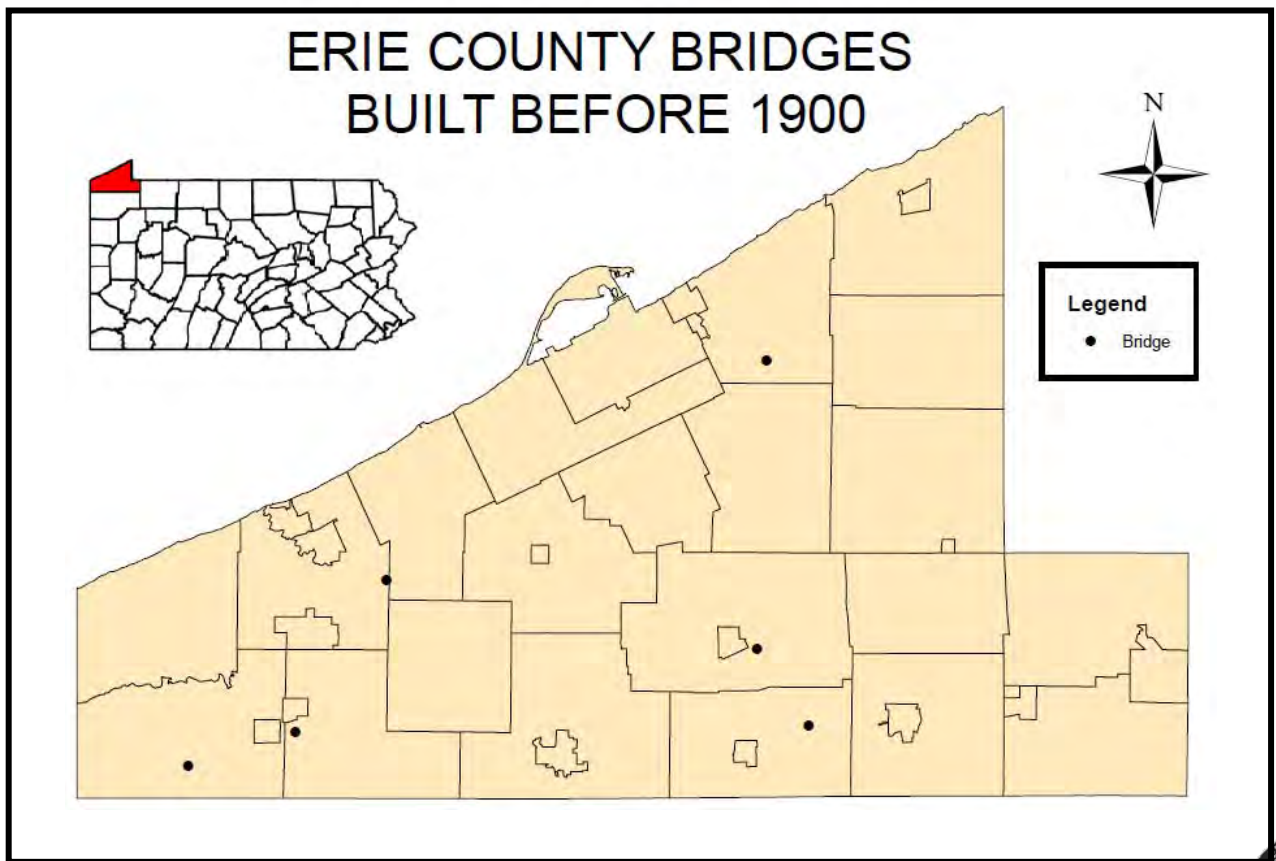
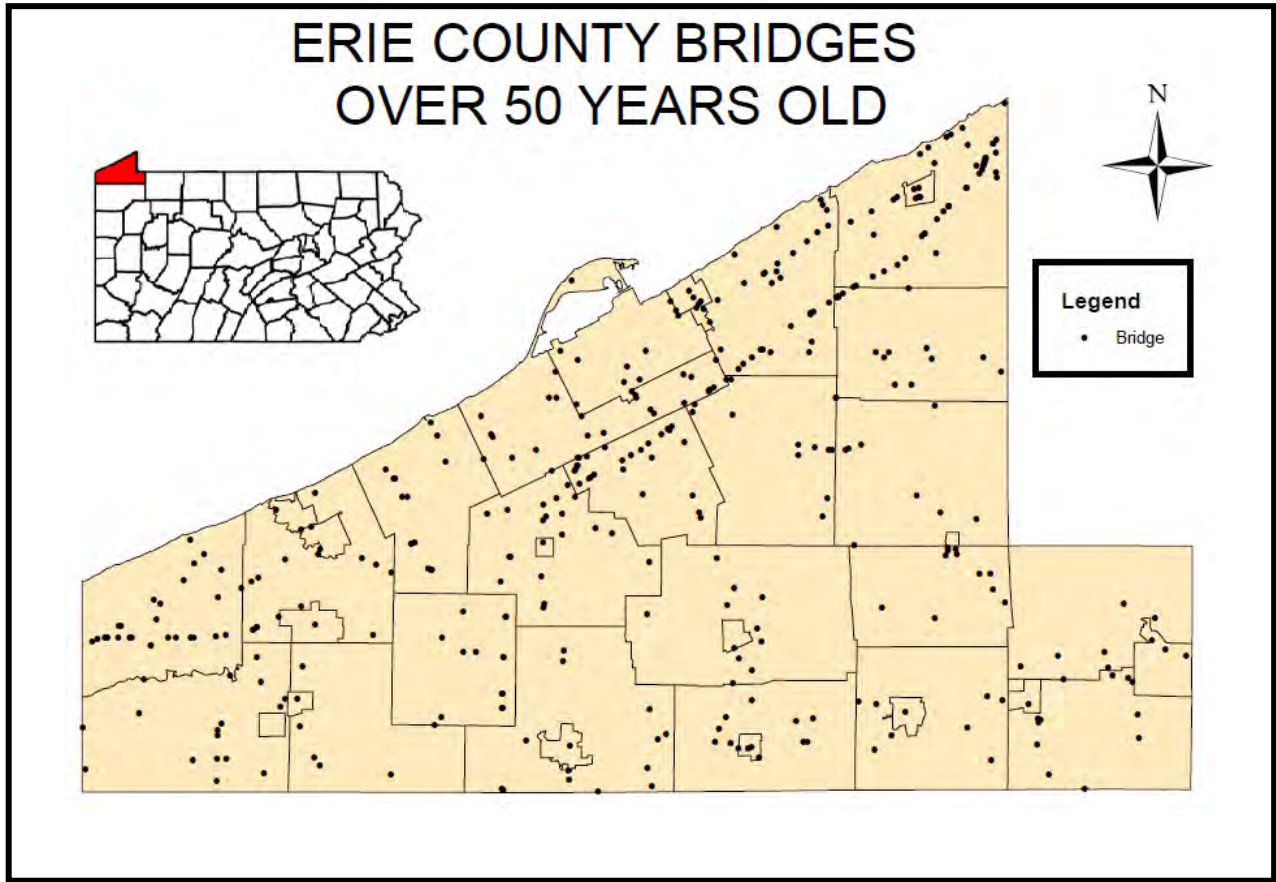
#### BRIDGES

Erie County has 692 bridges on state and local routes that are inspected by the Pennsylvania Department of Transportation (PennDOT). Of the 692 bridges, 575 are on the state route system. PennDOT inspectors have found 26 bridges (4.52%) to be *structurally deficient* and one bridge is listed as *posted*. “Structurally deficient” indicates that the bridge has deterioration to one or more of its major components; “posted” means the bridge is open but signs have been placed stating a weight limit that can travel across the bridge. PennDOT inspectors have classified 43 of the 177 bridges on local routes (36.75%) to be structurally deficient and list 21 as posted. PennDOT inspectors have also closed seven bridges on the local route system in Erie County (PennDOT, 2017). PennDOT closes a bridge when advance deterioration results in weight limits of less than three tons and/or no guarantee of the traveling public’s safety (PennDOT, 2011).

The average age of bridges on the state system, statewide, is over 50 years. Of the 688 bridges with known completion dates in Erie County, 367 (53.3%) are over 50 years old with 19 over 100 years old. Only 62 bridges (9%) have been completed in the last ten years.







## TRANSPORTATION

The Erie County Department of Planning previously considered the importance of highway infrastructure when it approved the Erie County 2042 Long Range Transportation Plan. A key part of the plan was to prioritize “transportation investments in Erie County over the next 20+ years and develop a financially-constrained project listing based on anticipated funding levels.” The 2042 LRTP process created seven goals that the plan would focus on: economic vitality, safety and security, multimodal accessibility and mobility, freight accessibility and mobility, sustainability, project feasibility, and congestion and maintenance. (Whitmann Requardt & Associates, LLP, 2017).

Part of the plan consisted of sustainability and livability. The contractor researched local plans, held public meetings and used public surveys to develop realistic, multi-modal solutions to encourage economic growth while preserving natural and historical resources. The available funding sources and the assumption that the majority of funds would be used for maintenance and repair with approximately 10% used for expansion and improvements was considered (Whitmann, Requardt & Associates, LLP, 2012).

According to the PennDOT District 1, which is made up of six counties (Crawford, Erie, Forest, Mercer, Venango and Warren), of the 4,562 miles of highways in its district, 1,110 (24.3%) are in Erie County. The table below shows the infrastructure maintained by the state in the district and county.

Table 4.3.16.1.A

PennDOT TRANSPORTATION INFRASTRUCTURE TO MAINTAIN			
	Erie County	District Wide	% of District
State Highway Miles	779	3,698	21.06%
Interstate Miles	146	346	42.20%
National Highway System Miles	184	527	34.91%
State Bridges over 8 feet Long	575	2,061	27.90%
Airports	3	9	33.33%
Transit Authority Systems	1	5	20.00%
Operating Railroads	7	8	87.50%
Ports	1	1	100%

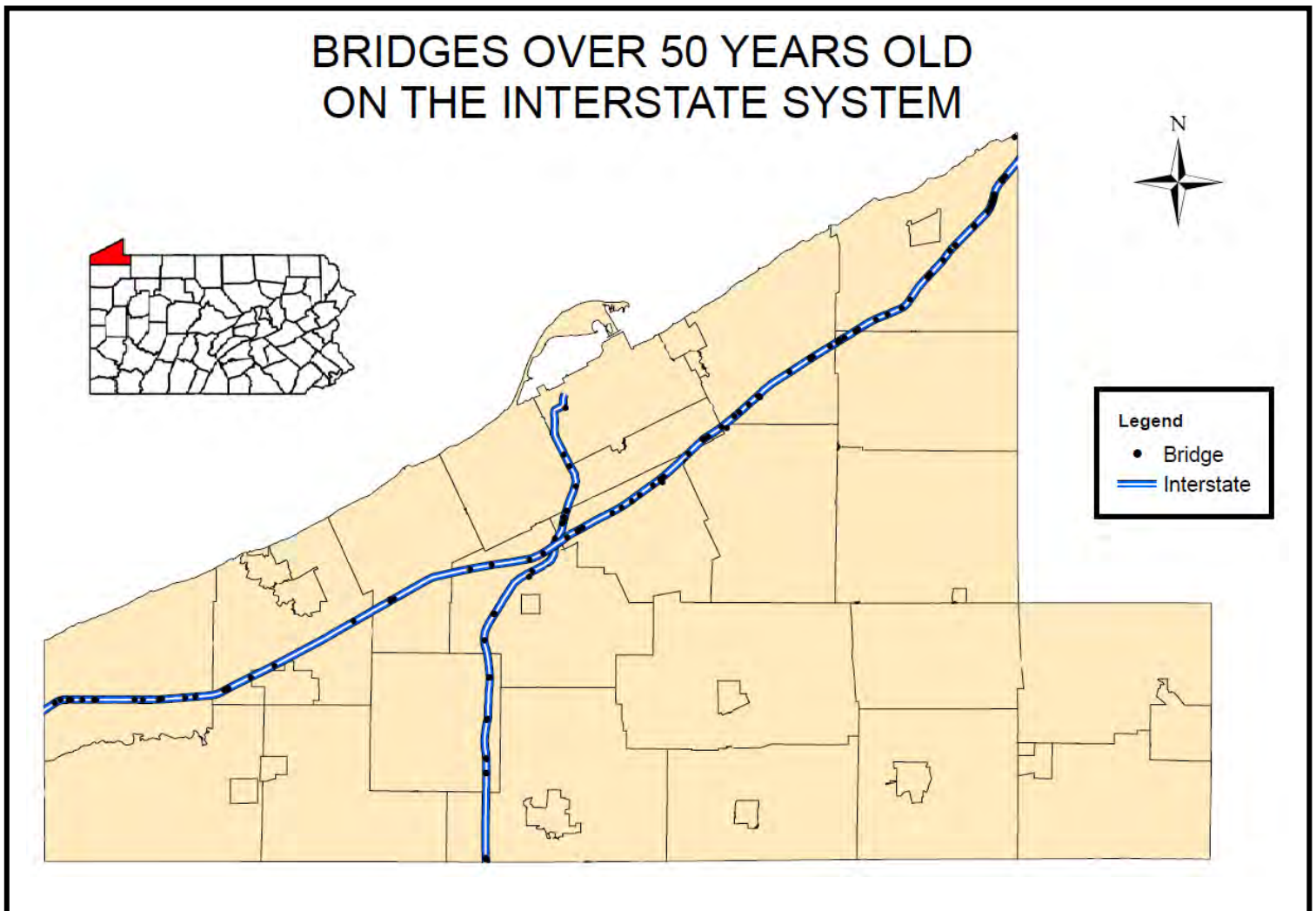
### 4.3.16.2 Range of Magnitude

Transportation infrastructure decay is a countywide issue as it occurs anywhere there are bridges, roads, etc. Infrastructure is the backbone of the



economy and a necessary input to every economic output. It is critical to prosperity and the public's health and welfare. Deteriorating infrastructure, long known to be a public safety issue, has a cascading impact on the economy, impacting business productivity and competitiveness, employment, and personal income (ASCE, 2016).

Certain infrastructure is reliant on the integrity of other infrastructure. As such, highways, especially the interstate system in Erie County, is reliant on bridges being maintained. The map below shows bridges that are at least 50 years old on the interstate system. Should these bridges fail, it could have devastating effects on commerce and tourism as the interstate, or sections of it, would need to be closed and/or traffic detoured around the affected areas and potentially slowing or halting traffic between New York and Chicago.



## PUBLIC HEALTH

There is no national record-keeping of how many deaths, injuries and illnesses are caused by failing and crumbling infrastructure. However, the data that does exist suggests that structures in need of repair do affect public health and safety. The federal DOT estimates poor road conditions are a factor in 14,000 fatalities each year (Nixon, 2015).

## SOCIAL VULNERABILITY

Urban populations depend on extensive infrastructure systems, making them more vulnerable to energy, water, wastewater, transportation, and public health failures. Many infrastructure systems are reliant on each other, such that electricity failures can affect water treatment and transportation services (NCA, 2014).

### 4.3.16.3 Past Occurrence

#### **Erie, Pennsylvania**

Local engineers think that a rainwater sewer pipe broke from heavy rain on Thursday, May 30, 2013. The ground under the intersection of 23<sup>rd</sup> Street and Myrtle Avenue was washed away, causing a five- by four-foot sinkhole to open in the road. Both roads had to be closed for one block in each direction and detours put in place (Matson, 2013).

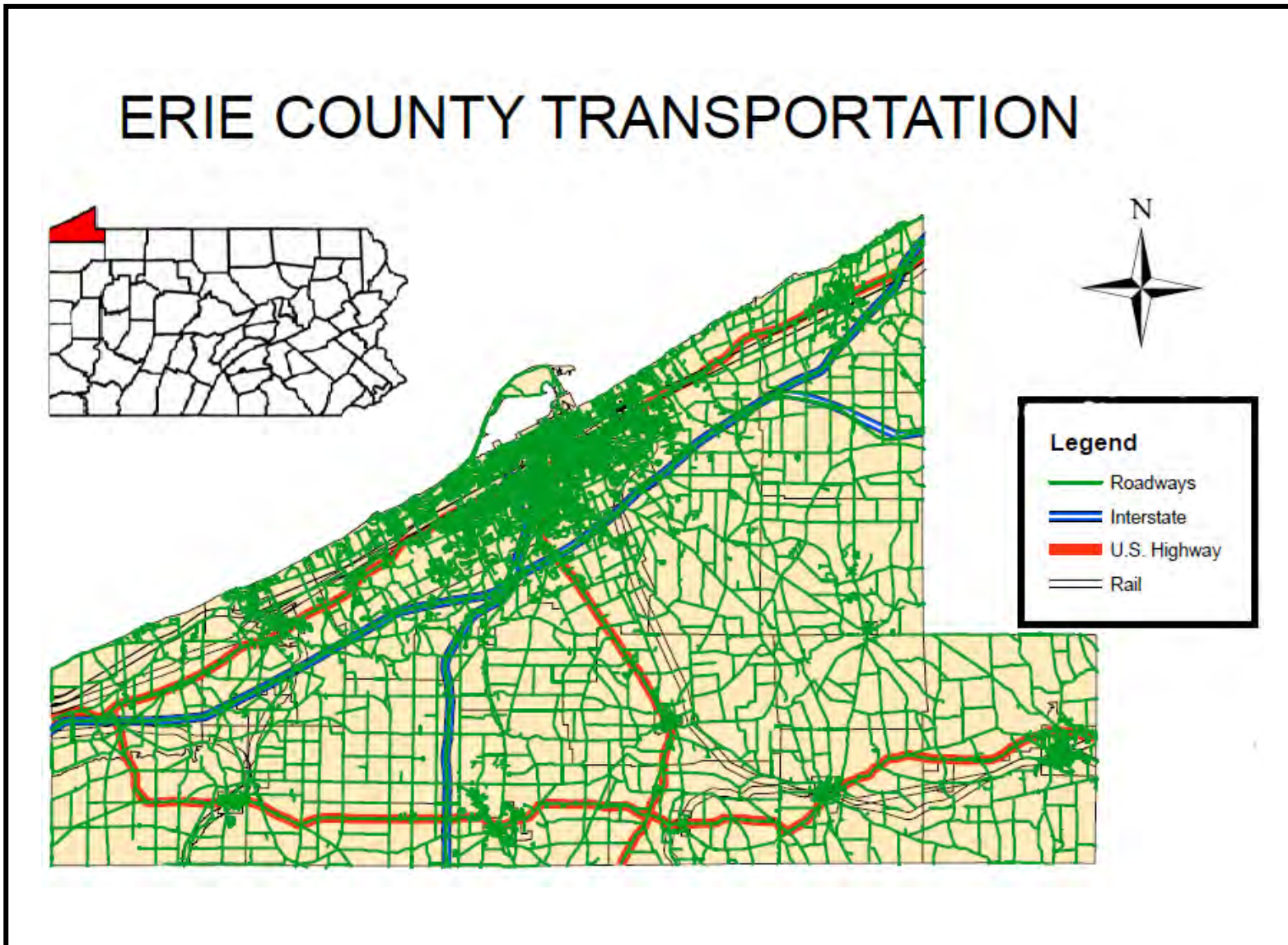
#### **Minneapolis, Minnesota**

On August 1, 2007, the eight-lane Interstate 35 Bridge spanning the Saint Anthony Falls of the Mississippi River in Minneapolis, MN collapsed during the event rush hour, killing 13 people and injuring 145. The National Transportation Safety Board (NTSB) ultimately concluded that the bridge's design-specified steel gusset plates were undersized and inadequate to support the load of the bridge (Holt & Hartmann, 2008). Photographs showed bowing of the gusset plates.

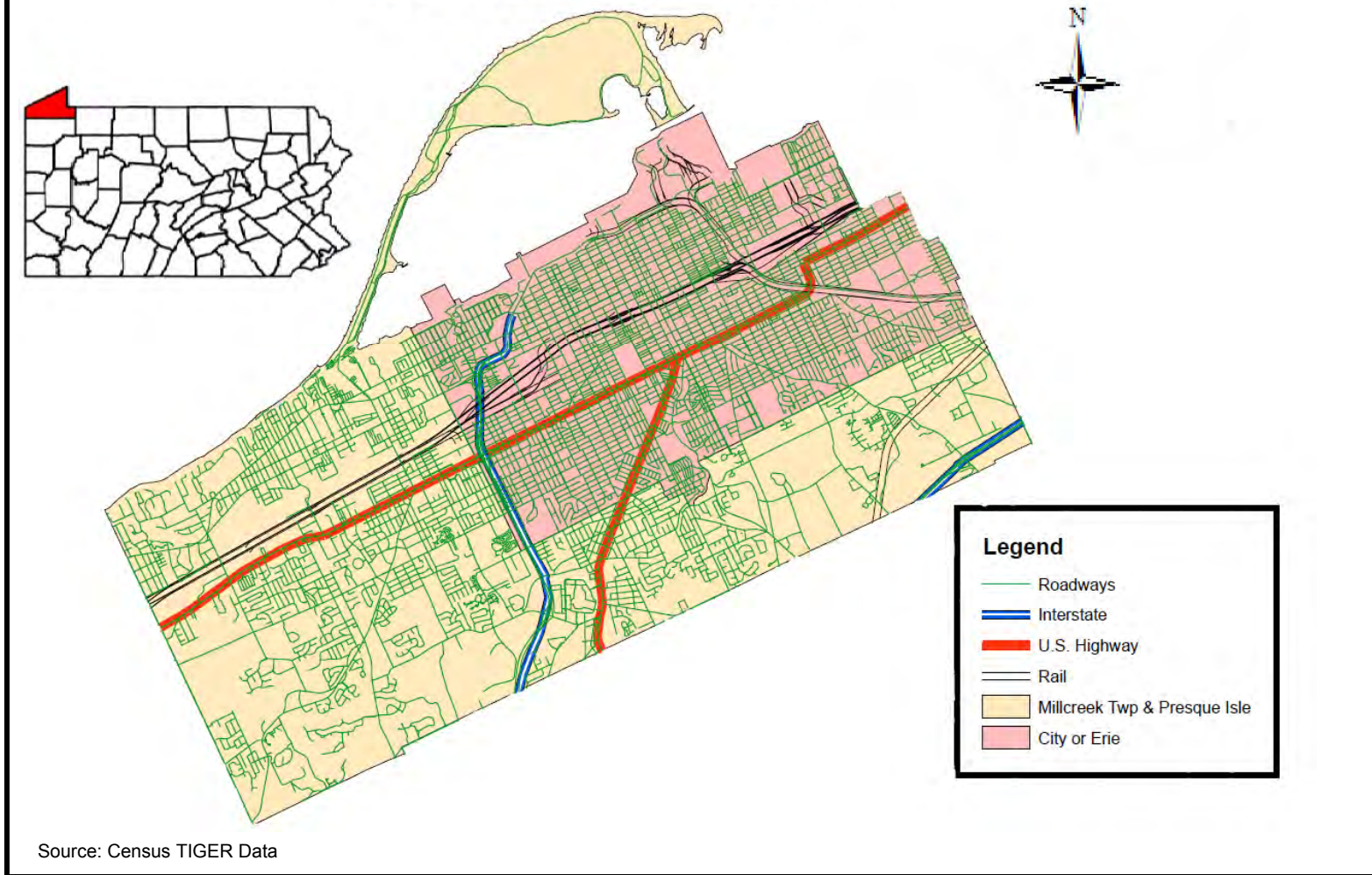
### 4.3.16.4 Future Occurrence

The following risk maps depict the transportation infrastructure in Erie County, Erie City, and Corry City.



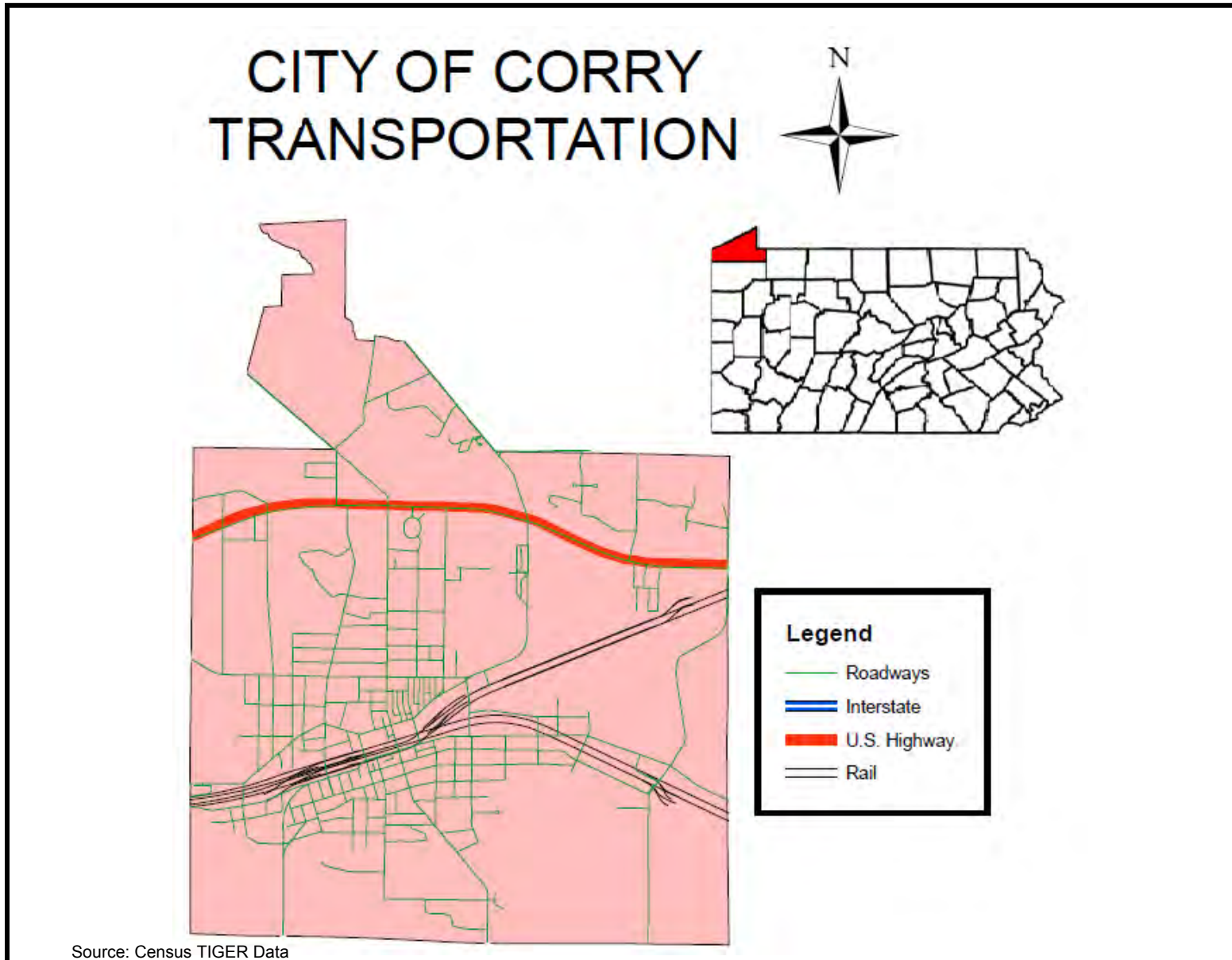


# CITY OF ERIE AND MILL CREEK TOWNSHIP TRANSPORTATION



Source: Census TIGER Data





4.3.16.5 Vulnerability Assessment

TABLE 4.3.16.5.A TRANSPORTATION INFRASTRUCTURE DECAY VULNERABILITY ASSESSMENT			
<i>Probability</i>		<i>Severity</i>	<i>Risk</i>
<b>FREQUENT</b>		<b>NEGLIGIBLE</b>	<b>MODERATE</b>
It is inevitable that transportation infrastructure will get older and begin to decay. The cost to maintain and repair infrastructure is much lower than replacing it. Further, transportation accidents are frequent occurrences throughout Erie County	+	Though transportation accidents are frequent occurrences and can be devastating to those involved, they typically impact very small segments of the population	=
			A combination of frequent occurrence and negligible level of severity puts this hazard at moderate risk to Erie County



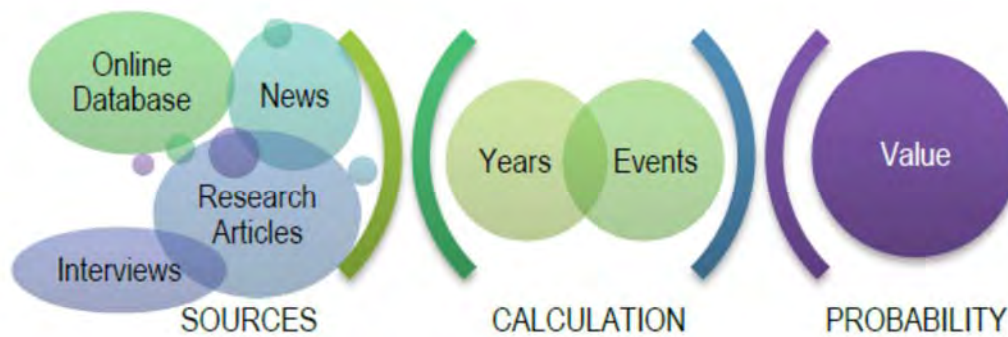


## 4.4 HAZARD VULNERABILITY SUMMARY

One of the components of the risk assessment is determining the probability of a hazard occurring and its potential severity should it occur. The process helps identify which hazards pose the most significant risk to Erie County and its municipalities.

### 4.4.1 Methodology

The probability and severity of an event are largely based on historical research. The probability of an event happening is determined based on the number of events that have occurred within a certain timeframe. The timeframe is based on information available from different resources and varies depending on the data.



The probability of occurrence is broken down into five categories as seen in the table below.

PROBABILITY CATEGORIES		
Value	Label	Specific Hazard Event
3.1+	Frequent	Likely to occur frequently
1.6 - 3	Probable	Will occur several times in a year
0.7 - 1.5	Occasional	Likely to occur sometime during a year
0.3 - 0.6	Remote	Unlikely to occur in a year
0 - 0.2	Improbable	So unlikely that it can be assumed it will not occur in a year

The chance of occurrence of a hazard within the next year can be quantified based on historical data. This can be expressed in a numerical measure or as a percentage of 0-100 percent. It is calculated by adding the total occurrences of a specific hazard and dividing it by the years of data. For example, if there have been seven tornadoes in the county between 1950 and 2016 (66 years), the quantitative probability would be calculated by dividing seven events by 66 years. The result would be 0.10 of 10% chance of tornado, roughly one every ten years. The percentage would then indicate an ‘improbable’ probability of occurrence based on the information presented in the table above. This formula for calculating probability will be used when historical data is available.

Number of events	7
----- = Probability	or --- = .10 OR 1 time every 10 years
Number of years	66

Although some hazards have zero recorded occurrences, the risk still exists. Since non-natural hazards generally do not depend on weather patterns to occur, they are not informed by this type of historical data. Non-natural and human-caused hazards are nearly impossible to assign measurement of probability. The severity of an event is based on three factors.

1. The historical deaths, injuries, and property/crop damage
2. The extent of potential secondary and/or cascading impacts of the hazard
3. The potentially impacted geographic area as determined through risk mapping

Generally the severity estimations will be less exact than probability estimations. The four classifications of severity are shown in the table below.

SEVERITY CATEGORIES	
Description	Definition
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness, or marginal structural damage
Marginal	Minor injury, minor illness, or structural damage
Negligible	Less than minor injury, illness or structural damage



The combination of hazard probability and hazard severity results are shown in the table below, known as the “risk assessment matrix.” The matrix is designed to show the hazards that are of most of concern to Erie County and its municipalities.

Table 4.4.1.C

		PROBABILITY				
		Frequent	Probable	Occasional	Remote	Improbable
SEVERITY	Catastrophic	High	High	High	Moderate	Moderate
	Critical	High	Moderate	Moderate	Moderate	Moderate
	Marginal	Moderate	Moderate	Moderate	Moderate	Low
	Negligible	Moderate	Moderate	Low	Low	Low

In the table below, each hazard is located within the risk assessment matrix based on the research and analysis of each hazard; these are shown in all caps and bold (**EXAMPLE**). The results of the risk assessment exercise completed by committee members at a meeting are shown in italics (*Example*). For more information, refer to each hazard profile section.

Table 4.4.1.D

		PROBABILITY				
		Frequent	Probable	Occasional	Remote	Improbable
SEVERITY	Catastrophic	<b>TORNADO &amp; WINDSTORM</b>				<b>EARTHQUAKE</b>
	Critical	<b>ENVIRONMENTAL HAZARDS URBAN FIRE &amp; EXPLOSION WINTER STORM</b>	<i>Winter Storm</i>	<i>Dam Failure Flood... Tornado &amp; Windstorm Trans. Inf. Decay Utility Interruption</i>	<i>LAKE HAZARDS RADIOLOGICAL INCIDENT WAR &amp; CRIMINAL ACTIVITY Radioactive Incident Urban Fire &amp; Explosion</i>	<b>DAM FAILURE</b>
	Marginal	<b>COASTAL EROSION FLOOD... UTILITY INTERRUPTION</b>	<b>INVASIVE SPECIES</b>	<i>Drought Landslide</i>	<i>DROUGHT Earthquake Invasive Species</i>	<b>LANDSLIDE</b>
	Negligible	<b>TRANS. INF. DECAY</b>			<i>Coastal Erosion Lake Hazards</i>	

The difference in results between the committee’s and the data analysis could be due to a difference in perception from each member. Some hazards may be more prevalent or



likely, or some jurisdictions may be more vulnerable to certain hazards. The ability to respond effectively to some events may also affect committee member rankings. In any event, comparing research results with perceptions provides insight as to where education and outreach can be helpful.

#### 4.4.2 Ranking Results

Determining an actual list of hazards of concern is more operational when presented as a list of hazards, starting with the “highest risk” and continuing sequentially until a “lowest risk” hazard is listed. Table 4.4.2.A presents such a ranking. To calculate the ranks, each cell in the above risk assessment matrix was assigned a whole number. Each hazard received two scores, the whole number corresponding to each the research-based and perception-based determinations in Table 4.4.1.D above. The risk factor (and ranking) is the result of an average of those whole numbers. Tie-breakers were as follows.

1. The risk assessment determination presented in each hazard profile
2. Highest severity element of risk assessment determination
3. Highest probability element of risk assessment determination

Table 4.4.2.A

RANKED LIST OF HAZARDS OF CONCERN		
Hazard Natural (N) or Man-Made (M)	Hazard Risk (see Hazard Profiles)	Risk Factor & Ranking
Environmental Hazards (M)	High	8 (1)
Tornado and Windstorm (N)	High	7.5 (2)
Winter Storm (N)	High	7.5 (3)
Urban Fire and Explosion (M)	High	6.5 (4)
Utility Interruption (M)	Moderate	6.5 (5)
Flood, Flash Flood, Ice Jam (N)	Moderate	6.5 (6)
Transportation Infrastructure Decay (M)	Moderate	6 (7)
Coastal Erosion (N)	Moderate	5 (8)
Invasive Species (N)	Moderate	5 (9)
Dam Failure (M)	Moderate	5 (10)
Radiological Incident (M)	Moderate	5 (11)
War and Criminal Activity (M)	Moderate	5 (12)
Drought (N)	Moderate	4.5 (13)
Earthquake (N)	Moderate	4.5 (14)
Lake Hazards (N)	Moderate	4 (15)
Landslide (N)	Low	4 (16)

Significantly, per the hazard profiles, there are hazards considered to be of high, moderate, and low risk in Erie County. Committee members elected to consider projects for



all of these hazards because the threats posed to life and property (or a combination of the two) were significant enough to warrant the need for risk reduction activities. Public outreach and emergency services activities largely address low risk hazards, yet committee members recognized a general benefit of mitigating those hazards when it could be done cost effectively. Risk factor rankings served to weight project prioritization rankings later in the mitigation planning process (see Appendix 3).

A result for the entire county does not mean that each municipality is at the same amount of risk to each hazard. Table 4.4.2.B shows the different municipalities in Erie County and whether their risk is greater than (>), less than (<), or equal to (+) the risk factor assigned to the county as a whole. The relationships between the municipal areas did not change from the 2012 version of the plan.

Table 4.4.2.B

	Environmental Hazards	Tornado & Wind Storm	Winter Storm	Urban Fire & Explosion	Utility Interruption	Flood, Flash Flood, Ice Jam	Transportation Infrastructure Decay	Coastal Erosion	Invasive Species	Dam Failure	Radiological Incident	War & Criminal Activity	Drought	Earthquake	Lake Hazards	Landslides
	8	7.5	7.5	6.5	6.5	6.5	6	5	5	5	5	5	4.5	4.5	4	4
Albion Borough	<	=	>	<	<	>	>	<	<	<	>	=	>	<	<	<
Amity Township	=	=	=	=	=	=	=	<	>	=	=	=	=	=	<	=
Concord Township	=	=	=	=	=	=	>	<	=	=	=	=	=	=	<	=
Conneaut Township	=	=	=	=	=	=	>	<	>	>	>	=	=	=	<	=
Corry City	>	=	=	>	=	=	>	<	=	=	=	=	=	=	<	=
Cranesville Borough	=	=	>	=	>	>	=	<	=	<	>	=	=	=	<	=
Edinboro Borough	>	=	>	>	=	=	>	<	=	>	=	=	=	=	<	=
Elgin Borough	<	=	=	=	=	=	>	<	=	=	=	=	=	<	<	=
Elk Creek Township	=	=	>	=	>	>	>	<	=	<	>	=	>	=	<	=
Erie City	>	>	>	>	>	>	>	>	>	<	=	>	=	>	>	>
Fairview Township	=	=	=	>	>	>	=	>	=	=	>	=	=	=	>	>
Franklin Township	=	=	>	=	>	>	>	<	=	<	>	=	>	=	<	=
Girard Borough	>	=	=	>	>	=	>	<	=	<	>	=	=	=	<	=
Girard Township	>	=	=	=	>	>	>	>	>	<	>	=	>	=	>	>
Greene Township	=	=	=	=	=	=	>	<	>	=	=	=	=	=	<	=
Greenfield Township	=	=	=	=	=	=	>	<	>	>	=	=	=	=	<	=



	Environmental Hazards	Tornado & Wind Storm	Winter Storm	Urban Fire & Explosion	Utility Interruption	Flood, Flash Flood, Ice Jam	Transportation Infrastructure Decay	Coastal Erosion	Invasive Species	Dam Failure	Radiological Incident	War & Criminal Activity	Drought	Earthquake	Lake Hazards	Landslides
	8	7.5	7.5	6.5	6.5	6.5	6	5	5	5	5	5	4.5	4.5	4	4
Harborcreek Township	=	=	>	>	>	=	>	>	=	=	=	>	=	>	>	>
Lake City Borough	>	=	=	>	=	=	=	=	=	=	>	=	=	=	=	=
Lawrence Park Township	>	=	=	>	=	>	>	>	=	<	=	=	=	=	>	>
Le Boeuf Township	=	=	=	=	=	=	>	<	>	>	=	=	>	=	<	=
McKean Borough	=	=	=	=	=	=	=	<	=	=	=	=	=	=	<	=
McKean Township	>	=	=	=	=	=	>	<	=	=	=	=	=	<	<	=
Mill Village Borough	=	=	=	=	=	=	>	<	=	=	=	=	=	<	<	=
Millcreek Township	>	=	=	>	>	>	>	>	=	>	=	>	=	>	>	=
North East Borough	>	=	=	>	=	=	>	<	>	=	=	=	>	=	<	=
North East Township	>	=	=	=	=	=	>	>	>	=	=	=	=	=	>	=
Platea Borough	=	=	=	=	=	=	>	<	=	<	>	=	=	>	<	=
Springfield Township	>	=	=	=	=	=	>	>	>	=	>	=	=	=	>	>
Summit Township	>	=	=	=	=	=	>	<	=	=	=	=	=	=	<	=
Union City Borough	>	=	=	>	=	=	>	<	=	=	=	=	=	=	<	=
Union Township	=	=	=	=	=	=	>	<	=	>	=	=	=	=	<	=
Venango Township	>	=	>	=	=	>	=	<	=	<	=	=	=	=	<	=
Washington Township	=	=	>	=	>	=	>	<	=	>	>	=	>	=	<	=
Waterford Borough	=	=	=	>	=	=	>	<	=	=	=	=	=	=	<	=
Waterford Township	=	=	=	=	=	=	>	<	>	=	=	=	=	=	<	=
Wattsburg Borough	=	=	>	=	=	>	=	<	=	=	=	=	=	<	<	=
Wayne Township	=	=	=	=	=	=	>	<	>	=	=	=	=	=	<	=
Wesleyville Borough	>	=	=	>	=	=	>	<	=	<	=	=	<	=	<	=

#### 4.4.3 Potential Loss Estimates

Based on various kinds of available data, potential loss estimates were established for coastal erosion, drought, earthquake, flood, invasive species, landslide, tornado and windstorm, winter storm, environmental hazards, radiological incidents, urban fire and explosion, utility interruption, and transportation infrastructure decay. Estimates provided in this section are based on resources as HAZUS-MH, based on historical occurrences, or by finding representative historical occurrences in comparable communities. 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.



## COASTAL EROSION

Costs can include protective measures ranging from annual purchases of sand to reduce rates of beach erosion to relocating structures. In 1987, due to coastal erosion, the National Park Service moved a lighthouse in North Carolina approximately 2,750 feet at a cost of \$9.8 million (NPS).

## DROUGHT

Loss estimates for droughts are difficult to quantify, though droughts generally affect crops rather than structures. There is no need for a loss estimate for structural damage. The varying severity levels of droughts make estimating crop loss difficult, especially considering the numerous possible mitigating factors such as time of year, heartiness of crop, etc.

The worst-case scenario would involve the entire agricultural sector being affected for a prolonged and serious drought. Based on 2012 numbers, market value of crops sold was \$70,163,000.00 (USDA, 2012). Table 4.4.3.A shows a decrease in crop production of approximately 12% making the potential loss \$8,419,560.



### Erie County Pennsylvania

  US Department of Agriculture National Agricultural Statistics Service		2012
Number of Farms		1,422
Land in Farms		168,634 acres
Average Size of Farm		119 acres
Market Value of Products Sold		\$91,675,000
Crop Sales \$70,163,000 (77 percent)		
Livestock Sales \$21,512,000 (23 percent)		
Average Per Farm		\$64,469



The table below shows crop harvested totals from the USDA's Survey of Agriculture 1998, 1999, and 2000. These years were chosen due to 1999 being the last drought emergency declared in Erie County. The data shows decreases in reported production of corn and hay, while also showing growth in apple production in a drought year. Some data has been redacted from the publicly available data by the USDA, to "avoid disclosing data for individual operations" (USDA, 2012). The data shown is fairly inconclusive. There are reductions in some types of agriculture, but growth in others.

Table 4.4.3.A

PRODUCTION (in Tons or Bushels) – DROUGHT LOSS ESTIMATE			
Product	1998	1999	2000
Corn	1,933,2000	1,992,800	3,046,100
Hay	75,000	70,700	85,100
Apples	5,340,000	6,000,000	5,130,000

#### EARTHQUAKE

The HAZUS-MH program from the federal Emergency Management Agency analyzed a potential earthquake striking just off the Erie County coast. The scenario depicts a 6.0 earthquake. Table 4.4.3.B highlights the expected building damage as reported by HAZUS and Table 4.4.3.C shows the estimated economic loss estimated.

Table 4.4.3.B

EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)										
	None		Slight		Moderate		Extensive		Complete	
	Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	118	0.45	73	0.35	106	0.47	76	0.53	66	0.45
Commercial	798	3.02	554	2.63	1,252	5.49	1,496	10.39	1,954	13.44
Education	26	0.10	17	0.08	36	0.16	44	0.31	55	0.38
Government	29	0.11	16	0.08	34	0.15	43	0.30	54	0.37
Industrial	275	1.04	171	0.81	387	1.70	496	3.44	656	4.51
Other Residential	5,866	21.80	4,512	21.42	5,627	24.67	4,556	31.63	4,497	30.93
Religion	139	0.52	98	0.46	125	0.55	106	0.73	131	0.90
Single Family	19,295	72.96	15,620	74.17	15,241	66.82	7,587	52.67	7,126	49.01
<b>TOTAL</b>	<b>26,445</b>		<b>21,061</b>		<b>22,810</b>		<b>14,405</b>		<b>14,540</b>	





Table 4.4.3.C

**HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (Millions of Dollars)**

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.00	34.49	419.24	21.71	22.03	497.46
	Capital Related	0.00	14.48	333.68	13.82	5.06	367.03
	Rental	78.10	134.76	153.63	8.05	9.53	384.07
	Relocation	271.70	91.59	270.03	32.16	78.41	743.89
	Subtotal	349.80	275.31	1,176.58	7.74	115.03	1,992.46
Capital Stock Losses	Structural	466.35	215.38	398.41	125.40	81.19	1,286.74
	Non Structural	1,442.18	951.37	1,324.29	476.40	263.86	4,458.11
	Content	376.47	209.20	636.09	311.30	121.93	1,654.98
	Inventory	0.00	0.00	15.04	69.42	0.88	85.34
	Subtotal	2,285.00	1,375.96	2,373.83	982.52	467.86	7,485.17
<b>TOTAL</b>		<b>2,634.80</b>	<b>1,651.27</b>	<b>3,550.40</b>	<b>1,058.27</b>	<b>582.89</b>	<b>9,477.63</b>

A second HAZUS estimate was completed using a 6.0 magnitude earthquake with an epicenter in the City of Erie. Table 4.4.3.D highlights the expected building damage and Table 4.4.3.E shows the estimated economic loss estimated.

Table 4.4.3.D

**EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)**

	None		Slight		Moderate		Extensive		Complete	
	Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	285	0.53	70	0.32	58	0.36	21	0.36	6	0.34
Commercial	2,659	4.93	1,089	5.02	1,401	8.67	692	11.91	213	12.63
Education	79	0.15	31	0.14	42	0.26	21	0.35	6	0.37
Government	83	0.15	27	0.13	39	0.24	21	0.36	6	0.38
Industrial	971	1.80	311	1.43	422	2.61	217	3.74	66	3.90
Other Residential	13,369	24.80	5,016	23.12	4,370	27.04	1,765	30.38	438	25.92
Religion	304	0.56	119	0.55	111	0.68	50	0.86	14	0.85
Single Family	36,162	67.08	15,029	69.29	9,717	60.13	3,022	52.03	940	55.60
<b>TOTAL</b>	<b>53,912</b>		<b>21,690</b>		<b>16,159</b>		<b>5,809</b>		<b>1,690</b>	



Table 4.3.2.E

**HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (Millions of Dollars)**

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.00	8.40	131.30	6.06	7.05	152.81
	Capital-Related	0.00	3.53	100.60	3.77	1.53	109.42
	Rental	24.04	41.80	51.03	2.41	2.88	122.15
	Relocation	88.24	30.77	94.14	10.55	24.10	247.81
	Subtotal	112.28	84.49	377.07	22.79	35.57	632.19
Capital Stock Losses	Structural	133.90	60.63	106.34	28.85	21.35	351.08
	Non-Structural	422.45	269.44	306.34	93.58	65.18	1,156.99
	Content	148.33	74.56	168.24	66.93	36.04	494.10
	Inventory	0.00	0.00	3.84	15.48	0.21	19.53
	Subtotal	704.69	404.63	584.75	204.85	122.78	2,021.69
<b>TOTALS</b>		<b>816.96</b>	<b>489.11</b>	<b>961.82</b>	<b>227.64</b>	<b>158.35</b>	<b>2,653.88</b>

**FLOOD, FLASH FLOOD, ICE JAM**

Loss estimates for future flood occurrences can be found using historical data from the NCEI. There have been 66 events recorded between 1996 and 2016. By dividing the number of events by the study period (21 years), an estimate of events per year is 3.14. Dividing the total property damage reported by the NCEI by the number of events, a per event property damage estimate is \$441,333. It is therefore estimated that the county will see \$1,385,786 of property damage caused by floods each year.

The HAZUS-MH program estimates that approximately 293 buildings would be affected by a 100-year flooding event. An estimated 36 of those buildings would be “substantially damaged.” The following tables summarize the HAZUS data.

Table 4.4.3.F

**BUILDING DAMAGE COUNT BY GENERAL OCCUPANCY (HAZUS-MH, 100-year Scenario)**

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
Industrial	0	0	1	3	1	1	0	6
Agriculture	0	0	0	0	0	0	0	0
Residential	196	0	3	4	12	30	36	281
Commercial	4	0	1	1	0	0	0	6
Education	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0
<b>Total</b>	<b>200</b>	<b>0</b>	<b>5</b>	<b>8</b>	<b>13</b>	<b>31</b>	<b>36</b>	<b>293</b>



Table 4.4.3.G

**BUILDING DAMAGE BY GENERAL OCCUPANCY (HAZUS-MH, 100-year Scenario)**

	Square Footage Distribution by Damage Percent Range ( <i>all values in thousands</i> )							
	Total Ft <sup>2</sup>	None	1-10	11-20	21-30	31-40	41-50	Substantial
Industrial	587	49	31	154	135	103	64	51
Agriculture	8	0	1	3	1	1	2	0
Residential	1,592	756	29	92	92	157	193	273
Commercial	894	263	98	336	163	25	6	3
Education	15	0	8	6	1	0	0	0
Religion	70	12	15	39	1	1	1	1
Government	13	1	6	6	0	0	0	0
<b>Total</b>	<b>3,179</b>	<b>1,081</b>	<b>188</b>	<b>636</b>	<b>393</b>	<b>287</b>	<b>266</b>	<b>328</b>

Table 4.4.3.H

**BUILDING DAMAGE BY BUILDING TYPE**

	Average Damage (%) within Each Damage Range ( <i>all values in thousands</i> )						
	None	1-10	11-20	21-30	31-40	41-50	Substantial
Wood	530	13	110	100	145	161	186
Concrete	68	28	64	38	11	6	6
Masonry	270	39	163	87	55	52	54
Steel	182	89	271	161	71	43	37
Manufactured Housing	30	0	0	0	0	0	42
<b>Total</b>	<b>1,080</b>	<b>169</b>	<b>608</b>	<b>386</b>	<b>282</b>	<b>262</b>	<b>325</b>

HAZUS also estimates economic losses for scenarios run in the program. For the 100-year flood scenario, the program estimates \$85,484,000 in building loss, \$120,207,000 in contents loss, and \$5,962,000 in inventory loss. The program also estimates \$139,000 in relocation losses, \$339,000 in capital-related income losses, \$731,000 in wage losses, and \$30,000 in rental income losses. The total loss for the 100-year scenario, per HAZUS, is \$212,892,000.

## INVASIVE SPECIES

The impact invasive species have on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with the activities and programs implemented to conduct surveillance and address infestation in Erie County have not been quantified in available documentation. However, the cost to control invasive species and the damages they inflict, nationally is estimated at \$137 billion annually.



## LANDSLIDE

Landslides historically have two costs: (a) direct cost, which is the cost to repair damages, and (b) associated costs, which consist of lost income and productivity as businesses are affected or closed, schools close due to damage to the drinking water system, etc. According to the PDCNR, PennDOT incurs substantial costs due to landslide damage and extra construction costs for new roads in known landslide-prone areas.

The only landslide cost study completed by the USGS in Pennsylvania took place in Allegheny County from 1970 to 1976. This study found that the total public and private costs of landslides averaged \$4 million per year (approximately \$17 million adjusted for 2017 dollars).

## TORNADO & WINDSTORM

Loss estimates for tornado events can be calculated using the historical data available from the NCEI. There have been 20 events recorded in the county between 1950 and 2016. By dividing the number of events by the study period (67 years), an estimate of events per year is 0.30. It is estimated that one tornado will touch down every three years. Dividing the total property damage reported in the NCEI by the number of events, a per-event property damage estimate is \$1,479,900. It is therefore estimated that every three years, the county will see this amount of property damage caused by a tornado event.

As with tornado events, loss estimates for wind storms can be calculated using historical data from the NCEI. There have been 402 events recorded in the county between 1950 and 2016. By dividing the number of events by the study period, 67 years, and estimate of events per year is six. Dividing the total property damage reported in NCEI, \$13,596,000, by the number of events, a per event property damage estimate is \$33,821. It is therefore estimated that the county will see \$202,926, in property damage each year.

## WINTER STORM

Loss estimates for future winter storm occurrences can be found using historical data from the NCEI. There have been 133 events recorded between 1996 and 2016. By dividing the number of events by the study period (21 years), an estimate of events per year is 6.33. Dividing the total property damage reported by the NCEI by the number of events, a per event property damage estimate is \$313,511. It is therefore estimated that the county will see \$1,984,525 of property damage caused by winter storms each year.



## ENVIRONMENTAL HAZARDS

RTK Net and PHMSA both estimate monetary damage. Some incidents, because of their size, have no cost associated with them; these incidents range from spilling a small amount of product while filling a tank to reports of sheens on Lake Erie. Of the 149 incidents recorded by the RTK Network, none had monetary damage associated with them. The PHMSA reported 49 incidents that had a total cost of \$135,000.

Damage estimates can be calculated by using historical data provided by the RTK Net and PHMSA databases. Over the last seven years, the county experienced \$135,000 in property damage due to hazardous materials incidents. When divided by the number of incidents, an estimated \$682 in property damage per incident is reached. A yearly estimate can be found by multiplying the average number of incidents in a year (29) by the estimated property damage, resulting in an estimate of \$19,778.00/year.

## RADIOLOGICAL INCIDENT

The Three Mile Island accident in 1979 is the largest and most expensive partial core meltdown in U.S. history. Clean-up after the accident cost \$973 million and took twelve years (World Nuclear Association). Metropolitan Edison Co., operator of Three Mile Island NPP, was also fined \$155,000 by the NRC.

According to the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration's Hazardous Materials Incident Reporting System, there have been 783 transportation incidents involving radioactive materials nationwide between 1971 and 2017. Total damages for these incidents was \$3,328,262, or approximately \$4,250 per incident.

## URBAN FIRE & EXPLOSION

The National Fire Protection Association (NFPA) collects annual data and produces reports and statistics on the loss of life and property annually. In 2015 (the last complete year of data available), there were 1,345,500 fires in the U.S., up 3.7% from 2014. The NFPA reports 3,280 civilian fire deaths and 15,700 injuries. Property damage was estimated to be \$14.3 billion.

## UTILITY INTERRUPTION

The ASCE report card on infrastructure notes on a national level that only half of the required financial commitment needed to maintain the nation's infrastructure is being



met. By not fully meeting these requirements, the U.S. will have \$3.9 trillion in losses to the GDP, \$7 trillion in lost business sales and \$2.5 million lot American jobs by 2025.

Failing to maintain infrastructure has an impact on individual families as well. An aging electric grid and water infrastructure translates to higher costs for businesses to manufacture and distribute goods and provide services. These higher costs get passed along, costing the average family \$3,400 per year.

With no historical property loss data, estimating a loss estimate for utility interruption is difficult. Events can range from a water main break causing loss of water pressure for a small community, to a widespread power outage that can cause significant economic loss.

#### TRANSPORTATION INFRASTRUCTURE DECAY

The ASCE report card on infrastructure notes on a national level that only half of the required financial commitment needed to maintain the nation's infrastructure is being met. By not fully meeting these requirements, the U.S. will have \$3.9 trillion in losses to the GDP, \$7 trillion in lost business sales and \$2.5 million lot American jobs by 2025.

Failing to maintain infrastructure has an impact on individual families as well. Poor roads and airports translate to higher costs for businesses to manufacture and distribute goods and provide services. These higher costs get passed along, costing the average family \$3,400 per year.

#### 4.4.4 Future Development and Vulnerability

Understanding the risk that Erie County faces from future occurrences is a multifaceted exercise. Identifying and analyzing development trends allows for the consideration of future vulnerability. This information comes from a variety of sources, including economic trends, comprehensive plans, and interviews with local officials.

Local officials recognize the need for better education and training as an element of economic growth. The need for industry-driven education to develop talents for well-paying skilled jobs could be met by implementing a pre-kindergarten-to-workforce education system. This system would allow for decisions on education based on data from which preschool programs best prepare students for kindergarten to which college majors or training school programs have the most successful graduates. To grow the county's economy, several local agencies engage with regional partners. These types of initiatives boost the impact of tourism by promoting year round attractions, and developing new industries while maintaining the



industries that have traditionally sustained the county's economy. Economic growth and employment opportunities can also be created by supporting entrepreneurship and creating an environment conducive to entrepreneurial success.

Erie County and 35 municipalities have adopted comprehensive plans that include discussions of future land use. The county provides a model zoning ordinance for consideration and possible use by municipalities but does not have a zoning ordinance. Thirty-five (35) municipalities have adopted zoning ordinances and 26 have adopted subdivision ordinances. The Erie County Subdivision and Land Development Ordinance has jurisdiction in the other 12 municipalities that have not adopted their own. The urban areas of the county are losing population while suburban and rural areas are seeing increases. This trend poses several challenges for both municipalities and the county. As an example, with population leaving the cities, tax revenue paying for essential functions such as schools and public safety has decreased. As people move to the outlying suburban areas, the need for improved transportation infrastructure, including road repair and widening and extended public transportation services, becomes critical. Longer commutes to places of employment in cities can lead to road congestion and deterioration.

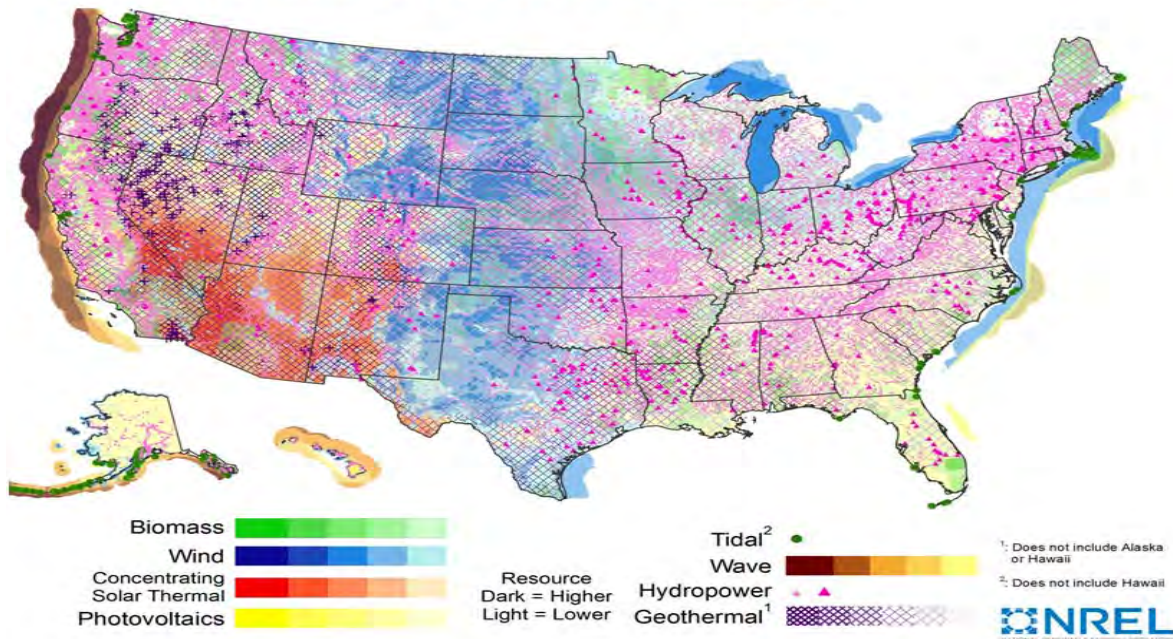
Revitalization seeks to provide environmental benefits such as pollution reduction, biodiversity, and water quality improvements. Environment Erie is currently working with Millcreek Township and the City of Erie, two of the most populated municipalities in the county, to implement revitalization projects and programs.

In 2015, Erie County joined the Lake Erie Energy Development Corp (LEEDCO). LEEDCO, whose mission is to promote regionally-consistent development of offshore wind energy markets, created the "Icebreaker Project." Icebreaker is a small development of six turbines approximately eight miles offshore. It could generate 21MW of power, enough to provide electricity to 7,000 homes. The project is currently in the scoping phase which is part of a federal environmental assessment (Ewing, 2016). Offshore winds tend to blow harder and more uniformly than on land. The potential energy produced from wind is directly proportional to the cube of the wind speed. As a result, increased wind speeds of only a few miles per hour can produce a significantly larger amount of electricity (BOEM).



As seen in the map below (National Renewable Energy Laboratory), Erie County has several options for pursuing renewable energy including wind, hydropower and geothermal. Permitting for wind energy, often a lengthy and difficult process, is a viable option as nuclear power plants (NPP), such as Perry and Davis-Besse in Ohio, and Beaver Valley in Pennsylvania may be closing (Funk, 2017).

## U.S. Renewable Resources





## 5.0 CAPABILITY ASSESSMENT

§201.6(c)(4)(ii) [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

This section discusses the capabilities present with jurisdictions in Erie County that can support mitigation implementation. It contains an overview of National Flood Insurance Program (NFIP) compliance and participation as well as identifies the plans, ordinances, and planning bodies that can support the management of mitigation projects. Finally, it presents the results of a capability assessment survey administered by the county's consultant.

### 5.1 UPDATE PROCESS SUMMARY

Erie County has 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.

Changes to this section in 2017 included updating the list of NFIP communities in the county and moving that list to the flood hazard profile (i.e., Section 4.3.4), updating and adding fields (i.e., capital budget and public works budget) to the jurisdictional capabilities table, and re-issuing the capability survey from 2012 (and updating the findings accordingly).

### 5.2 CAPABILITY ASSESSMENT FINDINGS

#### 5.2.1 Jurisdictional Capabilities

Erie County and its municipalities have capabilities that can support mitigation efforts including comprehensive plans, floodplain regulations, building codes, and zoning ordinances. The Erie County Planning Commission (ECPC) provides planning advice to the county government and planning-related advice and assistance to municipalities upon their request. Each municipality also has a planning commission that serve as advisory boards to their municipal governing



bodies. The role of the municipal planning commissions is defined in the Municipalities Planning Code (MPC) Act 247 and includes the following.

- Make recommendations to the governing body concerning the adoption or amendment of an official map.
- Prepare and present to the governing body a zoning ordinance, and make recommendations to the governing body on proposed amendments to it.
- Prepare, recommend, and administer subdivision and land development and planned residential development regulations.
- Prepare and present to the governing body a building code and a housing code and make recommendations concerning proposed amendments thereto.
- Do such other acts or make studies as may be necessary to fulfill the duties and obligations imposed by the MPC.
- Prepare and present to the governing body an environmental study.
- Submit to the governing body a recommended capital improvements program.
- Prepare and present to the governing body a water survey, which shall be consistent with the state water plan and any applicable water resources plan adopted by a river basin commission. The water survey shall be conducted in consultation with any public water supplier in the area to be surveyed.
- Promote public interest in, and understanding of, the comprehensive plan and planning.
- Make recommendations to governmental, civic, and private agencies and individuals as to the effectiveness of the proposals of such agencies and individuals.
- Hold public hearings and meetings.
- Present testimony before any board.
- Require from other departments and agencies of the municipality such available information as relates to the work of the planning agency.
- In the performance of its functions, enter upon any land to make examination and land surveys with the consent of the owner.



- Prepare and present to the governing body a study regarding the feasibility and practicability of using renewable energy sources in specific areas within the municipality.
- Review the zoning ordinance, subdivision and land development ordinance, official map, provisions for planned residential development, and such other ordinances and regulations governing the development of land no less frequently than it reviews the comprehensive plan.

Comprehensive plans promote sound land use and regional cooperation among local governments to address planning issues. These plans serve as the official policy guide for influencing the location, type, and extent of future development by establishing the basic decision-making and review processes on zoning matters, subdivision and land development, land uses, public facilities, and housing needs over time. The existing countywide comprehensive plan for Erie County was developed and adopted in 2003. The housing portion of the plan was updated and adopted in 2008 and the transportation section was updated and adopted in 2012. Most of the 38 jurisdictions have municipal comprehensive plans. County governments are required by law to adopt a comprehensive plan while municipalities may do so at their option. Future comprehensive plan updates and improvements will consider 2017 hazard mitigation plan findings.

Building codes regulate construction standards for new construction and substantially renovated buildings. Standards can be adopted that require resistant or resilient building design practices to address hazard impacts common to a given community. In 2003, the Commonwealth of Pennsylvania implemented Act 45 of 1999, the Uniform Construction Code (UCC), a comprehensive building code that establishes minimum regulations for most new construction, including additions and renovations to existing structures. All 38 municipalities in Erie County have “opted in” to this statewide building code. On December 10, 2009, the Commonwealth adopted regulations of the 2009 International Code Council’s codes. The effective date of the regulations is December 31, 2009. Since all municipalities in Erie County are required to abide by the UCC, they are required to enforce the 2009 building code regulations for all building permits (effective December 31, 2009).

Through administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to existing structures located in



the floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. Floodplain ordinances may also prohibit development in certain areas altogether. The National Flood Insurance Program (NFIP) establishes minimum ordinance requirements which must be met in order for that community to participate in the program. However, a community is permitted and (in fact) encouraged to adopt standards which exceed NFIP requirements. Thirty-four (34) municipalities within the county have floodplain regulations in place, but they vary in age and restrictiveness from community to community. Significantly, two jurisdictions were suspended from the NFIP program for not adopting floodplain ordinances and Platea does not participate in the NFIP (at the time of the 2017 update).

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. Twenty-six (26) of the 38 municipalities in Erie County have adopted and enforce a subdivision and land development ordinance. The other 12 are subject to the Erie County Subdivision and Land Development Ordinance, which was updated and adopted in 2010.

Zoning ordinances allow for local communities to regulate the use of land in order to protect the interests and safety of the general public. Zoning ordinances can address unique conditions or concerns within a given community. They may be used to create buffers between structures and high-risk areas, limit the type or density of development and/or require land development to consider specific hazard vulnerabilities. Thirty-five (35) of the 38 municipalities in Erie County have zoning regulations. Table 5.2.1.A summarizes the above discussion on a jurisdiction-by-jurisdiction basis. Data is taken from Questions 2, 3, 4, 5, 6, 7, 11, and 12 of the capability assessment survey issued by the county's consultant.



Table 5.2.1.A

Jurisdiction	Municipal Planning Commission	Comprehensive Plans	Floodplain Regulations	Building Codes*	Zoning Ordinance	Subdivision and Land Development Ordinance	Capital Budget	Public Works Budget	
Erie County	Yes	Yes	SEE SECTION 4.3.4 (FLOOD, FLASH FLOOD, ICE JAM PROFILE)	No	No	Yes	Yes	N/A	
Albion, Borough of	Yes	Yes		Yes	Yes	Yes	Yes	In-kind	
Amity, Township of	Yes	Yes		Yes	Yes	No†	N/A	N/A	
Concord, Township of	Yes	Yes		Yes	Yes	No	N/A	N/A	
Conneaut, Township of	Yes	Yes		Yes	No	No	N/A	N/A	
Corry, City of	Yes	Yes		Yes	Yes	Yes	N/A	N/A	
Cranesville, Borough of	Yes	No		Yes	Yes	No	N/A	N/A	
Edinboro, Borough of	Yes	Yes		Yes	Yes	Yes	No	No	
Elgin, Borough of	Yes	No		Yes	Yes	No†	N/A	N/A	
Elk Creek, Township of	Yes	Yes		Yes	No	No	N/A	N/A	
Erie, City of	Yes	Yes		Yes	Yes	Yes	N/A	N/A	
Fairview, Township of	Yes	Yes		Yes	Yes	Yes	Yes	Yes	In-kind
Franklin, Township of	Yes	Yes		Yes	Yes	Yes	Yes	No	No
Girard, Borough of	Yes	Yes		Yes	Yes	Yes	Yes	N/A	N/A
Girard, Township of	Yes	Yes		Yes	Yes	Yes	Yes	No	No
Greene, Township of	Yes	Yes		Yes	Yes	Yes	Yes	N/A	N/A
Greenfield, Township of	Yes	Yes		Yes	Yes	Yes	Yes	N/A	N/A
Harborcreek, Township of	Yes	Yes		Yes	Yes	Yes	Yes	N/A	N/A
Lake City, Borough of	Yes	Yes		Yes	Yes	Yes	Yes*	N/A	N/A
Lawrence Park, Township of	Yes	Yes		Yes	Yes	Yes	Yes*	N/A	N/A
Le Boeuf, Township of	Yes	Yes		Yes	Yes	Yes	No	N/A	N/A
McKean, Borough of	Yes	Yes		Yes	Yes	Yes	Yes*	N/A	N/A
McKean, Township of	Yes	Yes		Yes	Yes	Yes	Yes*	N/A	N/A
Mill Village, Borough of	Yes	Yes		Yes	Yes	Yes	No	N/A	N/A
Millcreek, Township of	Yes	Yes		Yes	Yes	Yes	Yes	N/A	N/A
North East, Borough of	Yes	Yes		Yes	Yes	Yes	Yes	Yes	In-kind
North East, Township of	Yes	Yes		Yes	Yes	Yes	Yes	N/A	N/A
Platea, Borough of	Yes	No		Yes	No	No†	No	No	In-kind
Springfield, Township of	Yes	Yes		Yes	Yes	Yes	Yes	N/A	N/A
Summit, Township of	Yes	Yes		Yes	Yes	Yes	Yes	N/A	N/A



Table 5.2.1.A

Jurisdiction	Municipal Planning Commission	Comprehensive Plans	Floodplain Regulations	Building Codes*	Zoning Ordinance	Subdivision and Land Development Ordinance	Capital Budget	Public Works Budget
Union Township of	Yes	Yes		Yes	Yes	No	N/A	N/A
Venango, Township of	Yes	Yes		Yes	Yes	Yes	N/A	N/A
Washington, Township of	Yes	Yes		Yes	Yes	Yes*	N/A	N/A
Waterford, Borough of	Yes	Yes		Yes	Yes	Yes*	N/A	N/A
Waterford, Township of	Yes	Yes		Yes	Yes	Yes*	N/A	N/A
Wattsburg, Borough of	Yes	Yes		Yes	Yes	No	N/A	N/A
Wayne, Township of	Yes	Yes		Yes	Yes	No	N/A	N/A
Wesleyville, Borough of	Yes	Yes		Yes	Yes	Yes	N/A	N/A

† Municipality indicated "No," but utilizes the in-place county ordinance.

\* Data imported from previous hazard mitigation plan.

Additionally, the Pennsylvania legislature enacted the Stormwater Management Act (Act 167 of 1978), commonly called Act 167. The Act enables the regulation of development and activities that cause accelerated runoff and encourages watershed-based planning and management of stormwater. The Department of Environmental Protection is the public agency charged with overseeing implementation of the Act 167 plans. 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. The *Erie County Act 167 County-Wide Stormwater Management Plan* was developed and adopted on February 1, 2011. The plan includes a model stormwater management ordinance for municipalities. Additionally, Erie County, together with Crawford, Venango and Warren Counties, has developed and made available a *Stormwater Management Implementation Guide for Municipal Officials* which is available on the department of planning's website, [www.eriecountyp Planning.org](http://www.eriecountyp Planning.org).

## 5.2.2 Administrative and Technical Capabilities

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 to effectively execute mitigation activities. Common examples of skill sets and technical personnel for hazard mitigation include planners with knowledge of land development/management practices, engineers or professionals trained in construction practices related to buildings and/or infrastructure (e.g., building inspectors), planners or engineers with an understanding of natural and/or human caused hazards, emergency managers, floodplain managers, land surveyors, scientists familiar with hazards in the community, staff with the education or expertise to assess community vulnerability to hazards, personnel skilled in geographic information systems, resource development staff or grant writers, and fiscal staff to handle complex grant application processes.

The Erie Conservation District and Erie County Department of Planning provide leading technical assistance roles for municipalities. Other local organizations that could act as partners in mitigating natural and human-made hazards include the Penn State Cooperative Extension, environmental advocacy groups, and watershed associations. State agencies agency 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 Corps of Engineers,
- Department of Housing and Urban Development,
- Department of Agriculture,
- Economic Development Administration,
- Emergency Management Institute,
- Environmental Protection Agency,
- Federal Emergency Management Agency, and
- Small Business Administration.



### 5.2.3 Fiscal Capabilities

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. Only three communities indicated having a paid grants specialist on its payroll.

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

- Community Conservation Partnerships Program,
- Community Revitalization Program,
- Floodplain Land Use Assistance Program,
- Growing Greener Program,
- Keystone Grant Program,
- Local Government Capital Projects Loan Program,
- Pennsylvania Heritage Areas Program
- Pennsylvania Recreational Trails Program,
- Shared Municipal Services, and
- Technical Assistance Program.

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

- Community Development Block Grant (CDBG),
- Disaster Housing Program,
- Emergency Conservation Program,
- Emergency Management Performance Grants (EMPG),
- Emergency Watershed Protection Program,
- Hazard Mitigation Grant Program (HMGP),
- Flood Mitigation Assistance Program,
- Non-Insured Crop Disaster Assistance Program,
- Pre-Disaster Mitigation Program,
- Repetitive Flood Claims Program (RFC),





- Section 108 Loan Guarantee Programs,
- Severe Repetitive Loss (SRL) Program, and
- Weatherization Assistance Program.

#### 5.2.4 Political Capabilities

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.

#### 5.2.5 Self-Assessment

The capability assessment survey asked each local jurisdiction to conduct its own self-assessment of its capability to effectively implement hazard mitigation activities. As part of this process, the county’s consultant encouraged local government officials to consider the barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance or further such strategies. In response to the survey questionnaire, local officials classified each of the capabilities as either “limited,” “moderate,” or “high.” Because this may be sensitive for local government officials, not every jurisdiction completed the self-assessment. Table 5.2.5.A summarizes the results of the self-assessment survey as a percentage of the 27 responses received. The table also compares the results from the 2017 survey with those recorded in 2012.

Table 5.2.5.A

CAPILITY SELF-ASSESSMENT									
Capability	Limited			Moderate			High		
	2012	2017	Change	2012	2017	Change	2012	2017	Change
Planning & Regulatory	29%	22%	NEG (-)	42%	59%	POS (+)	29%	19%	-
Administrative & Technical	33%	22%	-	43%	48%	+	24%	29%	+
Fiscal	47%	52%	+	39%	40%	+	14%	8%	-
Political	34%	0%	-	52%	71%	+	14%	29%	+

2012 Responses = 21  
2017 Responses = 27



Interestingly, a decrease of the percentage in the “Limited” columns signals an increase in capability. In three of the four cases – Planning & Regulatory, Administrative & Technical, and Political – Erie County’s jurisdictions indicated an increase in abilities (i.e., less of a limited ability). The “Fiscal” category was the only one to see a decrease, which can be most likely attributed to a perception of overall economic decline since 2012.

Jurisdictions reported an increase in capability for all four categories at the “Moderate” level. Increases in this area can be largely attributed to the decrease in self-reported limited capability. In other words, the “Moderate” category most likely captures the areas where jurisdictions revised their 2012 limited capabilities in a negative direction. Jurisdictions split their responses under the “High” capability category. Administrative and technical and political capabilities improved, while planning and regulatory and fiscal capabilities eroded slightly. The fiscal category was not surprising. However, the planning and regulatory decrease was unexpected.

The 2017 self-assessment added four questions to gauge community receptiveness to several types of mitigation strategies. Table 5.2.5.B details the results.

Table 5.2.5.B

SELF-ASSESSMENT: PROJECT CONSIDERATIONS					
Sample Mitigation Strategy	Very Much Unwilling	Unwilling	Neutral	Willing	Very Willing
XYZ community guides development away from known hazard areas.	0	0	10	9	5
XYZ community restricts public investments or capital improvements within hazard areas.	0	0	11	9	4
XYZ community enforces local development standards (e.g., building codes, floodplain management ordinances, etc.) that go beyond minimum state or federal requirements.	0	2	17	3	2
XYZ community offers financial incentives (e.g., through property tax credits) to individuals and businesses that employ resilient construction techniques (e.g., voluntarily elevate structures, employ landscape designs that establish buffers, install green infrastructure elements, etc.).	3	5	12	3	1



### 5.2.6 Plan Integration

The project list above identifies numerous opportunities for integrating hazard mitigation into compatible planning efforts as well as opportunities for using information generated in compatible planning efforts. This section serves as a summary narrative of those opportunities. It also presents a table meant to guide local government leaders in identifying further opportunities for plan integration.

The opportunities listed with the mitigation projects generally fall under eight categories.

1. Marrying hazard mitigation and stormwater management efforts
2. Improving water resources management
3. Supporting bluff setback regulations
4. Supporting transportation planning
5. Bridging the gap between the use of special flood hazard area (SFHA) information in land use planning
6. Reducing long-term risks by supporting improved emergency response
7. Providing additional recreational opportunities through green space and other low-impact development initiatives
8. Supporting neighborhood revitalization

Identifying opportunities for integrating various planning efforts brings extended stakeholders into the hazard mitigation process. It also supports enhanced planning even in periods with constrained budgets by developing and taking advantage of increased social capital in a community. Research shows that an increase in social capital builds a network through which partners can readily access a wider range of expertise and generate creative solutions because of access to varied perspectives on common challenges. Extending such a network can also lead to the identification of non-traditional funding sources for hazard mitigation projects or, conversely, identify areas in which mitigation funding can provide additional leverage (or matches) for other funding opportunities.

Key to identifying opportunities for plan integration was the realization of how similar the objectives of stormwater management planning and hazard mitigation planning are. For instance, Erie County Department of Planning maintains the county's Act 167 stormwater management plan, which identifies problem areas throughout the county where water backs up during heavy rain events, causing site-



specific flooding. In some cases, this site-specific flooding can result in structural damage. It frequently impacts roadways, thus resulting in economic loss. Thus, listing efforts to address these problem areas mitigates site-specific flooding in those areas.

In addition to support of stormwater management initiatives, hazard mitigation and risk reduction can support improved water resources management. Efforts to maintain river corridors, stabilize streambanks, etc. can allow water to flow in ways more readily consistent with the natural hydrology of an area. These efforts can take advantage of the ecological benefits of natural flooding (when combined with steps to limit the development of floodplains).

Local leaders also identified how considering risk reduction for coastal erosion supported existing bluff recession planning and regulations. The juxtaposition of these efforts serves as a classic example of how integration leads to a network of individuals with varied backgrounds and expertise can collaborative approach a challenge. Locally, the bluff management program seeks to engage landowners in the process. Considering such efforts as risk reduction measures (i.e., a way to lessen future losses) may serve as a tactic to increase landowner engagement.

Erie County's planning committee demonstrated an extensive concern for the decay of the local transportation infrastructure, noting how significant economic losses could be (locally and regionally) should a bridge fail (for example) on Interstate 90. Other impacts, such as more difficult evacuations, less responder access to communities, etc. could result from a failure of the transportation infrastructure. This concern enabled widespread integration of other efforts from throughout the county to maintain and improve the transportation infrastructure. In this respect, integration into the hazard mitigation context provides supporting documentation for funding requests to address transportation issues.

In guidance on mitigation planning, the comprehensive or land-use plan often serves as the example for plan integration. Erie County's department of planning is intimately involved with numerous phases of community land-use planning throughout the county. Though those efforts consider floodplain management, the hazard mitigation plan can provide a wealth of additional information on risks to floodplains, identify areas considered to be floodplains, etc. that can serve as a significant resource to comprehensive or land-use planning. As such, involving



partners that work on comprehensive planning bridges a potential gap in maximizing usage of SFHA data.

In Erie County, the departments of planning and public safety collaborated to lead this update. Planning ensured that many traditional community development initiatives could be considered by the process, which resulted in the identification of several of these opportunities for integration. However, public safety's involvement yielded insight as to how improving the efficiency of emergency responses could lead to a decrease in long-term impacts. Thus, efforts to educate the public, train and equipment responders, and support capability enhancements at the response agency level support mitigation by enabling a more rapid "resolution" of large-scale emergencies. If an emergency situation is more quickly resolved, then it has less time to cause losses.

In many instances, implementing traditional mitigation projects like acquisition and relocation results in areas that must be maintained as green space. Communities justifiably look at these efforts through the lens of minimizing its tax base. However, when looking at these spaces as opportunities to increase recreational offerings (and improve resident quality of life) or as "infrastructure" in that they can reduce stormwater runoff, communities may more readily see the potential for off-setting a small loss in the tax base.

Finally, Erie County (like many other communities) looks for ways to enhance and revitalize its communities. Revitalization and general community development link many other planning efforts, such as land use and transportation planning. Mitigation planning and risk reduction can be folded into those efforts as well. Reducing exposure to hazards can limit losses for future residents or businesses. Limiting development in hazard-prone areas can result in green space, recreational opportunities, and other features that enhance quality of life. Areas in which hazards are mitigated, then, can be marketed as areas with a high quality of life, low potential to suffer losses from weather and other features, improved public safety, etc.

The preceding paragraphs provide specific opportunities for plan integration based on discussions with stakeholders in Erie County as this plan was updated. Table 5.2.6.A below presents general considerations for local officials as these discussions continue.



Table 5.2.6.A

**GENERAL OPPORTUNITIES FOR PLAN/PROGRAM INTEGRATION**

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i>	<i>Mitigation Action Comparison</i>	
Emergency Operations Planning	Erie County Department of Public Safety Municipal EMA coordinators Emergency response agencies	County of Erie Emergency Operations Plan Hazard/vulnerability analyses Commodity flow studies	Ensure consistency between updated hazard analyses and the risk assessment portion of the plan Consider mitigation projects as part of the overall cycle of emergency management	
			<p>PLAN ELEMENTS/POLICIES</p> <p>Establish and maintain effective response program</p> <p>Support continuity of critical infrastructure and key resources</p> <p>Identify specific risk areas for certain hazards</p>	<p>ASSOCIATED MITIGATION GOAL/OBJECTIVE</p> <p>1.2: Identify other planning initiatives that could support hazard mitigation.</p> <p>5.3: Continually strive toward generating better hazard data to support decision-making.</p> <p>1.1: Provide opportunities for stakeholders from various disciplines to come together to discuss and consider hazard mitigation activities.</p> <p>5.3: Continually strive toward generating better hazard data to support decision-making.</p>



Table 5.2.6.A

**GENERAL OPPORTUNITIES FOR PLAN/PROGRAM INTEGRATION**

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i>	<i>Mitigation Action Comparison</i>	
Transportation Planning	Erie Metropolitan Planning Organization Erie County Department of Planning Planning commissions for the municipalities within the county PA Route 6 Alliance	Erie County 2042 Long Range Transportation Plan Erie County Comprehensive Plan (2003), Transportation Section (2012) Comprehensive plans Land use plans	Ensure hazards are acknowledged in long-range transportation planning Consider response elements to the hazards identified in the mitigation plan, as appropriate, with respect to transportation (e.g., evacuation) Ensure planned transportation projects do not add to vulnerabilities (e.g., ensure projects utilize proper drainage, are properly elevated, etc.) Consider the incorporation of green infrastructure/low-impact development as transportation projects are undertaken (e.g., permeable pavements, green streets and alleys, etc.)	
			<p>PLAN ELEMENTS/POLICIES</p> <p>Provide for emergency access to all parts of the county and safe evacuation routes</p> <p>Consider upgrades to transportation infrastructures to prevent, to the extent possible, long-term infrastructure decay</p>	<p>ASSOCIATED MITIGATION GOAL/OBJECTIVE</p> <p>1.2: Identify other planning initiatives that could support hazard mitigation.</p> <p>3.3: Upgrade and maintain the transportation infrastructure, including highways, bridges, and railways.</p> <p>3.3: Upgrade and maintain the transportation infrastructure, including highways, bridges, and railways.</p>



Table 5.2.6.A

**GENERAL OPPORTUNITIES FOR PLAN/PROGRAM INTEGRATION**

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i>	<i>Mitigation Action Comparison</i>	
Floodplain Management	Municipal floodplain coordinators Borough councils and township trustees Erie County Department of Planning	Floodplain ordinances Potential CRS applications	<p>Continue to enforce floodplain development ordinances Consider participation in the Community Rating System, as appropriate for the jurisdiction Continue public outreach to ensure awareness of flood risk and mitigation options</p>	
			<p>PLAN ELEMENTS/POLICIES</p> <p>Support resiliency by ensuring new development stays clear of known hazard areas or is built in such a way as to withstand the effects of known hazards</p> <p>Protect green spaces in special flood hazard areas</p>	<p>ASSOCIATED MITIGATION GOAL/OBJECTIVE</p> <p>4.1: Enforce existing floodplain development ordinances. 4.2: Enforce building and zoning codes.</p> <p>1.2: Identify other planning initiatives that could support hazard mitigation. 2.1: Integrate existing stormwater management planning efforts into the mitigation effort whenever possible.</p>





Table 5.2.6.A

**GENERAL OPPORTUNITIES FOR PLAN/PROGRAM INTEGRATION**

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i>	<i>Mitigation Action Comparison</i>	
Infrastructure (i.e., Water, Sewer) Development	Erie County Department of Planning Borough councils and township trustees Utility providers	Jurisdictional and/or utility-specific capital improvement plans Jurisdictional source water protection plans	Ensure protection of environmental features as infrastructure projects are undertaken Support resiliency by extending or improving public utility service to residents Support improved emergency communications	
			<p>PLAN ELEMENTS/POLICIES</p> <p>Support infrastructure development as a means of attracting economic development</p>	<p>ASSOCIATED MITIGATION GOAL/OBJECTIVE</p> <p>3.1: Upgrade water treatment and distribution infrastructure. 3.2: Upgrade sewer collection and treatment infrastructure. 3.4: Upgrade and maintain the electric grid.</p>



Table 5.2.6.A

**GENERAL OPPORTUNITIES FOR PLAN/PROGRAM INTEGRATION**

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i>	<i>Mitigation Action Comparison</i>	
Commercial/Economic Development	Municipal zoning departments and officers Planning commissions for the municipalities within the county Erie County Department of Planning	Zoning ordinances Building codes Subdivision and land development ordinances Erie County Natural and Historical resources Plan	Ensure adherence to floodplain, zoning, building, subdivision, and other relevant ordinances Consider incorporating green infrastructure/low-impact development into site-specific projects (e.g., use of porous pavement, tree planting initiatives, planter boxes, bio swales, etc.)	
			<p>PLAN ELEMENTS/POLICIES</p> <p>Encourage responsible land use</p> <p>Identify areas suitable for residential development (or redevelopment)</p> <p>Identify areas suitable for commercial development (or redevelopment)</p> <p>Identify areas suitable for industrial development (or redevelopment)</p>	<p>ASSOCIATED MITIGATION GOAL/OBJECTIVE</p> <p>4.2: Enforce building and zoning codes. 5.1: Provide opportunities for regular participation in the hazard mitigation process.</p> <p>1.2: Identify other planning initiatives that could support hazard mitigation.</p> <p>1.2: Identify other planning initiatives that could support hazard mitigation.</p> <p>1.2: Identify other planning initiatives that could support hazard mitigation.</p>
Stormwater Management	Erie County Department of Planning Borough councils and township trustees	Erie County PA Act 167 County-Wide Stormwater Management Plan Stormwater management ordinances Municipal MS4 permitting processes	Identification of site-specific flooding concerns Provides a means for consideration of low-impact development options for flood mitigation	



Table 5.2.6.A

**GENERAL OPPORTUNITIES FOR PLAN/PROGRAM INTEGRATION**

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i> (where applicable)	<i>Mitigation Action Comparison</i>	
			<p>PLAN ELEMENTS/POLICIES</p> <p>Encourage onsite management of runoff</p>	<p>ASSOCIATED MITIGATION GOAL/OBJECTIVE</p> <p>2.1: Integrate existing stormwater management planning efforts into the mitigation effort whenever possible.</p> <p>2.2: Regularly review stormwater problem areas for possible mitigation opportunities.</p>
Coastline Management	Erie County Department of Planning PA Department of Environmental Protection Borough councils and township trustees	Bluff setback regulations	<p>Identification of risk areas with respect to coastal and bluff erosion Identify assets potential at risk from erosion, high lake levels, etc., to include the identification of partners to engage in risk reduction discussions</p>	
			<p>PLAN ELEMENTS/POLICIES</p> <p>Encourage landowner engagement in mitigation</p> <p>Encourage responsible development in coastal areas</p>	<p>ASSOCIATED MITIGATION GOAL/OBJECTIVE</p> <p>1.1: Provide opportunities for stakeholders from various disciplines to come together to discuss and consider hazard mitigation activities.</p> <p>1.2: Identify other planning initiatives that could support hazard mitigation.</p> <p>5.1: Provide opportunities for regular participation in the hazard mitigation process.</p>



### 5.3 EXISTING LIMITATIONS

As discussed above (and in Section 4.3.4), communities in Erie County use a wide variety of floodplain regulations with an equally wide range of restrictiveness, but there is significant technical assistance available at the county level to standardize and use more restrictive ordinances. Municipalities that use the Commonwealth's model floodplain ordinance will have increased awareness of flood risk and NFIP capabilities. During the update process, FEMA released new flood insurance rate maps (FIRM) affecting 11 municipalities. The other 26 municipalities all have FIRMs updated in 2014. With the updated FIRMs, municipalities have the opportunity to update their floodplain regulations to reflect the latest information.

As mentioned, there are no communities in Erie County participating in the NFIP Community Rating System. However, 37 of 38 municipalities in the county have been designated as flood prone. Participation in this program can provide premium reductions for properties located outside of special flood hazard areas (SFHA) of up to 10 percent and reductions for properties located in SFHA of up to 45 percent. These discounts can be obtained by undertaking public information, mapping and regulations, flood damage reduction and flood preparedness activities (FEMA, 2009).

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

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



## 6.0 MITIGATION STRATEGY

§201.6(c)(3)(i)	[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
§201.6(c)(3)(ii)	[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.
§201.6(c)(3)(iii)	[The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This section uses the information presented thus far as the basis of a mitigation action plan comprised of specific projects to reduce or eliminate hazard-related losses throughout Erie County.

### 6.1 UPDATE PROCESS SUMMARY

Changes for 2017 in this section were straight forward; municipalities simply updated the project lists from the 2012 plan and added new projects where applicable. (Projects listed as completed, deleted, or deferred have been moved to Appendix 4.) The county's consultant led the planning committee in an exercise designed to create a series of overarching goals to guide the development of on-going and future mitigation projects. The narrative below shows the results of that exercise.

### 6.2 MITIGATION GOALS AND OBJECTIVES

During its May meeting, the planning committee discussed the county's goals for hazard mitigation. The consultant defined goals as desired end states toward which mitigation objectives and projects could work. The consultant also provided examples of goals, mostly designed around types of mitigation actions or specific hazard damage reduction.

Erie County's committee organized its goals with the intent of increasing general resilience to natural, technological, and man-made hazards. Committee members noted that all of their efforts, under either the mitigation or preparedness label, are undertaken for the purpose of increasing resilience and adaptability to emergencies and disasters of all scales. Objectives serve to operationalize goals, providing more concrete ideas as to how to achieve



goals. As such, the foundational goals and objectives for Erie County’s 2017 mitigation strategy are as follows.

Table 6.2.A

ERIE COUNTY MITIGATION GOALS AND OBJECTIVES	
Goals	Objectives
1: Enhance coordination amongst stakeholders relative to hazard mitigation.	1.1: Provide opportunities for stakeholders from various disciplines to come together to discuss and consider hazard mitigation activities.
	1.2: Identify other planning initiatives that could support hazard mitigation.
2: Address site-specific stormwater management issues as flood mitigation activities.	2.1: Integrate existing stormwater management planning efforts into the mitigation effort whenever possible.
	2.2: Regularly review stormwater problem areas for possible mitigation opportunities.
3: Support infrastructure upgrades of all types.	3.1: Upgrade water treatment and distribution infrastructure.
	3.2: Upgrade sewer collection and treatment infrastructure.
	3.3: Upgrade and maintain the transportation infrastructure, including highways, bridges, and railways.
	3.4: Upgrade and maintain the electric grid.
	3.5: Support on-going inspection and upgrades of dams.
4: Practice resilient development and construction.	4.1: Enforce existing floodplain development ordinances.
	4.2: Enforce building and zoning codes.
5: Educate community leaders and the public about hazard mitigation and risk reduction.	5.1: Provide opportunities for regular participation in the hazard mitigation process.
	5.2: Conduct annual reviews of the hazard mitigation plan as a way to build intellectual capital for implementing mitigation projects at the local level.
	5.3: Continually strive toward generating better hazard data to support decision-making.

### 6.3 IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

Erie County’s action plan (see below) utilizes the mitigation techniques presented in FEMA’s *Local Mitigation Planning Handbook* (USDHS, 2013). Those techniques include:

- local plans and regulations,
- structure and infrastructure projects,
- natural systems protection, and
- education and awareness programs.

Additionally, the county sees benefit in aligning mitigation goals and actions with other development goals. As a fifth technique, the county added, “integrated planning efforts.” All projects included in the action plan serve as examples of one of these five techniques.



The department of public safety and department of planning elected to add several new projects related to NFIP compliance as well as enforcement of the stormwater management ordinance. Though these efforts are technically completed and on-going, the county added them to highlight their connection to mitigation (particularly flood mitigation).

#### **6.4 MITIGATION ACTION PLAN**

The following action plan is organized by jurisdiction. It lists project priority, its status, a cost estimate and potential funding source, coordinating and support agencies, and opportunities for integrating this project into other planning mechanisms. Each project also identifies the goal and objective with which it relates. Where appropriate, the following tables also identify when and how other planning mechanisms were integrated into this process via specific projects.

It is important to note that the cost estimates are tentative and meant as a starting point for research on project feasibility. More specifically, these cost estimates are only ranges of probable costs; all figures are approximations. At the time implementation of any strategy is considered, a full cost estimate should be sought prior to securing possible funding. Possible funding sources identified include the following.

- Community Development Block Grant (CDBG)
- Flood Mitigation Assistance (FMA)
- Hazard Mitigation Grant Program (HMGP)
- Highway Safety Improvement Program (HSIP)
- Homeland Security Grant Program (HSGP)
- Local Funding
- PennDOT Highway Safety Funds (HSF)
- PennDOT Municipal Liquid Fuels Funding (MLFF)
- Pennsylvania Infrastructure Investment Authority (PENNVEST)
- Pre-Disaster Mitigation Grant (PDM)
- State Funding
- Surface Transportation Block Grant (STBG)

Erie County and the municipalities therein realize and acknowledge the importance of traditional flood mitigation techniques, such as acquisition, relocation, and demolition; mitigation reconstruction; and elevation. These techniques are high priority, but the jurisdictions in the county further realize that absent Presidential declarations, funding is rarely



available. Further, absent a substantial number of repetitive loss and severe repetitive loss properties, the jurisdictions understand that procuring federal funding via competitive opportunities (e.g., FEMA Pre-Disaster Mitigation [PDM] program) may be challenging. This document – the *2017 Erie County Hazard Mitigation Plan* – serves as the vehicle which ensures the county and all jurisdictions therein remain eligible for such programs and, therefore, these projects are hereby included as mitigation projects for all 38 participating jurisdictions.

Table 6.4.A: COMMON FLOOD MITIGATION PROJECTS FOR ALL OF ERIE COUNTY								
Project #	Goal / Objective	Project	Priority	Timeframe	Status	Funding Source	Coordinating Agency	Support Agencies
Erie County 1	4.1	Pursue acquisition, demolition, and relocation; mitigation reconstruction; and/or elevation projects to support flood mitigation, where appropriate and when funding is available	8	5 years	On-Going	HMGP, PDM	Municipal Councils	Erie County Department of Public Safety  Erie County Department of Planning
		<b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 45); it will be undertaken as funding is available. <b>Opportunities for Plan Integration:</b> Structural mitigation projects, in particular acquisition/relocation/demolition, may result in green space that can be used for recreation opportunities.						

The 2012 plan also listed the following projects as countywide efforts; they are re-listed as such for this update.

Table 6.4.B: OTHER MITIGATION PROJECTS FOR ALL OF ERIE COUNTY								
Project #	Goal / Objective	Project	Priority	Timeframe	Status	Funding Source	Coordinating Agency	Support Agencies
Erie County 2	4.1 5.1	Increase awareness of, and participation in, FEMA's Community Rating System (CRS) program. County will assist municipalities with developing and enforcing higher standard ordinances	3	5 years	On-Going	Local Funding	Municipal Councils  Erie County Department of Planning	Erie County Department of Public Safety
		<b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 14). To date, municipalities have concentrated their efforts on maintaining participation in the NFIP. <b>Opportunities for Plan Integration:</b> N/A						
Erie County 3	1.1 1.2 5.1	Update the ingestion pathway plan with assistance from key stakeholders including municipal, county, and Commonwealth officials	7	5 years	On-Going	Local Funding	Erie County Department of Public Safety	PEMA
		<b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 15). Local officials in both Ohio and Pennsylvania (the area surrounding the Perry Nuclear Power Plant) meet regularly to discuss emergency response planning. <b>Opportunities for Plan Integration:</b> This project features in the preparedness planning for potential incidents at the plant.						





Erie County 4	5.3	Identify and coordinate with appropriate partners and agencies to arrange for data collection of flood and structure data necessary to perform a Level 2 HAZUS analysis for the next hazard mitigation plan update (i.e., building value, lowest floor elevation, building type, occupancy type, foundation type, number of stories, and square footage).	3	5 years	On-Going	Local Funding	Erie County Department of Public Safety	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 42). While GIS data is more available, the committee listed this project as on-going to allow for the inclusion of additional relevant data.</p> <p><b>Opportunities for Plan Integration:</b> The data collected for this project may be applicable to a number of other comprehensive, economic development, and land use plan updates.</p>						
Erie County 5	2.1	Provide Municipal Assistance Program related to stormwater management assistance.	1	5 years	New	State Funding	Erie County Department of Planning	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> Supports Erie County's Act 167 Stormwater Management Plan. Data collected will also be helpful for MS4 permitting.</p>						
Erie County 6	1.1	Continue assisting municipalities on enforcement of Bluff Recession Setback Act, and assist landowners with bluff management	1	5 years	On-Going	State Funding Matching Local Funds	Erie County Department of Planning	N/A
		<p><b>Status Narrative:</b> This is an on-going program that addresses coastal bluff erosion by limiting development within the hazard area.</p> <p><b>Opportunities for Plan Integration:</b> Program is consistent with and supports municipal bluff setback regulations.</p>						
Erie County 7	2.1	Work with municipalities to determine possible interest in alternative funding structures for stormwater infrastructure projects, such as user fees. County should assist interested municipalities with enacting the funding programs.	3	5 years	New	State Funding	Erie County Department of Planning	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update. This project is supported by PA Act 62 and 123, among others.</p> <p><b>Opportunities for Plan Integration:</b> Supports Erie County's Act 167 Stormwater Management Plan.</p>						
Erie County 8	5.3	Collect and analyze data in order to better predict urban flooding.	3	5 years	New	State Funding  Local Funding	Erie County Department of Planning	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> Supports Erie County's Act 167 Stormwater Management Plan. Data collected will also be helpful for MS4 permitting.</p>						

The following tables present the mitigation action plan for each of the participating jurisdictions covered by this plan.



Table 6.4.C: ALBION BOROUGH PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Albion 1	3.3	Pursue roadway widening along US 6N according to the "Moving Forward Along Route 6" plan through Edinboro, Union City, and Corry when the state route is due for betterment	7	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Albion Borough Council  The PA Route 6 Alliance
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update. The alliance updated the plan in April 2016 and included additional Route 6 development. Though the majority of the Erie County work in the plan is in Edinboro, Union City, and Corry, US 6 does pass through Albion and supporting its development and upgrade benefits the borough.</p> <p><b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. Several communities participating in the plan have noted success in revitalization and beautification projects (including nearby Union City). The project also supports borough-wide and countywide emergency operations planning and thus folds the PA Route 6 Alliance, Erie County Department of Planning, Erie County Department of Public Safety as well as the West County Emergency Management Agency into the overall process.</p>							
Albion 2	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Albion Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> N/A</p>							
Albion 3	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	Albion Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth it also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							



Albion 4	2.1	Continue to enforce stormwater management ordinance	5	On-Going	New	N/A	Program maintenance included in existing budgets	Albion Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Albion 5	5.3	Develop and maintain a database to track community vulnerability	3	On-Going	New	N/A	Local Funding	Albion Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Albion 6	1.2	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	6	On-Going	New	N/A	Local Funding	Albion Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Albion 7	5.2	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	2	On-Going	New	N/A	Local Funding	Albion Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							



Table 6.4.D: AMITY TOWNSHIP PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Amity 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	2	On-Going	New	N/A	Program maintenance included in existing budgets	Amity Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Amity 2	4.1	Continue to enforce current floodplain regulations	3	On-Going	New	N/A	Program maintenance included in existing budgets	Amity Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Amity 3	2.1	Continue to enforce stormwater management ordinance	4	On-Going	New	N/A	Program maintenance included in existing budgets	Amity Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Amity 4	1.2	Clear beaver dams blocking the channel near Lowe Road.	1	3 years	New	N/A	Local personnel can be deployed to clear the dam.	Amity Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The project also appears in the county's Act 167 watershed stormwater management plan.</p>							



Amity 5	3.3	Resurfacing and/or restoration of SR 8 from Baldwin Road to one mile north of Casier Road	5	5 years	New	Up to \$4M	HSIP, MLFF, HSF, State Funding	Erie Metropolitan Planning Organization	Amity Township Supervisors PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds Erie County Department of Planning, Erie County Department of Public Safety as well as the Conelway Regional Emergency Management Agency into the overall process.</p>							



Table 6.4.E: CONCORD TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Concord 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Concord Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Concord 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Concord Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Concord 3	2.1	Continue to enforce stormwater management ordinance	3	On-Going	New	N/A	Program maintenance included in existing budgets	Concord Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Concord 4	3.3	Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Corry when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace/remove guardrails, and add signage.	4	5 years	New	Up to \$1M	STGB, State Funding	Erie Metropolitan Planning Organization	Concord Township Supervisors  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds Erie County Department of Planning, Erie County Department of Public Safety as well as the Conelway Regional Emergency Management Agency into the overall process.</p>							



Table 6.4.F: CONNEAUT TOWNSHIP PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Conneaut 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Conneaut Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Conneaut 2	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	Conneaut Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Conneaut 3	2.1	Continue to enforce stormwater management ordinance	6	On-Going	New	N/A	Program maintenance included in existing budgets	Conneaut Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							





Conneaut 4	3.3	Pursue roadway widening along US 6N according to the "Moving Forward Along Route 6" plan through Edinboro, Union City, and Corry when the state route is due for betterment	8	5 years	New	Up to \$1Ml	STBG, State Funding	Erie Metropolitan Planning Organization	Conneaut Township Supervisors  The PA Route 6 Alliance
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update. The alliance updated the plan in April 2016 and included additional Route 6 development. Though the majority of the Erie County work in the plan is in Edinboro, Union City, and Corry, US 6 does pass through Conneaut and supporting its development and upgrade benefits the Township.</p> <p><b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. Several communities participating in the plan have noted success in revitalization and beautification projects. The project also supports borough-wide and countywide emergency operations planning and thus folds the PA Route 6 Alliance, Erie County Department of Planning, Erie County Department of Public Safety as well as the West County Emergency Management Agency into the overall process.</p>							
Conneaut 5	1.2	Study the need for warning sirens to warn residents of disasters and install when funds are available	5	5 years	New	Up to \$100,000	EMPG, Local Funding	Conneaut Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b></p>							
Conneaut 6	5.3	Develop and maintain a database to track community vulnerability	3	On-Going	New	N/A	Local Funding	Conneaut Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b></p>							
Conneaut 7	5.2	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	7	On-Going	New	N/A	Local Funding	Conneaut Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b></p>							
Conneaut 8	5.1	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	2	On-Going	New	N/A	Local Funding	Conneaut Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b></p>							



Table 6.4.G: CORRY CITY PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Corry 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	2	On-Going	New	N/A	Program maintenance included in existing budgets	Corry City Council	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							
Corry 2	4.1	Continue to enforce current floodplain regulations	3	On-Going	New	N/A	Program maintenance included in existing budgets	Corry City Council	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.							
Corry 3	2.1	Continue to enforce stormwater management ordinance	4	On-Going	New	N/A	Program maintenance included in existing budgets	Corry City Council	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.							
Corry 4	2.2	Address stormwater problem areas, as outlined in the Act 167 plan, at the following locations: Airport Road, Church Street, SR 6, at the railroad bridge and culvert, Corry Middle School, Washington Street, E. Columbus and Scolia Street, Main Street, White Street, Liberty Street, and Pleasant Street.	4	5 years	New	Unknown	PENNVEST, State Funding, Local Funding	Corry City Council	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> The project also appears in the county's Act 167 watershed stormwater management plan.							



Corry 5	2.2	Improve stormwater sewer maintenance practices	1	On-Going	New	N/A	Program maintenance included in existing budgets	Corry City Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> Throughout the course of this update, local officials discussed Corry's stormwater system and noted it as antiquated. This project lends support for upgrading that system and recognizes that in addition to a more effective system, upgrading it can alleviate flooding problems caused by stormwater back-up.</p>							



Table 6.4.H: CRANESVILLE BOROUGH PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Cranesville 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Cranesville Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Cranesville 2	4.1	Continue to enforce current floodplain regulations	5	On-Going	New	N/A	Program maintenance included in existing budgets	Cranesville Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Cranesville 3	2.1	Continue to enforce stormwater management ordinance	8	On-Going	New	N/A	Program maintenance included in existing budgets	Cranesville Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Cranesville 4	2.2	Consider modification of culverts to allow for adequate hydraulic capacity	5	5 years	New	Up to \$1 mil	CDBG, HMGP, PDM, PENNVEST	Cranesville Borough Council	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> Borough officials have identified culverts and channels that overtop and flood. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Cranesville 5	2.2	Lift station improvement including streambank stabilization, manhole reinforcement, and back-up generator installation	8	5 years	On-Going	Up to \$1M	CDBG, HMGP, PDM, Local Funding	Cranesville Borough Council	Erie County Department of Public Safety
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 7). It has not yet been completed due to unavailable funds.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Cranesville 6	5.3	Develop and maintain a database to track community vulnerability	4	On-Going	New	N/A	Local Funding	Cranesville Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Cranesville 7	5.1	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	10	On-Going	New	N/A	Local Funding	Cranesville Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Cranesville 8	5.1	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	2	On-Going	New	N/A	Local Funding	Cranesville Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Cranesville 9	5.2	Provide educational information on WECEMA and its role in hazard mitigation	2	On-Going	New	N/A	Local Funding	WECEMA	Cranesville Borough Council
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Cranesville 10	2.2	Purchase and install camera system to allow for monitoring stormwater drainage system	5	5 years	New	Up to \$100K	CDBG, HMPG, Local Funding	Cranesville Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							



Table 6.4.I: EDINBORO BOROUGH PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Edin-boro 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Edinboro Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Edin-boro 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Edinboro Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Edin-boro 3	2.2	Address stormwater problem areas, as identified in the Act 167 plan, at the following locations: Water Street and Green Oaks, West Plum and Willow Streets, Heather Road, Industrial Drive, Peach Street, north of the lake, Penn Union site, Wipple Creek entrance to lake, Elm Street, and South Main Street	3	5 years	New	Unknown	PENNVEST, CDBG, State Funding, Local Funding	Edinboro Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The project also appears in the county's Act 167 watershed stormwater management plan.</p>							
Edin-boro 4	2.1	Continue to enforce stormwater management ordinance	3	On-Going	New	N/A	Program maintenance included in existing budgets	Edinboro Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Table 6.4.J: ELGIN BOROUGH PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Elgin 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Elgin Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Elgin 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Elgin Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Elgin 3	2.1	Continue to enforce stormwater management ordinance	3	On-Going	New	N/A	Program maintenance included in existing budgets	Elgin Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Table 6.4.K: ELK CREEK TOWNSHIP PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Elk Creek 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Elk Creek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Elk Creek 2	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	Elk Creek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Elk Creek 3	2.1	Continue to enforce stormwater management ordinance	5	On-Going	New	N/A	Program maintenance included in existing budgets	Elk Creek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Elk Creek 4	3.3	Consider repair and/or replacement of Ivoray Road Bridge	8	5 years	New	Up to \$1M	HSIP, MLFF, HSF, State Funding	Erie Metropolitan Planning Organization	Elk Creek Township Supervisors PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The bridge appears to be in poor condition and may need replacement. This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds PennDOT, Erie County Department of Planning, Erie County Department of Public Safety as well as the West County Emergency Management Agency into the overall process.</p>							





Elk Creek 5	3.3	Consider repair and/or replacement of Filling Road Bridge	8	5 years	On-Going	Up to \$1M	HSIP, MLFF, HSF, State Funding	Erie Metropolitan Planning Organization	Elk Creek Township Supervisors  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The bridge appears to be in poor condition and may need replacement. This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds PennDOT, Erie County Department of Planning, Erie County Department of Public Safety as well as the West County Emergency Management Agency into the overall process.</p>							
Elk Creek 6	3.3	Construct intersection improvements to address safety and congestion concerns at US 6N & Rt. 98 Intersection	7	5 years	New	Up to \$1M	HSIP, MLFF, HSF, State Funding	Erie Metropolitan Planning Organization	Elk Creek Township Supervisors  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds PennDOT, Erie County Department of Planning, Erie County Department of Public Safety as well as the West County Emergency Management Agency into the overall process.</p>							
Elk Creek 7	3.3	Pursue roadway widening along US 6N according to the Moving Forward Along Route 6 Plan through Edinboro, Union City, and Corry when the state route is due for betterment.	8	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Elk Creek Township Supervisors  The PA Route 6 Alliance
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update. The alliance updated the plan in April 2016 and included additional Route 6 development. Though the majority of the Erie County work in the plan is in Edinboro, Union City, and Corry, US 6 does pass through Elk Creek and supporting its development and upgrade benefits the borough.</p> <p><b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. Several communities participating in the plan have noted success in revitalization and beautification projects. The project also supports borough-wide and countywide emergency operations planning and thus folds the PA Route 6 Alliance, Erie County Department of Planning, Erie County Department of Public Safety as well as the West County Emergency Management Agency into the overall process.</p>							
Elk Creek 8	1.2	Construct a retention pond at previously identified vulnerable area	8	5 years	On-Going	Up to \$1M	CDBG, PENNVEST, Local Funding	Elk Creek Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 10). The project was not completed due to unavailable funding.</p> <p><b>Opportunities for Plan Integration:</b> N/A</p>							
Elk Creek 9	5.3	Develop and maintain a database to track community vulnerability	3	On-Going	New	N/A	Local Funding	Elk Creek Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> N/A</p>							



Elk Creek 10	5.1	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	6	On-Going	New	N/A	Local Funding	Elk Creek Township Supervisors	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							
Elk Creek 11	5.2	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	2	On-Going	New	N/A	Local Funding	Elk Creek Township Supervisors	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							



Table 6.4.L: ERIE CITY PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Erie 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	3	On-Going	New	N/A	Program maintenance included in existing budgets	Erie City Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Erie 2	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	Erie City Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Erie 3	2.1	Continue to enforce stormwater management ordinance	5	On-Going	New	N/A	Program maintenance included in existing budgets	Erie City Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Erie 4	1.1	Continue to enforce bluff recession and setback regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Erie City Council	Erie County Department of Planning PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning, along with the Pennsylvania Department of Environmental Protection (PADEP), coordinate several planning areas for the nine municipalities with bluff recession areas. The county added this project to the plan to demonstrate the dual purpose of those efforts: coastal management and mitigation.</p>							



Erie 5	1.2	Identify critical infrastructure that could be impacted by high lake levels	1	5 years	New	N/A	Could be included in program maintenance regarding bluff recession and setback areas	Erie City Council	Erie County Department of Planning  PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> There is historical precedent regarding potential impacts to infrastructure along the lake (see Section 4.3.15). This strategy can integrate with other efforts, such as infrastructure upgrades, designed to protect critical infrastructure and key resources in Erie County.</p>							



Table 6.4.M: FAIRVIEW TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Fair-view 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	3	On-Going	New	N/A	Program maintenance included in existing budgets	Fairview Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Fair-view 2	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	Fairview Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Fair-view 3	2.1	Continue to enforce stormwater management ordinance	5	On-Going	New	N/A	Program maintenance included in existing budgets	Fairview Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Fair-view 4	2.2	Consider streambank stabilization on Walnut Creek	8	5 years	New	Up to \$1M	HMGP, PDM, CDBG, Local Funding	Fairview Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Fair-view 5	1.2	Improve drainage in downtown Fairview along US 20 through streetscape elements	6	5 years	New	Up to \$1M	CDBG, PENNVEST, State Funding	Fairview Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie MPO adopted the <i>Erie County 2042 Long Range Transportation Plan</i> in 2017. The plan included beautification projects that also helped in mitigating certain hazards. By integrating plans the coordinating agencies are made aware of ways projects may increase vulnerability to hazards and how to mitigate the hazard.</p>							



Fair-view 6	2.2	Construct a five-foot berm for multimodal accessibility at Walnut Creek	6	5 years	New	Up to \$500K	CDBG, PENNVEST, Local Funding	Fairview Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Fair-view 7	4.1	Remove debris on Trout Run	1	On-Going	On-Going	N/A	Local Funding	Fairview Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 16). The project was not completed because the township focused on planning updates since the 2012 HMP.</p> <p><b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Fair-view 8	1.1	Continue to enforce bluff recession and setback regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Fairview Township Supervisors	Erie County Department of Planning PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning, along with the Pennsylvania Department of Environmental Protection (PADEP), coordinate several planning areas for the nine municipalities with bluff recession areas. The county added this project to the plan to demonstrate the dual purpose of those efforts: coastal management and mitigation.</p>							



Table 6.4.N: FRANKLIN TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Franklin 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	2	On-Going	New	N/A	Program maintenance included in existing budgets	Franklin Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Franklin 2	4.1	Continue to enforce current floodplain regulations	3	On-Going	New	N/A	Program maintenance included in existing budgets	Franklin Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Franklin 3	2.1	Continue to enforce stormwater management ordinance	4	On-Going	New	N/A	Program maintenance included in existing budgets	Franklin Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Franklin 4	2.2	Consider installing box culverts in areas with inadequate hydraulic capacity.	4	5 years	New	Up to \$1M	CDBG, PENNVEST, Local Funding	Franklin Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> Township officials have identified culverts and channels that overtop and flood. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Franklin 5	2.1	Increase capacity of cross pipes at nine previously identified vulnerable locations.	4	5 years	On-Going	Up to \$500K	PENNVEST, Local Funding	Franklin Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 18). Township officials have identified areas vulnerable to flooding but did not have the funding available to complete the project.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Franklin 6	1.2	Repair or purchase tornado warning sirens with radio receivers	1	5 years	On-Going	Up to \$50K	HSGP, Local Funding	Franklin Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 30). The project was not completed because of funding unavailability.  <b>Opportunities for Plan Integration:</b> This project supports emergency response planning.</p>							
Franklin 7	5.3	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	7	On-Going	New	N/A	Local Funding	Franklin Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							





Table 6.4.O: GIRARD BOROUGH PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Girard Boro 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Girard Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Boro 2	4.1	Continue to enforce current floodplain regulations	6	On-Going	New	N/A	Program maintenance included in existing budgets	Girard Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Girard Boro 3	2.1	Continue to enforce stormwater management ordinance	8	On-Going	New	N/A	Program maintenance included in existing budgets	Girard Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Girard Boro 4	2.2	Improve maintenance of Sunset Drive North channel leading to Lake Erie.	6	5 years	New	Up to \$100K	PENNVEST, Local Funding, State Funding	Girard Borough Council	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Girard Boro 5	2.2	Consider repairing / replacing Sunset Drive North culvert to allow sufficient hydraulic capacity.	3	5 years	New	Up to \$1M	CDBG, PENNVEST, Local Funding	Girard Borough Council	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> Borough officials have identified culverts and channels that overtop and flood. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Girard Boro 6	1.2	Replace hazard siren.	3	5 years	On-Going	Up to \$50K	HSGP, Local Funding	Girard Borough Council	Erie County Department of Public Safety
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 19). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> This project can support local level emergency operations plans, particularly in sections discussing public notification and warning.</p>							
Girard Boro 7	1.2	Obtain and install backup generator for municipal power.	3	5 years	On-Going	Up to \$50K	HSGP, HMGP, Local Funding	Girard Borough Council	Erie County Department of Public Safety
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 20). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Boro 8	1.2	Construct retention tank for the waste water treatment plant.	9	5 years	On-Going	Up to \$1M	PENNVEST, Local Funding	Girard Borough Council	N/A
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 40). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Boro 9	5.3	Develop and maintain a database to track community vulnerability	4	On-Going	New	N/A	Local Funding	Girard Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Boro 10	5.1	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	9	On-Going	New	N/A	Local Funding	Girard Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Boro 11	5.2	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	2	On-Going	New	N/A	Local Funding	Girard Borough Council	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							



Table 6.4.P: GIRARD TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Girard Twp 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	5	On-Going	New	N/A	Program maintenance included in existing budgets	Girard Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Twp 2	4.1	Continue to enforce current floodplain regulations	9	On-Going	New	N/A	Program maintenance included in existing budgets	Girard Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Girard Twp 3	2.2	Repair and improve maintenance practices on bridges to allow for proper stormwater flow.	9	5 years	New	N/A	Program maintenance included in existing budgets	Girard Township Supervisors	Erie Metropolitan Planning Organization PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Girard Twp 4	2.1	Continue to enforce stormwater management ordinance	11	On-Going	New	N/A	Program maintenance included in existing budgets	Girard Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Girard Twp 5	3.3	Study to develop an access management plan for US 20 from School Street to Imperial Parkway.	2	5 years	New	Up to \$50K	STBG, State Funding	Erie Metropolitan Planning Organization	Girard Township Supervisors PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							
Girard Twp 6	3.3	Reduce crest of vertical curve on Fairplain Road to improve sight distance and update railroad crossing to enhance freight access, particularly for the Gravel Pit on the east and other industry as water and sewer expand.	2	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Girard Township Supervisors PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements and capacity increases for water and sewer systems.</p>							
Girard Twp 7	1.2	Purchase hand held radios for EOC and shelter.	7	5 years	On-Going	Up to \$10K	HSGP, Local Funding	WECEMA	Girard Township Supervisors
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 8). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Twp 8	2.2	Tube replacement at four previously identified vulnerable locations.	11	5 years	On-Going	Up to \$1M	PENNVEST, State Funding, Local Funding	Girard Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 21). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Girard Twp 9	2.2	Stabilize and build up bank at two previously identified vulnerable locations to prevent road from washing out during flooding event.	4	5 years	On-Going	Up to \$1M	PENNVEST, Local Funding	Girard Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 22). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Girard Twp 10	5.1	Obtain necessary equipment for pre-wetting of salt and anti-skid materials (Storage tank and 5 hopper tanks).	4	5 years	On-Going	Up to \$100K	Local Funding	Girard Township Supervisors	Erie County Department of Public Safety
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 23). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Twp 11	1.2	Repair or purchase tornado warning sirens with radio receivers.	1	5 years	On-Going	Up to \$50K	HSGP, Local Funding	WECEMA	Girard Township Supervisors
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 31). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> This project supports local-level emergency operations planning, particularly sections dealing with public notification and warning.</p>							
Girard Twp 12	1.2	Continue to enforce bluff recession and setback regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Girard Township Supervisors	Erie County Department of Planning PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning, along with the Pennsylvania Department of Environmental Protection (PADEP), coordinate several planning areas for the nine municipalities with bluff recession areas. The county added this project to the plan to demonstrate the dual purpose of those efforts: coastal management and mitigation.</p>							
Girard Twp 13	5.3	Develop and maintain a database to track community vulnerability	7	On-Going	New	N/A	Local Funding	Girard Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Twp 14	5.1	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	13	On-Going	New	N/A	Local Funding	Girard Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Girard Twp 15	5.2	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	6	On-Going	New	N/A	Local Funding	Girard Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							



Table 6.4.Q: GREENE TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Greene 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Greene Township Supervisors	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							
Greene 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Greene Township Supervisors	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.							
Greene 3	2.1	Continue to enforce stormwater management ordinance	3	On-Going	New	N/A	Program maintenance included in existing budgets	Greene Township Supervisors	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.							
Greene 4	2.2	Eliminate cross pipes at previously identified vulnerable locations.	3	5 years	On-Going	Unknown	PENNVEST, Local Funding	Greene Township Supervisors	N/A
		<b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 24). The project was not completed due to funding unavailability. <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.							



Table 6.4.R: GREENFIELD TOWNSHIP PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Greenfield Twp 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	2	On-Going	New	N/A	Program maintenance included in existing budgets	Greenfield Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Greenfield Twp 2	4.1	Continue to enforce current floodplain regulations	3	On-Going	New	N/A	Program maintenance included in existing budgets	Greenfield Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Greenfield Twp 3	2.1	Continue to enforce stormwater management ordinance	4	Ongoing	New	N/A	Program maintenance included in existing budgets	Greenfield Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Greenfield Twp 4	2.2	Continue to monitor culverts and remove beaver dams to allow for sufficient hydraulic capacity.	1	New	New	N/A	Program maintenance included in existing budgets	Greenfield Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Table 6.4.S: HARBORCREEK TOWNSHIP PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Harbor-creek 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	2	On-Going	New	N/A	Program maintenance included in existing budgets	Harborcreek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Harbor-creek 2	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	Harborcreek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Harbor-creek 3	2.1	Continue to enforce stormwater management ordinance	6	On-Going	New	N/A	Program maintenance included in existing budgets	Harborcreek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Harbor-creek 4	2.2	Consider installing box culverts in Brookside area to lessen effects of flooding.	6	5 years	New	Up to \$1M	CDBG, PENNVEST, Local Funding	Harborcreek Township Supervisors	Erie Metropolitan Planning Organization PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							





Harbor-creek 5	2.2	Consider repairing/replacing culverts on Backus Road to lessen effects of flooding	6	5 years	New	Up to \$1M	CDBG, PENNVEST, HMGP, PDM, Local Funding	Harborcreek Township Supervisors	Erie Metropolitan Planning Organization  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Harbor-creek 6	3.3	Implement the Depot Road study recommended improvements, including flattening the horizontal curve radius, adjusting vertical grades, adding turning lanes, shoulder widening, driveway tie-ins, installing snow fence, and intersection realignment.	5	5 years	New	Up to \$1M	HSIP, MLFF, HSF, State Funding	PennDOT	Harborcreek Township Supervisors
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements and capacity increases for water and sewer systems.</p>							
Harbor-creek 7	3.3	Study of traffic circulation, signal warrants, left turn lane and phase warrants at approximately 12 signals in Harborcreek and Wesleyville; study should include recommendations on equipment upgrades, traffic signal coordination, potential signals for removal, intersection improvements, and signal timing plans.	2	5 years	New	\$50K	HSIP, MLFF, HSF, State Funding	Harborcreek Township Supervisors	Erie Metropolitan Planning Organization
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							



Harbor-creek 8	1.2	Continue to enforce bluff recession and setback regulations	1	On-Going	New	N/A	Program maintenance included in existing budgets	Harborcreek Township Supervisors	Erie County Department of Planning  PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning, along with the Pennsylvania Department of Environmental Protection (PADEP), coordinate several planning areas for the nine municipalities with bluff recession areas. The county added this project to the plan to demonstrate the dual purpose of those efforts: coastal management and mitigation.</p>							



Table 6.4.T: LAKE CITY BOROUGH PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Lake City 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	3	On-Going	New	N/A	Program maintenance included in existing budgets	Lake City Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Lake City 2	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	Lake City Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Lake City 3	2.1	Continue to enforce stormwater management ordinance	5	On-Going	New	N/A	Program maintenance included in existing budgets	Lake City Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Lake City 4	2.2	Consider providing maintenance to Kelly Run channel by removing deteriorating foundation restricting water flow.	1	5 years	New	N/A	Program maintenance included in existing budgets	Lake City Borough Council	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Lake City 5	2.2	Repair and increase capacity of stormwater system.	6	5 years	On-Going	Up to \$1M	CDBG, State Funding, Local Funding	Lake City Borough Council	N/A
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 25). The project was not completed due to funding unavailability.</p> <p><b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Lake City 6	1.2	Continue to enforce bluff recession and setback regulations	1	On-Going	New	N/A	Program maintenance included in existing budgets	Lake City Borough Council	Erie County Department of Planning PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning, along with the Pennsylvania Department of Environmental Protection (PADEP), coordinate several planning areas for the nine municipalities with bluff recession areas. The county added this project to the plan to demonstrate the dual purpose of those efforts: coastal management and mitigation.</p>							



Table 6.4.U: LAWRENCE PARK TOWNSHIP PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Lawrence Park 1	4.1	Review and adopt floodplain management ordinance.	3	1 year	New	N/A	Administrative actions should require little to no additional funding	Lawrence Park Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update. Lawrence Park Township was suspended from participation in the National Flood Insurance Program on June 18, 2017, for failure to adopt a floodplain management ordinance.</p> <p><b>Opportunities for Plan Integration:</b> N/A</p>							
Lawrence Park 2	1.2	Consider stream bed restoration	2	5 years	New	Up to \$1M	PENNVEST, Local Funding	Lawrence Park Township Supervisors	N/A
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Lawrence Park 3	2.1	Continue to enforce stormwater management ordinance	3	On-Going	New	N/A	Program maintenance included in existing budgets	Lawrence Park Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Lawrence Park 4	3.3	Construct intersection improvements and signal upgrades.	5	5 years	New	Up to \$100K	STBG, State Funding, Local Funding	Lawrence Park Township Supervisors	Erie Metropolitan Planning Organization PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements and capacity increases for water and sewer systems.</p>							



Law- rence Park 5	1.2	Continue to enforce bluff recession and setback regulations	1	On-Going	New	N/A	Program maintenance included in existing budgets	Lawrence Park Township Supervisors	Erie County Department of Planning  PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning, along with the Pennsylvania Department of Environmental Protection (PADEP), coordinate several planning areas for the nine municipalities with bluff recession areas. The county added this project to the plan to demonstrate the dual purpose of those efforts: coastal management and mitigation.</p>							



Table 6.4.V: LEBOEUF TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
LeBoeuf 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	LeBoeuf Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
LeBoeuf 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	LeBoeuf Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
LeBoeuf 3	2.1	Continue to enforce stormwater management ordinance	3	On-Going	New	N/A	Program maintenance included in existing budgets	LeBoeuf Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



LeBoeuf 4	3.3	Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Corry when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace, remove guardrails and add signage.	4	5 years	New	Up to \$1M	STGB, State Funding	Erie Metropolitan Planning Organization	LeBoeuf Township Supervisors  The PA Route 6 Alliance
<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds the PA Route 6 Alliance, Erie County Department of Planning, Erie County Department of Public Safety as well as LeBoeuf Township.</p>									





Table 6.4.W: MCKEAN BOROUGH PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
McKean Boro 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	McKean Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
McKean Boro 2	4.1	Continue to enforce current floodplain regulations	5	On-Going	New	N/A	Program maintenance included in existing budgets	McKean Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
McKean Boro 3	3.3	Study of potential improvements to Edinboro Road at West Road to address traffic congestion and safety concerns.	1	5 years	New	Up to \$50K	STBG State Funding	McKean Borough Council	Erie Metropolitan Planning Organization PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements and capacity increases for water and sewer systems.</p>							
McKean Boro 4	2.1	Continue to enforce stormwater management ordinance	6	On-Going	New	N/A	Program maintenance included in existing budgets	McKean Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



McKean Boro 5	5.3	Develop and maintain a database to track community vulnerability	4	On-Going	New	N/A	Local Funding	McKean Borough Council	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							
McKean Boro 6	5.1	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	7	On-Going	New	N/A	Local Funding	McKean Borough Council	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							
McKean Boro 7	5.2	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	3	On-Going	New	N/A	Local Funding	McKean Borough Council	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							



Table 6.4.X: MCKEAN TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
McKean Twp 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	McKean Township Supervisors	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							
McKean Twp 2	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	McKean Township Supervisors	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.							
McKean Twp 3	2.2	Stabilization of previously identified vulnerable locations.	5	5 years	On-Going	Up to \$1M	CDBG, PENNVEST, HMGP, PDM, Local Funding	McKean Township Supervisors	Erie County Department of Planning
		<b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 26). The project was not completed due to funding unavailability. <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.							
McKean Twp 4	2.1	Continue to enforce stormwater management ordinance	5	On-Going	New	N/A	Program maintenance included in existing budgets	McKean Township Supervisors	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.							
McKean Twp 5	5.3	Develop and maintain a database to track community vulnerability	3	On-Going	New	N/A	Local Funding	McKean Township Supervisors	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							



McKean Twp 6	5.1	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	7	On-Going	New	N/A	Local Funding	McKean Township Supervisors	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							
McKean Twp 7	5.2	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	2	On-Going	New	N/A	Local Funding	McKean Township Supervisors	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							
McKean Twp 8	1.1	Purchase and install warning sirens with radio receivers.	7	5 years	On-Going	Up to \$50K	HSGP, Local Funding	WECEMA	McKean Township Supervisors  Erie County Department of Public Safety
		<b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 31). The project was not completed due to funding unavailability. <b>Opportunities for Plan Integration:</b> This project can assist local emergency operations planning efforts, particularly sections outlining public notification and warning.							



Table 6.4.Y: MILL VILLAGE BOROUGH PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Mill Village 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Mill Village Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Mill Village 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Mill Village Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Mill Village 3	2.1	Continue to enforce stormwater management ordinance	3	On-Going	New	N/A	Program maintenance included in existing budgets	Mill Village Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Mill Village 4	2.2	Re-install bridge and road and to dig creek bed down to a much lower level throughout the town.	5	5 years	On-Going	Up to \$1M	HSIP, CDBG, State Funding	Mill Village Borough Council	Erie Metropolitan Planning Organization  PennDOT
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 39). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Mill Village 5	3.3	Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Corry when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace, remove guardrails and add signage.	4	5 years	New	Up to \$1M	STGB, State Funding	Erie Metropolitan Planning Organization	Mill Village Borough Council  PennDOT  The PA Route 6 Alliance
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The alliance updated the plan in April 2016 and included additional Route 6 development. This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds the PA Route 6 Alliance, Erie County Department of Planning, Erie County Department of Public Safety as well as Mill Village Borough.</p>							



Table 6.4.Z: MILLCREEK TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Mill-creek 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	3	On-Going	New	N/A	Program maintenance included in existing budgets	Millcreek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Mill-creek 2	4.1	Continue to enforce current floodplain regulations	7	On-Going	New	N/A	Program maintenance included in existing budgets	Millcreek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Mill-creek 3	2.1	Continue to enforce stormwater management ordinance	8	On-Going	New	Unknown N/A	Program maintenance included in existing budgets	Millcreek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Mill-creek 4	3.3	Traffic and safety study in the area around Old French Road due to many roadways intersecting at odd angles creating traffic circulation and safety concerns; study should recommend projects for implementation to address issues.	3	5 years	New	Up to \$50K	State Funding, Local Funding	Millcreek Township Supervisors	Erie Metropolitan Planning Organization  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							



Mill-creek 5	3.3	Study of traffic circulation and ramp configuration around interchange of I-90 at Route 8, to be pursued as development pressure occurs.	3	5 years	New	Up to \$50K	STBG, State Funding, Local Funding	PennDOT	Millcreek Township Supervisors
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							
Mill-creek 6	3.5	Complete stormwater conveyance and detention planning and construction.	10	5 years	On-Going	Up to \$500K	CDBG, PENNVEST, Local Funding	Millcreek Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 28). The project was not completed due to funding unavailability.</p> <p><b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Mill-creek 7	3.3	Construct turn lanes and protected/permitted left-turn phasing for the northbound and southbound approaches at Zuck Road and W 23rd Street.	9	5 years	New	Up to \$50K	State Funding, Local Funding	Millcreek Township Supervisors	Erie Metropolitan Planning Organization
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							
Mill-creek 8	3.3	Safety and traffic study of interchange ramp configuration and access management at the interchange of I-79 and US 20 / W 26th Street.	3	5 years	New	Up to \$50K	STBG, State Funding, Local Funding	Millcreek Township Supervisors	Erie Metropolitan Planning Organization
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							





Mill-creek 9	1.2	Continue to enforce bluff recession and setback regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Millcreek Township Supervisors	Erie County Department of Planning  PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning, along with the Pennsylvania Department of Environmental Protection (PADEP), coordinate several planning areas for the nine municipalities with bluff recession areas. The county added this project to the plan to demonstrate the dual purpose of those efforts: coastal management and mitigation.</p>							
Mill-creek 10	3.1 3.2 3.3 3.4	Identify critical infrastructure that could be impacted by high lake levels	1	5 years	New	N/A	Could be included in program maintenance regarding bluff recession and setback areas	Millcreek Township Supervisors	Erie County Department of Planning  PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> There is historical precedent regarding potential impacts to infrastructure along the lake (see Section 4.3.15). This strategy can integrate with other efforts, such as infrastructure upgrades, designed to protect critical infrastructure and key resources in Erie County.</p>							



Table 6.4.AA: NORTH EAST BOROUGH PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
North East Boro 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	North East Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
North East Boro 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	North East Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
North East Boro 3	5.2	Develop a public outreach campaign to increase community awareness about local mitigation actions	5	5 years	On-Going	\$5K	Local Funding	North East Area EMA	North East Borough Council
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 29). The borough listed the project as on-going so as to maintain public engagement.  <b>Opportunities for Plan Integration:</b> N/A</p>							
North East Boro 4	2.2	The building of infiltration galleys, porous pavement, directed downspout drainage, and landscaping to control stormwater runoff in municipal parking lots	2	5 years	New	\$100K	PENNVEST, Local Funding	North East Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



North East Boro 5	2.1	Continue to enforce stormwater management ordinance	4	On-Going	New	N/A	Program maintenance included in existing budgets	North East Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Table 6.4.AB: NORTH EAST TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
North East Twp 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	2	On-Going	New	N/A	Program maintenance included in existing budgets	North East Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
North East Twp 2	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	North East Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
North East Twp 3	2.1	Continue to enforce stormwater management ordinance	6	On-Going	New	N/A	Program maintenance included in existing budgets	North East Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
North East Twp 4	3.3	Repair and improve maintenance practices on bridges to allow for proper stormwater flow.	4	5 years	New	Up to \$500K	PENNVEST, State Funding, Local Funding	North East Township Supervisors	Erie Metropolitan Planning Organization  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



North East Twp 5	2.2	Full reconstruction and stormwater upgrades along Sidehill Road (SR 1008) to correct slope and embankment failure and remove the roadway weight restriction.	6	5 years	New	Up to \$500K	STBG, State Funding	Erie Metropolitan Planning Organization	North East Township Supervisors  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve. This project also supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds PennDOT, Erie County Department of Planning, Erie County Department of Public Safety as well as the North East EMA into the overall process.</p>							
North East Twp 6	3.3	Construct road diet along the US 5 corridor near its intersection with SR 89 to reduce travel speeds through corridor, improve traffic and multimodal connectivity between downtown North East and Freeport Beach, when state route is due for betterment	8	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	North East Township Supervisors  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							
North East Twp 7	1.2	Continue to enforce bluff recession and setback regulations	1	On-Going	New	N/A	Program maintenance included in existing budgets	North East Township Supervisors	Erie County Department of Planning  PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning, along with the Pennsylvania Department of Environmental Protection (PADEP), coordinate several planning areas for the nine municipalities with bluff recession areas. The county added this project to the plan to demonstrate the dual purpose of those efforts: coastal management and mitigation.</p>							
North East Twp 8	5.2	Develop a public outreach campaign to increase community awareness about local mitigation actions	3	5 years	On-Going	Up to \$5K	Local Funding	North East EMA	North East Township Supervisors
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 29). The township elected to keep this project to maintain engagement with residents.  <b>Opportunities for Plan Integration:</b> N/A</p>							



Table 6.4.AC: PLATEA BOROUGH PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Platea 1	4.1	Research and complete requirements to become an NFIP participating community.	2	1 year	New	N/A	Administrative actions should require little to no additional funding.	Platea Borough Council	Erie County Department of Planning
		<b>Status Narrative:</b> This project was added as part of the 2017 update. Platea Borough has not been a participating community since 2/19/2015. <b>Opportunities for Plan Integration:</b> N/A							
Platea 2	3.3	Improve maintenance practices to alleviate flooding from runoff to lower railroad bed at Rt. 18 and W Peach Street	3	5 years	New	Up to \$50K	Program maintenance included in existing budgets	Platea Borough Council	Erie Metropolitan Planning Organization PennDOT
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.							
Platea 3	1.2	Repair or purchase tornado warning sirens with radio receivers.	1	5 years	On-Going	Up to \$50K	HSGP, Local Funding	WECEMA	Platea Borough Council Erie County Department of Public Safety
		<b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 31). The project was not completed due to funding unavailability. <b>Opportunities for Plan Integration:</b> This project can assist local emergency operations planning efforts, particularly sections outlining public notification and warning.							
Platea 4	1.2	Purchase hand held radios for EOC and shelters	5	5 years	On-Going	Up to \$10K	HSGP, Local Funding	WECEMA	Platea Borough Council Erie County Department of Public Safety
		<b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 8). The project was not completed due to funding unavailability. <b>Opportunities for Plan Integration:</b> This project supports local emergency operations planning efforts, particularly sections detailing communications and mass care operations.							
Platea 5	5.3	Develop and maintain a database to track community vulnerability	5	On-Going	New	N/A	Local Funding	Platea Borough Council	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							



Platea 6	5.1	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	7	On-Going	New	N/A	Local Funding	Platea Borough Council	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							
Platea 7	5.2	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	4	On-Going	New	N/A	Local Funding	Platea Borough Council	WECEMA
		<b>Status Narrative:</b> This project was added as part of the 2017 update. <b>Opportunities for Plan Integration:</b> N/A							



Table 6.4.AD: SPRINGFIELD TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Springfield 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	2	On-Going	New	N/A	Program maintenance included in existing budgets	Springfield Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Springfield 2	4.1	Continue to enforce current floodplain regulations	6	On-Going	New	N/A	Program maintenance included in existing budgets	Springfield Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth it also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Springfield 3	3.3	Pursue roadway widening along US 6N according to the Moving Forward Along Route 6 Plan through Edinboro, Union City, and Corry when the state route is due for betterment.	9	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Springfield Township Supervisors The PA Route 6 Alliance
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update. The alliance updated the plan in April 2016 and included additional Route 6 development. Though the majority of the Erie County work in the plan is in Edinboro, Union City, and Corry, US 6 does pass through Springfield and supporting its development and upgrade benefits the township.  <b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. Several communities participating in the plan have noted success in revitalization and beautification projects. The project also supports borough-wide and countywide emergency operations planning and thus folds the PA Route 6 Alliance, Erie County Department of Planning, Erie County Department of Public Safety as well as the West County Emergency Management Agency into the overall process.</p>							
Springfield 4	2.2	Consider improving Tubbs Road culvert discharge.	2	5 years	New	Up to \$500K	CDBG, PENNVEST, Local Funding	Springfield Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> Township officials have identified culverts and channels that overtop and flood. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							





Springfield 5	2.1	Continue to enforce stormwater management ordinance	7	On-Going	New	N/A	Program maintenance included in existing budgets	Springfield Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Springfield 6	1.2	Continue to enforce bluff recession and setback regulations	1	On-Going	New	N/A	Program maintenance included in existing budgets	Springfield Township Supervisors	Erie County Department of Planning PADEP
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning, along with the Pennsylvania Department of Environmental Protection (PADEP), coordinate several planning areas for the nine municipalities with bluff recession areas. The county added this project to the plan to demonstrate the dual purpose of those efforts: coastal management and mitigation.</p>							
Springfield 7	5.3	Develop and maintain a database to track community vulnerability	5	On-Going	New	N/A	Local Funding	Springfield Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Springfield 8	5.1	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	8	On-Going	New	N/A	Local Funding	Springfield Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Springfield 9	5.2	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	4	On-Going	New	N/A	Local Funding	Springfield Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							



Table 6.4.AE: SUMMIT TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Summit 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Summit Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Summit 2	4.1	Continue to enforce current floodplain regulations	3	On-Going	New	N/A	Program maintenance included in existing budgets	Summit Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Summit 3	3.3	Conduct traffic analysis and design coordinated traffic signal system using adaptive signal control to account for changing traffic patterns such as holiday shopping season, emergency detour route diversion from I-90, and general weekday peak hour traffic. Analysis and recommendations should take into account operations of personal motor vehicles along with transit, commercial vehicles, pedestrians and bicycles.	1	5 years	New	Up to \$100K	STBG, State Funding	Erie Metropolitan Planning Organization	Summit Township Supervisors PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							



Summit 4	3.3	Construct capacity enhancements such as widening on Oliver Road, additional turn lanes, traffic signal phasing changes, and accommodations for pedestrians to safely cross US 19 or Oliver Road	5	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Summit Township Supervisors  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							
Summit 5	2.1	Continue to enforce stormwater management ordinance	4	On-Going	New	N/A	Program maintenance included in existing budgets	Summit Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Table 6.4.AF: UNION TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Union Twp 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Union Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Union Twp 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Union Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Union Twp 3	3.3	Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Corry when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace/remove guardrails, and add signage.	3	5 years	New	Up to \$1M	STGB, State Funding	Erie Metropolitan Planning Organization	Union Township Supervisors PennDOT The PA Route 6 Alliance
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The alliance updated their plan in April 2016 and included additional Route 6 development. This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds Erie County Department of Planning, Erie County Department of Public Safety as well as the Conelway Regional Emergency Management Agency into the overall process.</p>							



Union Twp 4	2.1	Continue to enforce stormwater management ordinance	3	On-Going	New	N/A	Program maintenance included in existing budgets	Union Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Table 6.4.AG: UNION CITY BOROUGH PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Union City 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Union City Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Union City 2	4.1	Continue to enforce current floodplain regulations	3	On-Going	New	N/A	Program maintenance included in existing budgets	Union City Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Union City 3	3.3	Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Corry when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace/remove guardrails, and add signage.	4	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Union City Council PennDOT The PA Route 6 Alliance
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds Erie County Department of Planning, Erie County Department of Public Safety as well as the Conelway Regional Emergency Management Agency into the overall process.</p>							



Union City 4	3.3	Perform traffic analysis, upgrade equipment, and prepare signal timings at three traffic signals in Union City to improve operations and safety by reducing congestion.	1	5 years	New	Up to \$500K	STBG, State Funding	Union City Borough Council	Erie Metropolitan Planning Organization PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							
Union City 5	2.1	Continue to enforce stormwater management ordinance	4	On-Going	New	N/A	Program maintenance included in existing budgets	Union City Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Table 6.4.AH: VENANGO TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Venango 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Venango Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Venango 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Venango Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Venango 3	2.2	Add sluice pipes and elevate Knoyle Road	2	5 years	On-Going	Up to \$100K	HMGP, PDM, Local Funding	Venango Township Supervisors	Erie Metropolitan Planning Organization PennDOT
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 33). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Venango 4	2.1	Continue to enforce stormwater management ordinance	4	On-Going	On-Going	N/A	Program maintenance included in existing budgets	Venango Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							





Table 6.4.AI: WASHINGTON TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Wash 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	2	On-Going	New	N/A	Program maintenance included in existing budgets	Washington Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Wash 2	4.1	Continue to enforce current floodplain regulations	5	On-Going	New	N/A	Program maintenance included in existing budgets	Washington Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Wash 3	1.2	Repair or purchase tornado warning sirens with radio receivers	1	5 year	On-Going	Up to \$50K	HSGP, Local Funding	Washington Township Supervisors	Erie County Department of Public Safety
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 30). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Wash 4	3.3	Pursue roadway widening along US 6N according to the Moving Forward Along Route 6 Plan through Edinboro, Union City, and Corry when the state route is due for betterment.	8	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Washington Township Supervisors  PennDOT  The PA Route 6 Alliance
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update. The alliance updated the plan in April 2016 and included additional Route 6 development. Though the majority of the Erie County work in the plan is in Edinboro, Union City, and Corry, US 6 does pass through Washington Township and supporting its development and upgrade benefits the township.  <b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. Several communities participating in the plan have noted success in revitalization and beautification projects (including nearby Union City). The project also supports borough-wide and countywide emergency operations planning and thus folds the PA Route 6 Alliance, Erie County Department of Planning, Erie County Department of Public Safety as well as the West County Emergency Management Agency into the overall process.</p>							



Wash 5	2.1	Continue to enforce stormwater management ordinance	6	On-Going	New	N/A	Program maintenance included in existing budgets	Washington Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Wash 6	5.3	Develop and maintain a database to track community vulnerability	4	On-Going	New	N/A	Local Funding	Washington Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Wash 7	5.1	Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	7	On-Going	New	N/A	Local Funding	Washington Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Wash 8	5.2	Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	2	On-Going	New	N/A	Local Funding	Washington Township Supervisors	WECEMA
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							



Table 6.4.AJ: WATERFORD BOROUGH PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Waterford Boro 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Waterford Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Waterford Boro 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Waterford Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Waterford Boro 3	3.3	Restoration of US 19 (Waterford Pike) from the southern intersection with SR 97 to the northern intersection with SR 97	4	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Waterford Borough Council PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							
Waterford Boro 4	2.1	Continue to enforce stormwater management ordinance	3	On-Going	New	N/A	Program maintenance included in existing budgets	Waterford Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Table 6.4.AK: WATERFORD TOWNSHIP PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Waterford Twp 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	1	On-Going	New	N/A	Program maintenance included in existing budgets	Waterford Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Waterford Twp 2	4.1	Continue to enforce current floodplain regulations	2	On-Going	New	N/A	Program maintenance included in existing budgets	Waterford Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Waterford Twp 3	2.1	Continue to enforce stormwater management ordinance	4	On-Going	New	N/A	Program maintenance included in existing budgets	Waterford Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Waterford Twp 4	2.2	Replace cross pipe at Baghdad Road	2	5 years	On-Going	Up to \$500K	CDBG, PENNVEST, Local Funding	Waterford Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 35). The project was not completed due to funding unavailability.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Table 6.4.AL: WATTSBURG BOROUGH PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Wattsburg 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	3	On-Going	New	N/A	Program maintenance included in existing budgets	Wattsburg Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Wattsburg 2	4.1	Continue to enforce current floodplain regulations	4	On-Going	New	N/A	Program maintenance included in existing budgets	Wattsburg Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Wattsburg 3	2.2	Consider repairing/replacing storm drains under Main Street	4	5 years	New	Up to \$500K	CDBG, HMGP, PDM, PENNVEST, State Funding	Wattsburg Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Wattsburg 4	2.2	Improve storm sewer maintenance practices	1	5 years	New	N/A	Program maintenance included in existing budgets	Wattsburg Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Wattsburg 5	2.1	Continue to enforce stormwater management ordinance	6	On-Going	New	N/A	Program maintenance included in existing budgets	Wattsburg Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Watts- burg 6	3.3	Obtain signage for re-routing traffic during high water events.	2	5 years	On-Going	Up to \$10K	State Funding, Local Funding	Wattsburg Borough Council	Erie Metropolitan Planning Organization  PennDOT
<p><b>Status Narrative:</b> This project is continued from the 2012 HMP (Table 6.4.1, Action 36). The project was not completed due to funding unavailability.</p> <p><b>Opportunities for Plan Integration:</b> This project supports hazard mitigation by facilitating evacuation operations. The project also supports borough-wide and countywide emergency operations planning and thus folds Erie County Department of Planning, Erie County Department of Public Safety as well as the Borough of Wattsburg.</p>									



Table 6.4.AM: WAYNE TOWNSHIP PROJECTS									
Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Wayne 1	4.1	Continue to participate in the National Flood Insurance Program (NFIP)	2	On-Going	New	N/A	Program maintenance included in existing budgets	Wayne Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> N/A</p>							
Wayne 2	4.1	Continue to enforce current floodplain regulations	3	On-Going	New	N/A	Program maintenance included in existing budgets	Wayne Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> As part of the county's comprehensive plan, a land use plan was developed. Although the land use plan identifies areas for residential and commercial growth is also highlights area that would be unwise to develop such as floodplains. This project ensures that jurisdictions do not develop SFHAs or other areas of special hazard.</p>							
Wayne 3	2.1	Continue to enforce stormwater management ordinance	4	On-Going	New	N/A	Program maintenance included in existing budgets	Wayne Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Wayne 4	2.2	Use of improved design practices to prevent stormwater collection	1	On-Going	New	N/A	Administrative actions should require little to no additional funding	Wayne Township Supervisors	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.  <b>Opportunities for Plan Integration:</b> The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							



Wayne 5	3.3	Construct improvements to remove obstructions to sight distance and improve intersection safety at the intersection of US 6 and Beaver Dam Road.	4	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Wayne Township Supervisors  PennDOT
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							
Wayne 6	3.3	Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Corry when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace/remove guardrails, and add signage.	4	5 years	New	Up to \$1M	STBG, State Funding	Erie Metropolitan Planning Organization	Wayne Township Supervisors  PennDOT  The PA Route 6 Alliance
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The alliance updated their plan in April 2016 and included additional Route 6 development. This project supports hazard mitigation by decreasing potential response times and facilitating such emergency operations as evacuation. The project also supports borough-wide and countywide emergency operations planning and thus folds Erie County Department of Planning, Erie County Department of Public Safety as well as Wayne Township into the overall process.</p>							





Table 6.4.AN: WESLEYVILLE BOROUGH PROJECTS

Project #	Goal / Objective	Projects	Priority	Timeframe	Status	Cost Estimate	Funding Source	Coordinating Agency	Support Agencies
Wesleyville 1	4.1	Research and complete requirements to become an NFIP participating community.	1	1 years	New	N/A	Administrative actions should require little to no additional funding	Wesleyville Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update. Wesleyville Borough has been suspended from the NFIP since 2/20/2014</p> <p><b>Opportunities for Plan Integration:</b> N/A</p>							
Wesleyville 2	2.1	Continue to enforce stormwater management ordinance	2	On-Going	New	N/A	Program maintenance included in existing budgets	Wesleyville Borough Council	Erie County Department of Planning
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The department of planning along with 38 municipalities completed a two phase, multi-year Act 167 stormwater management plan in 2010. At the completion of the plan, all 38 municipalities adopted stormwater management ordinances. The <i>Erie County Act 167 Stormwater Management Plan</i> identified problem areas and offered recommendations for zoning, river corridor protection and low-impact development. The plan recognizes it is step to manage and protect water resources but there is opportunity to improve.</p>							
Wesleyville 3	3.3	Study of traffic circulation, signal warrants, left turn lane and phase warrants at approximately 12 signals in Harborcreek and Wesleyville; study should include recommendations on equipment upgrades, traffic signal coordination, potential signals for removal, intersection improvements, and signal timing plans.	2	5 years	New	Up to \$50K	STBG, State Funding	Wesleyville Borough Council	Erie Metropolitan Planning Organization
		<p><b>Status Narrative:</b> This project was added as part of the 2017 update.</p> <p><b>Opportunities for Plan Integration:</b> The Erie Metropolitan Planning Organization and county municipalities completed the Erie County 2042 Long Range <i>Transportation Plan</i> (LRTP) in 2017. The plan included multiple improvement and highway study projects. Integration with the LRTP would include the coordinating and support agencies considering improvements to decrease potential response times and facilitating such emergency operations as evacuation.</p>							



## 7.0 PLAN MAINTENANCE PROCESS

§201.6(c)(4)(i)	[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
§201.6(c)(4)(iii)	[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

### 7.1 UPDATE PROCESS SUMMARY

Changes for 2017 in this section include updating the annual review process to align with recurring quarterly emergency management meetings and adding the use of a survey to engage public officials. The plan integration discussion has been removed from this section as integration is noted in other applicable sections. Finally, continued public involvement will be facilitated through social media, municipal and county websites, and online surveys.

### 7.2 MONITORING, EVALUATING, AND UPDATING THE PLAN

Erie County Department of Public Safety and the Erie County Department of Planning established a method for a periodic review of this document. As the custodial agencies, the department of public safety assumes responsibility for scheduling reviews and serves as the point of contact with PEMA during the five year period. Public safety also maintains the master copy of the plan, which is where all additions, corrections, and changes will be made. Upon any review, the master copy will be brought up to date to reflect the most current information on the committee, planning process, hazard data, vulnerability analysis, mitigation strategy and plan maintenance process. The department of planning serves as the primary point of contact for municipal elected officials and ensures the availability of the plan is publicized to them annually.



The formal updating process will consist of a series of meetings and surveys to review mitigation projects, the hazard list, and the asset inventory. Each municipality will be given three opportunities to participate in the plan maintenance process annually. The Erie County Department of Public Safety (DPS) feels it is beneficial to coordinate the mitigation review meetings with other planning efforts. The department of public safety offers quarterly training for municipal emergency managers, who are required to attend at least three training sessions annually. As such, the department of public safety will coordinate mitigation review during the first and third training sessions each year and discuss hazards/assets at one and projects at the other. As the third opportunity, the department of public safety or department of planning will distribute an annual survey to municipal elected officials to keep them engaged in the process. Erie County DPS will compile an annual summary of these meetings for submission to PEMA and FEMA Region III.

Additionally, municipal emergency managers update one another on completed or underway mitigation projects. Each project listed in this plan includes resources that aid in implementation; such resources may include potential funding sources. Many of these funding sources require stringent project administration tasks (including performance measures and close-out procedures), all of which would be followed by the jurisdiction implementing a project. Adherence to these requirements will ensure the successful implementation of projects funded by such programs. For projects funded locally, existing purchasing policies are followed, including competitive bidding, maintenance of invoice copies, regular departmental budget reviews, etc. All files associated with purchasing at the local level are maintained.

Public safety will ask municipal emergency management coordinators to evaluate the performance of their projects based on several criteria. For instance, coordinators should consider revising mitigation strategies if it appears strategies are failing according to one of the following measures.

**Cost Effectiveness:** Is sufficient funding available to implement the project at a cost manageable by the local government? If not, is funding available? Will the costs of implementing the project be significantly less than the cumulative future costs potentially incurred by an un-corrected situation?

**Property Protection:** How significant will the action be at eliminating or reducing damage to structures and infrastructure?



**Life Safety:** How effectively will the action protect lives and prevent injuries?

**Environmental Impacts:** Will implementing the project adversely affect the environment in any way? Will implementing the project actually benefit the environment?

**Social Impacts:** Will the public perceive the project as positively lessening hazard-related losses? Will implementing the project adversely affect any segment of the population?

**Legal Impacts:** Do your governmental organizations and/or partner agencies have the authority to implement the actions?

**Political Impacts:** Will implementing the project create negative political issues?

**Overall Feasibility:** Do local policies and capabilities currently allow for the implementation of the project? Are programs available to assist in funding the implementation of the project? Do local leaders generally agree that implementing the project will be beneficial to the community?

### 7.3 CONTINUED PUBLIC INVOLVEMENT

Erie County understands that the general public must be involved in the initial planning process as well as the updates to the completed plan. As such, the Erie County Department of Public Safety and the Erie County Department of Planning will invite the public to participate as the plan is updated through a variety of formats including the following.

- Social media posts
- County website
- Municipal websites
- Online surveys

Further, as the plan is adopted, the public will be given the chance to comment on the updated plan prior to its adoption by passage of resolution or ordinance. The department of public safety will maintain a copy of the hazard mitigation plan on the county website and file copies that are available for review and inspection by the public. The department of public safety intends to log all comments received regarding the mitigation plan.



## **APPENDIX 1: MEETING DOCUMENTATION**

This appendix contains evidence of participation and involvement throughout the hazard mitigation plan update. It includes the following materials.

- Meeting Notices
  - Invitations sent to planning committee members
  - Newspaper advertisement for first public meeting
  - Screen shot of website with second public meeting date posted
  - Announcements via social media advertising public meetings
  - Signage denoting public meetings
  
- Evidence of Attendance
  - Sign-in sheets from stakeholder and public meetings
  - Sign-in sheets from resiliency workshop
  - Scans of handwritten activity sheets (from planning committee meetings)
  
- Presentation Materials
  - Slide decks from October and May planning committee meetings
  - Planning committee handouts regarding hazard mitigation overview and potential mitigation strategies
  - Slide deck from public meetings
  - Handouts from public meetings
  - Photos of room set-up for public meetings
  - Resiliency workshop agenda
  - Slide deck from resiliency workshop
  - Resiliency workshop handouts (i.e., hazard overview, top strategies)



Name: ROBERT "DOC" ORR

Agency/Municipality/Other: GIRARD BORO

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic				DROUGHT NUCLEAR INCIDENT TRANSPORTATION ACCIDENT	<del>CATASTROPHIC</del> <del>STORM</del>
Critical				WINDY STORM	URBAN FIRE + EXP
Marginal			UTILITY INTERRUPTION	DROUGHT TORNADO + WIND STORM	EARTHQUAKE FLOODS
Negligible					COASTAL EROSION INVASIVE SPECIES LAND SLIDE DAM FAILURE

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
Remote	Unlikely to occur once in a several year period, but possible.
Improbable	So unlikely it can be assumed occurrence will not occur

### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: CYNTHIA MILLER

Agency/Municipality/Other: AMITY TOWNSHIP

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic		Tornado			
Critical		Winter Storm			
Marginal	Invasive Species	Floods Utility Interruption	Tram Accident	Earthquake Nuclear Incident	
Negligible				Drought	Coastal Erosion Landslide Dam Failure Urban Fire + Explosion



### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
Remote	Unlikely to occur once in a several year period, but possible.
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### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: EARL BROWN

Agency/Municipality/Other: UNION TOWNSHIP

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic	WINTER STORM	TORNADO & WINDSTORM			
Critical		FLOODS, TRANSPORTATION ACCIDENT	UTILITY INTERRUPTION	DEM FAILURE, URBAN FIRE & EXPLOSION	
Marginal			EARTH & LAKE	DROUGHT, INVASIVE SPECIES, NUCLEAR INCIDENT	
Negligible				COASTAL EROSION	LANDSLIDE

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
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### Hazard Severity Classifications

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Catastrophic	Death or major structural loss
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Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: JOHN McBRANON

Agency/Municipality/Other: ERIE COUNTY DEPT OF PLANNING

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic	URBAN FIRE/EXPLOSION			TORNADO	EARTH QUAKE DAM FAILURE NUCLEAR INCIDENT
Critical	<del>FLOODS</del> FLOODS WINTER STORMS				
Marginal	COASTAL EROSION TRANSPORTATION ACCIDENTS				
Negligible	UTILITY INTERRUPTION	DROUGHT LANDSLIDE	INVASIVE SPECIES		

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
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### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: BRIAN MESAROS

Agency/Municipality/Other: ERIE COUNTY

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic	TRANSPORTATION / / / / /	/ / / / /	/ / / / /	/ / / / /	
Critical	TORNADO WIND WINTER STORM URBAN FIRE / / / / /	DAM FAILURE / / / / /	EARTHQUAKE / / / / /	<del>EMASQUAKE</del> NUCLEAR INCIDENT	
Marginal	FLOODS UTILITY FMT. / / / / /	INVASIVE SPECIES / / / / /	DROUGHT	LAND SLIDE	
Negligible	COASTAL EROSION				

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
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### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
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Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Will Rogers

Agency/Municipality/Other: North East Borough

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic				Dam failure Trans accident Urban fire + exp.	
Critical	winter storm	floods	invasive species tornado winds from	Utility interruption	Drought Nuclear incident
Marginal				Earthquake	Coastal Erosion landslide
Negligible					Coastal



### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
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Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

10/27/2016

Name: Julian Gibson

Agency/Municipality/Other: Wayne County

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic					
Critical			TORNADO		
Marginal		UTIL. INTERR. WINTER STORM	FLOODS DROUGHT	TRANSP. ACCIDENT NUCLEAR INCIDENT	INVASIVE SPECIES
Negligible			EARTHQUAKE		COASTAL EROSION LANDSLIDE DAM FAILURE URBAN FIRE EXPOSURE

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
Remote	Unlikely to occur once in a several year period, but possible.
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### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
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Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Dave Palko

Agency/Municipality/Other: Elgin Board

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic		Winters Storm			
Critical		Tornado/Windstorm	Transportation		Nuclear Event Dam Failure
Marginal			Utility Interruption	Flood	Invasive Species
Negligible			Earthquake		Landslide Urban Fire/Explosion Coastal Erosion

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
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### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
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Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Matt Exley

Agency/Municipality/Other: Millcreek Township

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic	Floods Tornado + windstorm Winter storm	Urban fire Explosion		<del>Earthquake</del>	
Critical	<del>Earthquake</del> <del>Tornado + windstorm</del> Transportation Incident	Coastal Erosion		Dam failure Nuclear incident	
Marginal	Utility Interruption	Invasive species	Landslide		
Negligible		Drought	Earthquake		

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
Remote	Unlikely to occur once in a several year period, but possible.
Improbable	So unlikely it can be assumed occurrence will not occur

### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Erin Bisbee

Agency/Municipality/Other: Wayne Township

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic					Earthquake
Critical		Transportation Accident	Tornado	<del>Transportation Accident</del>	
Marginal		Winter Storm	Drought Floods		
Negligible			Utility Interruption		Coastal Erosion Invasive Species Nuclear Incident Urban Fire Explosion Dam Failure



### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
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### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Janice Ohl

Agency/Municipality/Other: Concord Township

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic					
Critical			Tornado	Nuclear	
Marginal		Winter storm	Drought Floods	Earthquake (transportation)	Urban Fire
Negligible			Utility Interruption		Coastal Erosion Dam Failure Landslide Invasive Species

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
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Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Dale Robinson

Agency/Municipality/Other: Co. of Erie

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic				Dam failure Earthquake	
Critical	Transportation Incident/Accident	Floods		Urban Fire/Explosion	Nuclear Incident
Marginal	Coastal Erosion Tornado/windstorm utility interruption - E winter storm	Climate change	Invasive species HABS		Land slide
Negligible	Drought				

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
Remote	Unlikely to occur once in a several year period, but possible.
Improbable	So unlikely it can be assumed occurrence will not occur

### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Andrew Jarvi

Agency/Municipality/Other: WEC EMA

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic				Tornado	
Critical		Winter Storm		Dam Failure Earthquake Invasive Species	
Marginal		Drought	Floods Utility Interruption Transportation Accident	Nuclear Incident	
Negligible				Coastal Erosion Urban Fire + Explosion Landslide	

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
Remote	Unlikely to occur once in a several year period, but possible.
Improbable	So unlikely it can be assumed occurrence will not occur

### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Terry Thomson

Agency/Municipality/Other: North East Twp

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic	transportation		tornado/windstorm	nuclear inc. urban fire/explosion	
Critical	winter storm	coastal erosion flood wt, i.ty	invasive species		
Marginal			drought land slides	dam failure earthquake	
Negligible					



### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
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### Hazard Severity Classifications

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Catastrophic	Death or major structural loss
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Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Sarah Kelly

Agency/Municipality/Other: Eric Co EMA

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic	Urban Fire / Explosion	Winter Storm		Earthquake Landslide Nuclear Inc.	
Critical	Transportation	Tornado / Wind	Flood	DAM Failure	
Marginal			Coastal Erosion	<del>Water</del>	
Negligible	Utility Interruption	Invasive Species	Drought		

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
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### Hazard Severity Classifications

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Catastrophic	Death or major structural loss
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Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Kevin Bartlett Greenfield Sup

Agency/Municipality/Other: Greenfield Sup

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
<b>Catastrophic</b> <i>Dam failure nuclear incident</i>				$\frac{X}{X}$	
<b>Critical</b>					
<b>Marginal</b> <i>winter storm</i>		X	<del>X</del>		
<b>Negligible</b>					

### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
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Negligible	Injuries or structural damage are not expected

Name: JACK LEE

Agency/Municipality/Other: SUMMIT TOWNSHIP

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic				Nuclear Incident	
Critical		Transportation accident	winter storm urban fire	Tornado + Windstorm	
Marginal			Utility Interruptions Invasive species	floods	Drought
Negligible				Earthquake	<del>Drought</del> Coastal Erosion Land slide Dam Failure

### Hazard Probability Classifications

Description	Specific Hazard Event
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Remote	Unlikely to occur once in a several year period, but possible.
Improbable	So unlikely it can be assumed occurrence will not occur

### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Name: Jemetz, TJ

Agency/Municipality/Other: Borough of Edinboro

Please fill out the Risk Assessment Matrix below using the definitions on the back.

Write in where you think each hazard discussed falls on the matrix based on the definitions.

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic			Floods	Tornado & Windstorm Dam Failure	
Critical			<del>Floods</del> Winter Storm	Utility Interruption	Drought Earthquake Landslide Nuclear Incident Urban Fire
Marginal			<del>Floods</del> <del>Winter Storm</del>		
Negligible					Coastal Erosion Invasive Species <del>can</del>



### Hazard Probability Classifications

Description	Specific Hazard Event
Frequent	Likely to occur frequently within a year time span.
Probable	Will likely occur several times over the course of several years
Occasional	Likely to occur once in a several year period.
Remote	Unlikely to occur once in a several year period, but possible.
Improbable	So unlikely it can be assumed occurrence will not occur

### Hazard Severity Classifications

Severity Levels	Severity Description
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness, or minor structural damage
Negligible	Injuries or structural damage are not expected

Erie County  
Resilience Workshop Sign-In Sheet  
July 20, 2017

Name	Jurisdiction/Agency/Organization	Email	Break Out Group	Initials
Ryan Anderson	Erie County Department of Planning	randerson@eriecountypa.gov	1	RA
Charles Baker	FEMA Region III	charles.baker@fema.dhs.gov	2	CB
Erin Bisbee	Wayne Township	waynetwp@tbacc.com	1	EB
Sarah Bowen	Resilience Action Partners	sbowen@mbakerintl.com	1	
Darlene Bracken	PA Emergency Management Agency	dbracken@pa.gov	1	DB
Fred Chapman	PA Department of Community and Economic Development	frchapman@pa.gov	1	FZC
Scott Connors	North East Area Emergency Management	neemc2@hotmail.com	2	SC
Jeffery Harvey	JH Consulting, LLC	jharvey@jhpreparedness.com	2	JH
John Kelly	Erie County Department of Public Safety	jkelly@eriecountypa.gov	1	JK
John McGranor	Erie County Department of Planning	jmcgranor@eriecountypa.gov	2	JMG
Brian Mesaros	Erie County Department of Public Safety	BMesaros@eriecountypa.gov	2	BM
Jake Moore	PA Department of Environmental Protection	jacmoore@pa.gov	2	JM
Alaurah Moss	Dewberry	amos@Dewberry.com	2	

Erie County  
Resilience Workshop Sign-In Sheet  
July 20, 2017

Name	Jurisdiction/Agency/Organization	Email	Break Out Group	Initials
Laura Ortiz	US Army Corps of Engineers	Laura.v.ortiz@usace.army.mil	1	
Robert Pierson	FEMA Region III	Robert.Pierson@fema.dhs.gov	1	RP
Brittany Prischak	Erie County Department of Planning	bprischak@eriecountypa.gov	2	BLP
Dale Robinson	Erie County Department of Public Safety	DRobinson@eriecountypa.gov	2	
Leann Sestak	Environment Erie	lsestak@environmenterie.org	2	
Sara Stahlman	Pennsylvania Sea Grant	sng121@psu.edu	1	SS
Ernie Szabo	PA Emergency Management Agency	erszabo@pa.gov	2	ES
Joe Walko	City of Erie Fire Department	jwalko@erie.pa.us	1	
Kathy Wyrosdick	Erie County Department of Planning	KWyrosdick@eriecountypa.gov	1	
Brian Zeppenfeld	Erie County Conservation District	bzeppenfeld@erieconservation.com	1	BZ
Henry McDonald	JH Consulting	hmcDonald@jhcpreparations.com		HM
Steve Porter	NWPAGE / CRANE	sjporter58@yahoo.com		SP


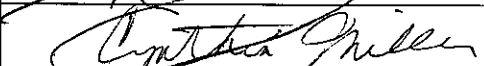
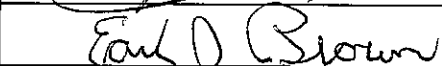


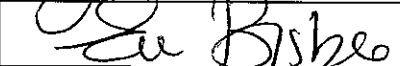
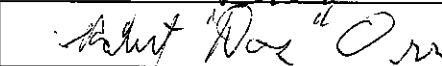
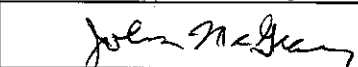
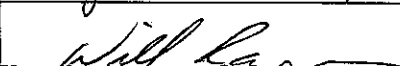
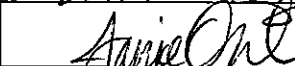
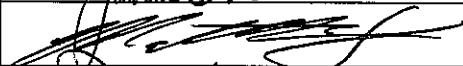


# Sign-In Sheet

## Initial Hazard Mitigation Plan Update Meeting

October 27, 2016

10:00 am

Erie County Public Safety Building

Name - Print	Municipality/Agency	Signature
Jemetz, T	Edinboro Borough	
CYNTHIA MILLER	AMITY TWP	
EARL J. BROWN	UNION TOWNSHIP	
Dick Patterson	Elgin Boro	
JILL M GIBSON	Wayne/ELGIN	
Erin Bischo	Wayne	
ROBERT "DOC" OIR	GIRARD BORO	
JOHN McGRANON	ERIE COUNTY	
Will Rogers	NorthEast Boro	
JANICE OHL	Concord Township	
Matt Exley	Millcreek Township	
JACK LEE	SUMMIT TOWNSHIP	
BRIAN MESAROS	ERIE COUNTY	



# HAZARD MITIGATION PLAN MEETING SIGN-IN SHEET

Meeting: Hazard Mitigation Meeting

Class Date: May 2, 2017

Presenter: Jeff Harvey, JH Consulting

Place/Room: Erie County

Name	Municipality	Email	Signature
BRUCE EICHAU	CITY OF ERIE	BACHAN@ERIE.PA.GOV	B Eicha
Garry Wells	Albion Borough	Albiontown@eriedel.org	G Wells
Will Rogers	NorthEast Boro	manager@northeastborough.com	Will Rogers
KEVIN BARTLETT	GREENFIELD TWP	K11326@VERIZON.NET	Kevin Bartlett
EARL BROWN	Union TWP.	UNION TOWNSHIP @ UNIONTWP2005.COM	Earl J Brown
CINDY MILLER	AMITY TWP	deepsnow@verizon.net	Cindy Miller
JOHN MCGRAW	ERIE COUNTY	JMCGRAW@ERIECOUNTY.PA.GOV	John McGraw
JILL GIBSON	ELGIN	elginborough@yahoo.com	Jill Gibson
DICK PATTERSON	Elgin	rpatterson37@neo.rr.com	Dick Patterson
Bill Felege	Genard Twp	JSBILL@VPHAS.COM	Bill Felege (w-c-600)
Erin Bisbee	Wayne Twp	waynetwp@tbscc.com	Erin Bisbee
JEFF HARVEY	JH CONSULTING, LLC	jharvey@jhpreparedness.com	Jeff Harvey
Henry McDonald	JH Consulting LLC	hmcDonald@jhpreparedness.com	Henry McDonald
GARRY BLAKESLEE	CONCORD		Garry Blakeslee
Sarah Kelly	Erie County	SKelly@eriecounty.gov	Sarah Kelly
Dale Robinson	Erie Co.	dsobinson@eriecounty.gov	Dale Robinson
BRIAN MESAROS	ERIE CO.	Bmesaros@eriecounty.pa.gov	Brian Mesaros



# ERIE COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

*Erie County Public Safety Building*

July 20, 2017 @ 6:00 p.m.  
Sign In Sheet

	Name	Community Represented	Contact Info. (Phone or Email)
1.	BRIAN MESAROS	ERIE COUNTY	BMESAROS@ERIECOUNTYPA.GOV
2.	JEFF HARVEY	JH CONSULTING, LLC	jharvey@jhpreparedness.com
3.	Henry McDonald	JH Consulting	hmcDonald@jhpreparedness.com
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			



# ERIE COUNTY HAZARD MITIGATION PLAN

Public Meeting

June 20, 2017 @ 6:00 p.m.

Sign In Sheet

	Name	Community Represented	Contact Info. (Phone or Email)
1.	JEFFERY HARVEY	JH CONSULTING, LLC	jharvey@jhpreparedness.com
2.	JOHN R GRAPPY	ERIE COUNTY	JGRAPPY@ERIECOUNTYPA.GOV
3.	Henry McDonald	JH Consulting	hmcDonald@jhpreparedness.com
4.	Dale Robinson	ERIE CO.	d.robinson@eriecounty.pa.gov
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			

Jack Lee Summit Township

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	X				no coast in township
Dam Failure	X				no dams close
Drought			X		Water wells feed water authority. (also farmers)
Earthquake		X			RARE
Floods		X			RARE (Summit) high ground
Invasive Species		X			NOT AWARE.
Landslide	X				RARE
Nuclear Incident			X		Nuclear energy plant west of us in Ohio
Tornado & Windstorm			X		Seen them, (Two)
Transportation Accident			X		Reckless driving on Interstate (fowl weather)
Urban Fire & Explosion			X		MANY BUSINESSES + SUBDIVISIONS.
Utility Interruption			X		at times, bitter cold.
Winter Storm			X		Lake effect

Feel free to use the reverse side for additional comments.

Jemetz, TJ  
Borough of Edinboro

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	X				Inland municipality
Dam Failure				X	High hazard dam that does not meet modern dam safety standard
Drought	X	-			We have a tremendous aquifer and a Lake Can't ever see this being an issue for us.
Earthquake		X			No tall bldgs. Main street has 500+ old brick bldgs that could be impacted by a strong earthquake
Floods				X	Our water Dept/Treatment Facility is located in a flood plain below a high hazard dam. Likely to fail w/ max probable storm
Invasive Species	X				Not our issue.
Landslide	X				Very little high ground and no steep slopes. Can't see this being an issue
Nuclear Incident			X		
Tornado & Windstorm			X		
Transportation Accident	X				No railroads. Some highway - 6N + SR 99
Urban Fire & Explosion		X			
Utility Interruption			X		Extended power outages are <del>usually</del> to be worried about
Winter Storm			X		We do this every winter - Routine!

Feel free to use the reverse side for additional comments.

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	X				DO NOT HAVE
Dam Failure	X				" " "
Drought		X			SELDOM
Earthquake		X			"
Floods	X				"
Invasive Species	X				"
Landslide	X				DO NOT HAVE
Nuclear Incident		X			POSSIBLE NUCLEAR PLANT IN OHIO
Tornado & Windstorm			X		SELDOM
Transportation Accident			X		AIRPLANE TRAFFIC ZONE RAILROAD HAZARDS
Urban Fire & Explosion		X			DO NOT HAVE SO FAR
Utility Interruption			X		PERKINS HAS POWER OUTAGE SO WE CAN'T DISTURBANT POWER
Winter Storm		X			SELDOM

Feel free to use the reverse side for additional comments.

# CYNTHIA MILLER - AMITY TOWNSHIP

## ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	✓				
Dam Failure	✓				
Drought		✓			farm crops affected
Earthquake		✓			
Floods			✓		flash floods washing <sup>out</sup> roadways + pipes
Invasive Species				✓	fragmities taking over farmland
Landslide	✓				
Nuclear Incident		✓			westerly winds from Ohio can affect our area
Tornado & Windstorm			✓		
Transportation Accident		✓			Routes 8 & 89 heavily traveled by trucks
Urban Fire & Explosion	✓				
Utility Interruption			✓		trees down during storm events
Winter Storm				✓	snowbelt - can have major snow amounts and/or ice

Feel free to use the reverse side for additional comments.

## ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion		X			
Dam Failure			X		
Drought		X			
Earthquake				X	OLD INFRASTRUCTURE & BUILDINGS & LOW MAGNITUDE = HIGH DAMAGE
Floods			X		FLOODING IS A CONCERN, BUT KEPT TO MINIMUM WITH COUNTY IN 2 DIFFERENT WATERSHEDS.
Invasive Species		X			
Landslide		X			
Nuclear Incident				X	NO STATE PLANNING FOR PERRY
Tornado & Windstorm				X	WIND IS AN ISSUE WITH ABOVEGROUND UTILITIES
Transportation Accident				X	VERY FREQUENT, LARGE PILE-UPS ON INTERSTATES
Urban Fire & Explosion			X		
Utility Interruption			X		
Winter Storm				X	CAUSES MANY ISSUES COUPLED WITH COLD TEMPS.

Feel free to use the reverse side for additional comments.

JOHN McBRANOR - ERIE COUNTY DEPT. OF PLANNING

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion		✓			Primarily impacts individual property owners rather than community-wide
Dam Failure	✓				UNLIKELY
Drought		✓			SOME IMPACTS TO AGRICULTURE
Earthquake		✓			UNLIKELY BUT WOULD OR COULD CAUSE A LOT OF DAMAGE
Floods			✓		FREQUENT PROBLEM
Invasive Species		✓			
Landslide	✓				SAME COMMENTS AS COASTAL EROSION
Nuclear Incident		✓			UNLIKELY - SAME COMMENT AS FOR EARTHQUAKE
Tornado & Windstorm		✓			
Transportation Accident		✓			
Urban Fire & Explosion			✓		
Utility Interruption		✓			
Winter Storm		✓			FREQUENT, BUT POPULATION IS USED TO THEM

Feel free to use the reverse side for additional comments.

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion		X			
Dam Failure			X		
Drought			X		
Earthquake		X			
Floods				X	WEATHER (CELLS SET UP w/EXTREME
Invasive Species			X		
Landslide	X				
Nuclear Incident			X		
Tornado & Windstorm				X	
Transportation Accident				X	3 INTERSTATES IN ERIE COUNTY & EXTREME WEATHER
Urban Fire & Explosion		X			
Utility Interruption				X	
Winter Storm				X	WEATHER TENDS TO BE EXTREME

RAIN/SNOW FALL)

Feel free to use the reverse side for additional comments.



Will Rogers North East Borough

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	X				No coastal Area
Dam Failure		X			We have 3 dams @ 3 reservoirs regularly inspected and monitored
Drought	X				water supply is drawn from Lake Erie. local drought will have minimal impact
Earthquake		X			A fault line runs through Lake Erie. a moderate quake could impact our water intake
Floods			X		Flood plain through Borough - impact to business district
Invasive Species			X		Zebra mussels & Algae blooms could impact water intake
Landslide	X				Topography
Nuclear Incident	X				no nearby facilities
Tornado & Windstorm		X			Cause local damage + utility interruptions
Transportation Accident			X		Hi <del>speed</del> speed freight trains Bakken oil
Urban Fire & Explosion		X			
Utility Interruption		X			
Winter Storm		X			pretty common / caused traffic problems.

Feel free to use the reverse side for additional comments.

## ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	✓				
Dam Failure	✓				
Drought	✓				
Earthquake		✓			
Floods		✓			MORE FLASH FLOODING OF CULVERTS W/ ROAD DAMAGE VERSUS STREAM ISSUES
Invasive Species	✓				
Landslide	✓				
Nuclear Incident		✓			w/ transportation / re: reports of increased nuclear transports by rail & route 19
Tornado & Windstorm		✓			
Transportation Accident		✓			
Urban Fire & Explosion	✓				
Utility Interruption			✓		Potential for major emergency if occurring during winter season
Winter Storm		✓			

Feel free to use the reverse side for additional comments.

## ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	✓				
Dam Failure	✓				
Drought			✓		
Earthquake		✓			
Floods			✓		
Invasive Species	✓				
Landslide	✓				
Nuclear Incident			✓		2 Major transportation routes cut thru the Boro - Railroad / Route 6
Tornado & Windstorm			✓		
Transportation Accident				✓	Same comment as in Nuclear incident.
Urban Fire & Explosion	✓				
Utility Interruption			✓		Relly good service at present but potential exists
Winter Storm				✓	

*Feel free to use the reverse side for additional comments.*

Emm Bisbee  
Wayne Township

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	✓				
Dam Failure	✓				
Drought	✓				
Earthquake	✓				
Floods		✓			We have township residents in our flood plains (homes)
Invasive Species	✓				
Landslide	✓				
Nuclear Incident			✓		
Tornado & Windstorm			✓		
Transportation Accident			✓		
Urban Fire & Explosion	✓				
Utility Interruption			✓		
Winter Storm				✓	Winters are very unpredictable in our area. They can be mild- to horrific.

Feel free to use the reverse side for additional comments.

Janice OHL  
Concord Township

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	X				
Dam Failure	X				
Drought		X			
Earthquake	X				
Floods		<del>X</del>	X		
Invasive Species	X				
Landslide	<del>X</del>	X			
Nuclear Incident		X			
Tornado & Windstorm			X		
Transportation Accident		X			
Urban Fire & Explosion		X			
Utility Interruption			X		
Winter Storm			X		

Feel free to use the reverse side for additional comments.

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion			✓		Many homes sitting on bluffs. already seeing homes uninhabitable due to collapse.
Dam Failure		✓			
Drought		✓			
Earthquake	✓				
Floods				✓	
Invasive Species			✓		
Landslide			✓		
Nuclear Incident			✓		we have a gamma generator facility in our area. also, we have large amounts of material by rail+road
Tornado & Windstorm				✓	Wind events are frequent and have large amts of damage
Transportation Accident			✓		
Urban Fire & Explosion				✓	
Utility Interruption			✓		
Winter Storm				✓	Snow - not so much Ice - catastrophic

Feel free to use the reverse side for additional comments.

Andrew Jarvis  
WEC EMA  
(11 Municipalities)

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	✓				
Dam Failure		✓			Dam in Edinboro - could impact Washington Twp Residents
Drought			<del>Concerned</del>	✓	Albion Borough due to the drought conditions declared a disaster - trucked in water for 2 mos. + other Twp wells were going dry along with private wells leaving residents struggling
Earthquake		✓			
Floods			✓		Girard Twp had homes flooding due to man-made hazards in Girard Borough
Invasive Species		✓			West Erie County is very rural lots of farm land
Landslide	✓				
Nuclear Incident		✓			Perry - How will the evacuations from Ohio impact us.
Tornado & Windstorm			✓		Albion Tornado of '85 - Still a lot of public concern
Transportation Accident			✓		16 miles of I-90, + I-79 and Bakken Crude Trains
Urban Fire & Explosion	✓				
Utility Interruption		✓			
Winter Storm				✓	Very rural lack of resources to deal with winter storms + high poverty

Feel free to use the reverse side for additional comments.

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
E Coastal Erosion		X			critical Infrastructure along Lake shore Impacts on P.I. state Park and tourism/Economic Erosion of Tax Base - High Dollar Homes - impact
Dam Failure			X		Age of Dams
Drought		X			most of Co. Population receives drinking water from Lake, but can have economic impact on Ag.
Earthquake			X		High Percentage of Buildings in Co. Built prior to 1950's can easily "slide" off Foundation in a moderate E. Quake
Floods			X		seem to flood but doesn't seem to endanger Homes - mostly pavement flooding
Invasive Species		X			can impact fishing/tourism industry HABs can endanger tourism/fishing & drinking water
Landslide	X				
Nuclear Incident		X			Age of Perry Nuke Plant. Also the Perry Nuke Plant might impact Lake Erie water (?)
Tornado & Windstorm				X	Lots of wind events - enhanced due to "down sloping"
Transportation Accident			X		I-90 and Lake effect snows very troubling could oil unit trains -
Urban Fire & Explosion		X			
E Utility Interruption				X	Age and condition of systems - Electrical Demands ever increasing - water breaks - many
E Winter Storm				X	ICE storm could be devastating - storm like Buffalo Nov. 2014 could happen to.

Feel free to use the reverse side for additional comments.

climate  
change

X unknown ramifications -



ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

North East Twp

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion			X		LAND EROSION IN OUR SHORE LINE / AG & HOMES
Dam Failure				X	3 DAMS IN OUR AREA
Drought			X		smaller wells / Ag
Earthquake		X			fault line in our AREA
Floods			X		low lying land along creeks
Invasive Species			X		Ag & water borrow bio bacteria
Landslide		X			high Banks in Ag area along lake shore
Nuclear Incident		X			transportation along our AREA
Tornado & Windstorm			X		water spots & unstable air currents
Transportation Accident				X	Last Municipality Before NY tolls / Rail cars
Urban Fire & Explosion		X			plot of chemical Risk in our AREA
Utility Interruption			X		plot of Nursing & old Folk Homes
Winter Storm				X	shelter management, Road closure

Feel free to use the reverse side for additional comments.

## ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion		✓			
Dam Failure		✓			
Drought		✓			
Earthquake		✓			DO Happen in Region, Infrastructure agms and Not prepared for it.
Floods			✓		Most people it seems do not have Flood insurance and have basements
Invasive Species			✓		Lamprey eel, DNR is treating creeks / streams for eggs.
Landslide		✓			
Nuclear Incident		✓			Transportation of Nuclear material from Canada to SG, thru Erie county
Tornado & Windstorm			✓		Wind issues from Lake Erie Has knocked out large areas of power.
Transportation Accident			✓		<del>I got stuck in traffic</del> MASS TRANSIT corridors.
Urban Fire & Explosion		✓			
Utility Interruption				✓	Erie's winter storms can seriously damage utilities / critical infra.
Winter Storm				✓	Winter storms / Ice storms are bad here (top ten area for Annual Snow Accum)

Feel free to use the reverse side for additional comments.

Kevin Bartlett Greenfield Sup.

ERIE COUNTY STAKEHOLDERS COMMITTEE HAZARD PERCEPTIONS

HAZARDS	PERCEPTIONS				COMMENTS
	Not at All Concerned	Somewhat Concerned	Concerned	Very Concerned	
Coastal Erosion	X				
Dam Failure		EATON RES.			The dam is on the Sup and if it failed it would flood French creek in the south & east parts of the township
Drought	X				
Earthquake	X				
Floods		X			
Invasive Species	X				
Landslide	X				
Nuclear Incident		I-86			all of interstate 86 that is in PA is in Greenfield concerned for transportation of nuclear material mishaps
Tornado & Windstorm	X				
Transportation Accident		I-86			see above
Urban Fire & Explosion		X			
Utility Interruption	X				
Winter Storm		SNOW BELT			always a possible threat however the residents are fairly good at surviving blizzards

Feel free to use the reverse side for additional comments.

**FIRE EXIT**  
**NO PARKING**  
**FRONT OF DOOR**

Hazard Mitigation  
Public Meeting  
Room 301  
@  
6:00 pm



**FIRE EXIT**  
**NO PARKING**  
**FRONT OF DOOR**

Erie County  
Hazard  
Mitigation  
Public Meeting  
Rm 201  
6pm





# Erie County Department of Public Safety

9-1-1 / EMA / HAZMAT

Erie County, Pennsylvania

2880 Flower Rd. Erie PA, 16509 Phone: (814)

## County Press Release & News

### Hazard Mitigation Plan Update Public Meeting - 07/20/17

Erie County Receives Storm Ready Designation

Erie County Unveils New Spill Response Trailers

New Dispatch Console System at Public Safety

Telecommunicators are "first first responders"

Erie Times 911 Center Video

NWPAERG Regional Emergency Notification System Self-Registration Portal

Next Generation Radio System - Project Update 06/21/17

## MISSION

Provide for the safety and welfare of the public through the preservation of life, health, property, economy, environment, and continued government.



**Purpose**

Provide for the citizens, visitors, businesses, organizations and emergency responders of Erie County a comprehensive program of 9-1-1 / communications, emergency management, innovative technology systems and services through mitigation, preparedness, response, and recovery. The Department of Public Safety works closely with appropriate municipal, county, state, and federal agencies in order to carry out its mission.

**CUSTOMERS**

- Residents of Erie County
- 38 Municipalities of Erie County
- Emergency Service Providers of Erie County
- Schools, Civic and Public Service Organizations
- Local business and industry
- State, County and Local Officials
- State and Federal Emergency Management Officials
- Media Broadcast Stations

**AUTHORITY**

- Pennsylvania Emergency Services Code, 35 Pa. C.S.
- 4 PA Code Chapter 120b Public Safety Emergency Telephone Act.
- 4 PA Code Chapter 120c Training and Certification Standards.
- 4 PA Code Chapter 120d Performance Review and Quality Assurance Standards
- Pennsylvania Public Utilities Commission.
- Erie County Administrative Code as revised and reenacted November 1, 2007, Section 11, "Department of Public Safety".
- Erie County Directives, Policies and Procedures



Erie Cou

SafeTown

Registration

Autism form for inclusion in the Computer Aided Dispatch Syst

Special Needs form for inclusion in the Computer Aided Dispatch S

**NGR Update**



**ERIE COUNTY NEXT GENERATION PUBLIC SAFETY RADIO SYSTEM**

MCM CONSULTING GROUP, INC. MARCH 7, 2016



Get weekly updates to this calendar:

< July 2017 >



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
+1 event 25	+1 event 26	27	28	29	30	+1
2	3	4	5	6	7	+1

## RESPONSIBILITIES AND SERVICES

- Provide emergency and non-emergency public safety (9-1-1) call taking and dispatch services to the citizens and visitors of Erie County.
- Provide individual and organizational training programs for public safety telecommunications staff and emergency service providers to ensure prompt, efficient, and effective disaster emergency services and response, in compliance with applicable Pennsylvania State Laws and Regulations.
- Provide Quality Assurance / Quality Management programs to ensure the services provided meet and/or exceed the highest standard of customer service to the citizens and visitors of Erie County.
- Provide Public Education programs to the Erie Community to help educate the citizens on the resources and services provided by the Public Safety Department to include 9-1-1, Emergency Management, Hazardous Materials Response and Special Teams.
- Provide programs and services to the citizens of Erie County, such as:
  - Safe Town "Household Profiles," a quick, easy and secure way to provide critical information about your home and family to the people who can provide emergency services to you and your family.
  - Public Alert Siren System – An all-hazard alert (siren) system used to warn the general population of potential danger.
- Cooperate and collaborate with Local, State, and Federal Government Officials / Organizations to provide the highest standard of customer service as it pertains to emergency services and communications

# Storm Siren Testing

January - April - July - October  
**15<sup>th</sup>**

**City of Corry - 12:00**

**Union City - 12:15**

**West County, McKean - 12:30**  
**Edinboro, Washington Twp**

**Mill Village - 12:45**



## TRENDS IN USE OF SERVICES

- Continued participation (direct involvement) as a member of the Legislative Government Affairs Committee as it relates to the legislative re-write of the Pennsylvania Emergency Services Code, 35 Pa. C.S.
- Enhancement of staff expertise and competency levels.
- Continuation of the consolidation of countywide emergency communications services.
- Implementation of Next Generation Public Safety Radio System (APCO P25 Phase II Trunked UHF Simulcast Repeated Radio System) to provide reliable, interoperable communications among Emergency Service Providers on a common frequency that meets or exceeds National Industry Standards with consideration given to include Public Transportation, Public Works, School Districts, etc.
- Continued participation in the Regional Shared Services Assessment
- Establish redundancy of the Erie County Public Safety Answering Point (PSAP) / Dispatch Center among other County PSAPs with a regional approach, eliminating the need for a physical redundant center located in Erie County in the event of an evacuation or catastrophic failure.
- Maintain current on emerging technology / systems (i.e. Next Generation 9-1-1), offering the most advanced services such as "Text-to-911, Photos, Streaming Video, Telematics, etc.
- Establish a centralized record management system for all County Law Enforcement Agencies, a central repository of crime data; sharing information across jurisdictional boundaries; crime mapping; outstanding warrants, etc.
- Remain current on geo-referenced, aerial, oblique image libraries and software (Pictometry) that are incorporated with the Computer-aided Dispatch (CAD) and Geographic Information System (GIS) software. These software resources are utilized 24/7 to provide a fast response to emergencies that threaten the lives and property of citizens of Erie County.

## GOALS

- Continue to improve the operational capabilities of the Community Emergency Response Team to support Search & Rescue, Hazardous Materials, Medical, Logistical and Emergency Operations Center activities.
  - Improve the operational capabilities of the county animal response team. Specifically the areas of recruitment/retention, public education and pet sheltering.
  - In cooperation with municipal governments and local fire departments, establish a consolidated specialized technical rescue team with confined space, trench, high angle, collapse, hazardous materials, and water rescue capabilities.
  - Obtain a comprehensive, independent report that includes short, intermediate, and long term goals with best practice recommendations to enhance the emergency management program.
  - Develop a rail safety (all hazard) plan for emergency preparedness to potential incidents and identify associated risk(s) to the community.
  - Continue to build a “stop gap” cache of equipment and supplies to meet the immediate response needs of the County.
  - Re-organize the County Emergency Operations Center Staff positions.
  - Implement an on-line damage reporting system for use by the public for reporting damages to municipal and county governments.
  - Assist and support the voluntary regionalization of municipal emergency management.
  - Expand the use of Knowledge Center within the County.
  - Work with various community groups to develop and promote “community resiliency” initiatives.
  - Update the County Hazard Mitigation Plan.
-

## NOTICE OF PUBLIC MEETING

The Erie County Department of Public Safety and the Erie County Department of Planning, as part of the Erie County Hazard Mitigation Planning Committee, will hold a public meeting on June 20, 2017, in the **Erie County Department of Public Safety – 2880 Flower Road – Erie PA 16509** at 6:00 p.m.

The purpose of the meeting is to review updates to the county's hazard mitigation plan. Members of the public will be given the opportunity to comment on the natural and man-made hazards most affecting them.

The Erie County Hazard Mitigation Plan was last updated in 2012 per federal requirements in Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000.

EP-267196



### Erie County Department of Public Safety

Published by John Kelly [?]

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📍 Tag Photo

📍 Add Location

✎ Edit



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Write a comment...



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EP-267196

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**Erie Co EOC** @ErieCoEOC

now

Notice of Public Meeting. The Erie County Hazard Mitigation Planning Committee will hold a public meeting on June 20, 2017 at 6:00 p.m.



# COUNTY OF ERIE



Kathy Dahlkemper  
County Executive

John R. Grappy  
Director of Public Safety

**Department of Public Safety**  
**2880 Flower Road Erie, PA 16509**  
Office (814) 451-7920 • Fax (814) 451-7930  
Web Site: [www.ecdops.org](http://www.ecdops.org)

## **Hazard Mitigation Plan Committee Meeting**

The effective period of Erie County's current Multi-Jurisdictional All-Hazards Mitigation Plan will end in December of 2017. Formally adopted by the county's 37 of the County's political subdivisions in 2012, Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act requires the plan be updated every five years if covered communities are to remain eligible to receive funding under FEMA's mitigation grant programs.

To ensure the continued countywide scope and application of our plan, we are respectfully seeking official representation from your jurisdiction to assist in the update process. The person(s) selected should be familiar with Erie County's risks/vulnerabilities and able to help develop mitigation strategies and projects for inclusion in the revised plan.

The first update committee meeting is scheduled for Thursday, October 27, 2016 at the Erie County Department of Public Safety, 2880 Flower Rd., Erie, Pa 16509. The meeting, which will be facilitated by JH Consulting, LLC, will begin at 10:00 a.m. In order to make it as convenient as possible for jurisdictions to attend, we will hold two meetings on October 27<sup>th</sup>. The second meeting will begin at 6:00 p.m. The goal of the meeting will be to kick-off the project as well as discuss existing mitigation strategies, their status, thoughts on countywide risks, and to outline committee member responsibilities. Additional planning committee meetings will be scheduled in early 2017.

Thank you, in advance, for your help with this important initiative. Once chosen, please have your representative contact me via email at [bmesaros@eriecountypa.gov](mailto:bmesaros@eriecountypa.gov) by October 21<sup>st</sup> so they may be added to the update committee roster.

# COUNTY OF ERIE



Kathy Dahlkemper  
County Executive

John R. Grappy  
Director of Public Safety

**Department of Public Safety**  
**2880 Flower Road Erie, PA 16509**  
Office (814) 451-7920 • Fax (814) 451-7930  
Web Site: [www.eriecountypa.gov](http://www.eriecountypa.gov)

## MEMORANDUM – INVITATION

To: Municipal Officials  
From: Brian Mesaros, Assistant Emergency Management Coordinator  
Date: April 12, 2017  
Re: Hazard Mitigation Plan Update – Mitigation Projects

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In the fall of 2016, we began the process of updating Erie County's multi-jurisdictional hazard mitigation plan. We met with representatives from the county's thirty-eight (38) political subdivisions in October 2016 to discuss the various risks and vulnerabilities faced by the county.

The second committee meeting will be facilitated by JH Consulting, LLC, and has been scheduled for **Tuesday, May 2, 2017 at the Department of Public Safety, 2880 Flower Road, Erie, PA 16509**. In order to make it as convenient as possible for jurisdictions to attend, we will hold two separate meetings on May 2<sup>nd</sup>. The morning meeting will begin at 09:00 AM, and the evening meeting will begin at 6:00 p.m. The goal of the meeting will be to discuss mitigation projects for your jurisdiction. You should be prepared to discuss and/or provide comment on the status of the projects included in the 2012 hazard mitigation plan.

As a reminder, the effective period of Erie County's current Multi-Jurisdictional All-Hazards Mitigation Plan will end in December of 2017; formally adopted by the county's thirty-eight (38) political subdivisions in 2012. Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act requires the plan be updated every five (5) years if covered communities are to remain eligible to receive funding under FEMA's mitigation grant programs.

Please plan to attend one of the two meetings. If you are unable to attend, please feel free to send a representative. Your representative should be able to help develop mitigation strategies and projects for inclusion in the revised plan.

Thank you, in advance, for your continued support of this important initiative. Should you have any questions, please do not hesitate to contact me at my office or via email at [bmesaros@eriecountypa.gov](mailto:bmesaros@eriecountypa.gov).

PROOF OF PUBLICATION  
In  
THE ERIE TIMES-NEWS  
COMBINATION EDITION

ERIE CO DEPT OF PUBLIC SAFETY  
2880 FLOWER ROAD  
ERIE PA 16509

REFERENCE: 111857 267196  
Public Meeting

STATE OF PENNSYLVANIA)  
COUNTY OF ERIE ) SS:

Brenda L. Learn, being duly sworn, deposes and says that: (1) he/she is a designated agent of the Times Publishing Company (TPC) to execute Proofs of Publication on behalf of the TPC; (2) the TPC, whose principal place of business is at 205 W. 12th Street, Erie, Pennsylvania, owns and publishes the Erie Times-News, established October 2, 2000, a daily newspaper of general circulation, and published at Erie, Erie County Pennsylvania; (3) the subject notice or advertisement, was published in the regular edition(s) of said newspaper on the date(s) referred to below. Affiant further deposes that he/she is duly authorized by the TPC, owner and publisher of the Erie Times-News, to verify the foregoing statement under oath, and affiant is not interested in the subject matter of the aforesaid notice or advertisement, and that all allegations in the foregoing statement as to time, place and character of publication are true.

PUBLISHED ON: 06/13/17

TOTAL COST: \$409.00 AD SPACE: 0 Lines

FILED ON: 06/13/17

NOTICE OF PUBLIC MEETING

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Sworn to and subscribed before me this 13<sup>th</sup> day of June 2017

Affiant: Brenda L. Learn

NOTARY: Barbara J. Moore

COMMONWEALTH OF PENNSYLVANIA  
NOTARIAL SEAL  
Barbara J. Moore, Notary Public  
City of Erie, Erie County  
My Commission Expires March 23, 2020  
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

**Erie County Department of Public Safety**

July 24, 2017 at 6:30pm · 🌐

Erie County we've received great feedback about reducing the effect of disasters in Erie County but want more. The Department of Public Safety & Erie County Planning Department are seeking your (the public's)...  
More

**Erie County Hazard Mitigation Survey**

Web survey powered by SurveyMonkey.com. Creat...  
[surveymonkey.com](http://surveymonkey.com)



Like



Comment



Share

**Boost Post**





## Erie County Department of Public Safety

July 24, 2017 at 6:30pm · 🌐

Erie County we've received great feedback about reducing the effect of disasters in Erie County but want more. The Department of Public Safety & Erie County Planning Department are seeking your (the public's) input in the below surveys, one is risk based, the other action based. Please do not forget to share.

Please click on the two links and be taken to a survey:  
Survey #1 (Risk-Based): <https://www.surveymonkey.com/r/ErieHazardMitigation...> See More

### Erie County Hazard Mitigation Survey

Web survey powered by SurveyMonkey.com. Create your own online survey now with SurveyMonkey's expert certified FREE templates.

[SURVEYMONKEY.COM](https://www.surveymonkey.com)



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# Erie County, Pennsylvania

## Kathy Dahlkemper, County Executive

- Home
- County Executive ▾
- County Council ▾
- Property & Tax Records ▾
- Courts ▾
- County Services ▾
- Open Finances ▾

[Login / Register](#)

# Erie County Hazards

**How is our community vulnerable to hazards?  
Your opinion is needed. Click here to take the surveys.**

### COUNTY NEWS

- Coastal Zone grant applications to be accepted
- Public input sought on draft Cultural Heritage Plan
- Erie County awards \$187,000 in Greenways grants to area organizations
- Community College Proposal
- Erie County programs honored by National Association of Counties
- Dahlkemper appointed by governor to Local Government Advisory Committee

### Property Records

- Search Property & Tax Records
- Recent Property Transfers
- Tax Sale - Repository List
- Sheriff's Sale
- Tax Sales

### County Services

- View Job Postings
- Elections and Voting
- A-Z Departments & Phone Directory
- Sheriff's Most Wanted
- Documents and Forms

### Courts

- Daily Court Schedules
- Should I Report For Jury Duty?
- Clerk of Courts (Criminal Records)
- Court & Trial Schedules
- Prothonotary (Civil Records)



**Erie Co EOC**

@ErieCoEOC

**Notice of Public Meeting. The Erie County Hazard Mitigation Planning Committee will hold a public meeting on July 20, 2017 at 6:00 p.m.**

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# Erie County, Pennsylvania

## Kathy Dahlkemper, County Executive

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- Erie County Department of Public Safety
- Public Safety
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## Erie County Department of Public Safety

9-1-1 / EMA / HAZMAT Erie County, Pennsylvania

2880 Flower Rd. Erie PA, 16509 Phone: (814) 451-7920

### County Press Release & News

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# Erie County Hazard Mitigation Plan

2017 Update

Public Meeting – Erie, PA

20 June 2017

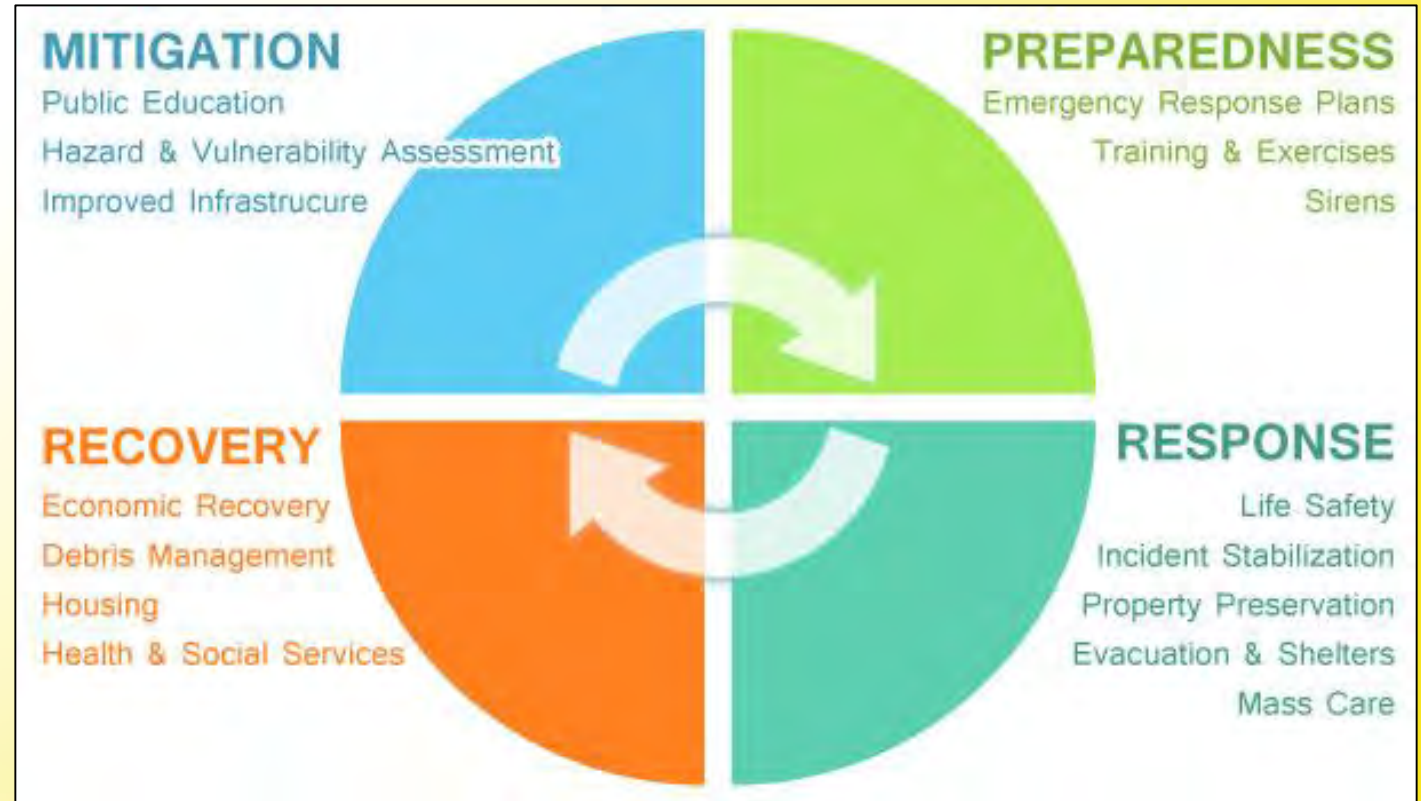


# Agenda

- 'Hazard Mitigation' Overview
- Risk vs. Vulnerability
- Erie County Hazard Mitigation Plan Overview
- Activity
- Discussion

# 'Hazard Mitigation' Overview

- Hazard mitigation is the effort to reduce loss of life and property by lessening the impact of disasters.



# Risk vs. Vulnerability

RISK	VULNERABILITY
Exposure to danger, harm, or loss	The <u>quality or state</u> of being exposed to the possibility of danger, harm, or loss

*With hazard mitigation, we assess risk.*

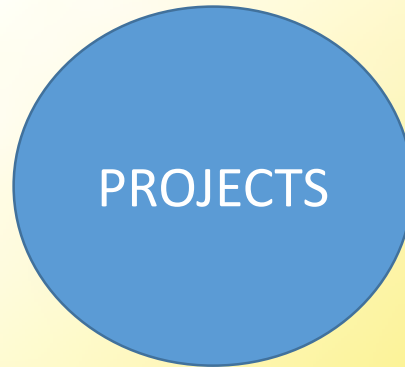
*We also identify projects that can lessen vulnerability.*

# Erie County Hazard Mitigation Plan

- Purpose of the Hazard Mitigation Plan
  - Assess risks and vulnerabilities
  - Increase awareness around threats, hazards, and vulnerabilities
  - Build partnerships for risk reduction
  - Identify broad, long-term strategies for risk reduction
  - Align risk reduction with other community objectives
  - Identify implementation approaches
- **Jurisdictions:** All cities, boroughs, and townships in Erie County
- **Scope:** All hazard

# Activity

- Select three hazards.
- Break into three groups.



- Take 10 minutes and brainstorm the topic assigned to your group.
- Designate a spokesperson.
- Summarize your group's discussion.

# General Discussion

# Erie County Hazard Mitigation Plan

2017 Update

Public Meeting – Erie, PA

19 July 2017

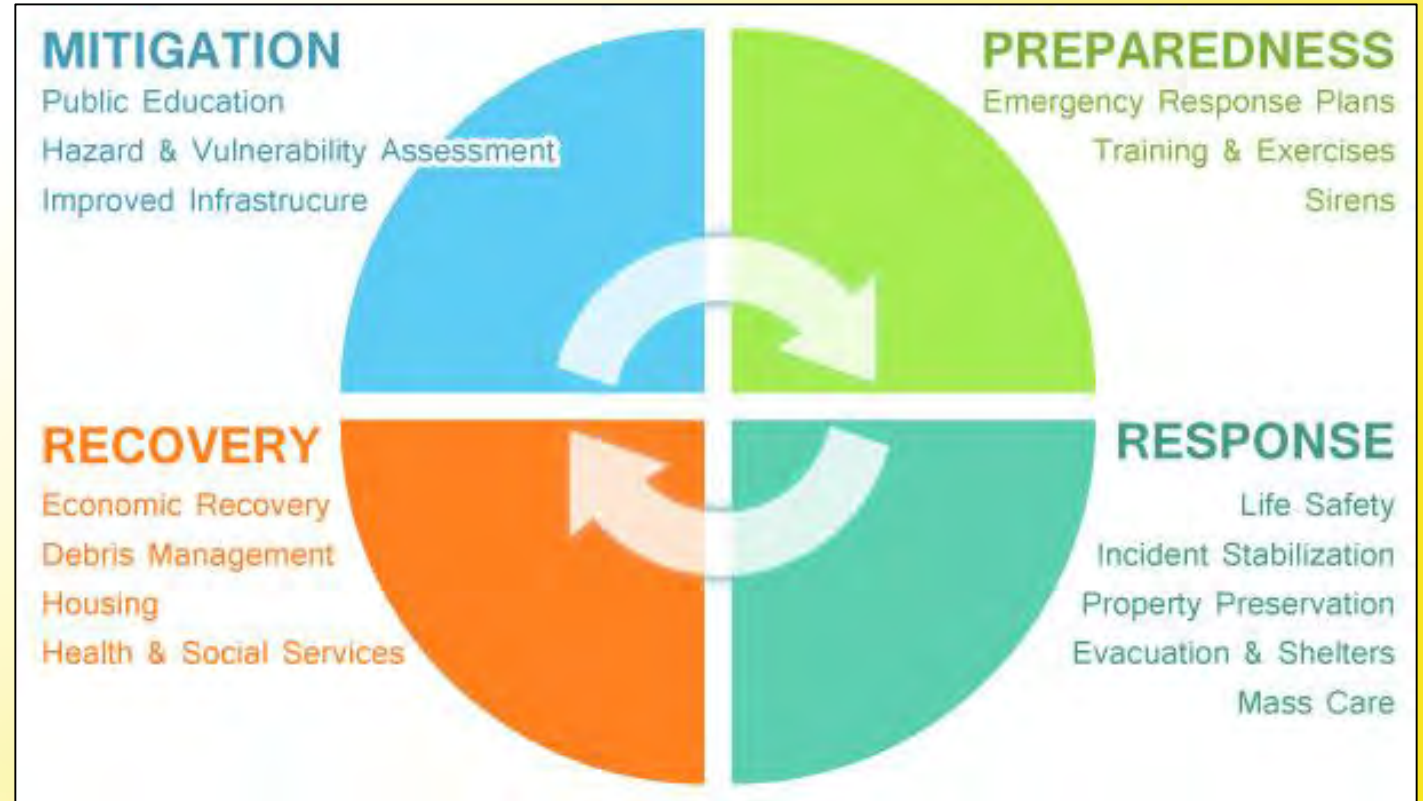
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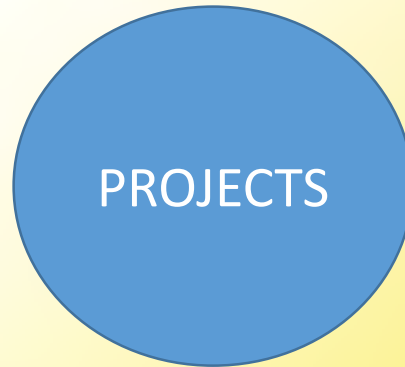
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# General Discussion

# Erie County Hazard Mitigation Plan

2017 Update

Presentation at the Erie County Resiliency Workshop – Erie, PA

19 July 2017

# Hazards in the 2017 Update

Name	Description
Acts of Violence	Includes but is not limited to acts of terrorism (domestic and international), active shooter situations, and acts of school violence.
Drought	Considers agricultural and livestock impacts.
Earthquake	Includes earthquakes with epicenters in Erie County as well as those from the wider region felt in Erie County.
Floods	Includes river floods, coastal floods, storm surges, inland flooding, flash flooding, stormwater backups, etc.
Hazardous Materials	Includes incidents at fixed facilities involving hazardous materials and incidents during transport by highway or rail.
Infrastructure Decay	Considers the decay and/or failure of critical infrastructure including dams, bridges, water systems, etc. Includes utility interruptions that are not cascading effects of another hazard.
Invasive Species	Includes both land and water types.
Lake Hazards	Includes coastal erosion, harmful algae blooms (HABs), high lake levels, and seiche waves.
Landslide	Includes land subsidence, landslides, mud flows, expansive soils, etc.
Radioactive Incidents	Includes incidents at fixed facilities such as the Perry Nuclear Power Plant and transportation incidents involving radioactive/nuclear materials.
Tornado & Windstorm	Includes high winds, strong winds, thunderstorms, and tornadoes.
Urban Fire & Explosion	Includes large structure fires, multi-structure fires, and explosions of all types.
Winter Storms	Includes heavy snow, ice storms, and lake effect snow as well as cascading effects such as utility failures and transportation incidents.

# Goals & Objectives

**GOAL** (*Big Picture, Stretch Item*)

OBJECTIVE (*More Specific, Organizational*)

OBJECTIVE (*More Specific, Organizational*)

STRATEGY / ACTION / PROJECT

STRATEGY / ACTION / PROJECT

STRATEGY / ACTION / PROJECT

STRATEGY / ACTION / PROJECT



# Completing the Plan – Outstanding Needs

- Asset list confirmations
- Capability assessment survey

<https://www.surveymonkey.com/r/GTLKR7Y>

- Updated projects

# Public Survey #2

- Public Survey #1 (Risks and Vulnerabilities) – Fall 2016
  - 285 respondents
- Public Survey #2 (Mitigation Actions) – Current
  - Need more responses!

<https://www.surveymonkey.com/r/EriePublic2>

# General Discussion

# Erie County Resiliency Workshop Agenda

July 20, 2017

1:00 p.m. to 4:00 p.m.

Erie County Conservation District

## **1:00 PM: Sign In**

## **1:15 PM: Welcome and Introductions**

## **1:25 PM: Quick Overview of Risk MAP and Agency Programs**

An overview of resiliency and its connection to the National Flood Insurance Program (NFIP), hazard mitigation, the Risk Mapping, Assessment, and Planning (Risk MAP) program, and State and Federal agencies will help set the course for the workshop.

## **1:45 PM: Introduction of Non-Regulatory Flood Risk Products**

Flood Risk Products greatly help assess, visualize, and communicate local flood risk. This presentation will focus on the new tools available for Erie County communities and how they can be used to support risk reduction, including:

- Support Floodplain Management, Hazard Mitigation Assistance grants, and Community Rating System activities;
- Enhance emergency and community planning by illustrating the most severely impacted areas;
- Assist with response and recovery planning and resource distribution;
- Inform flood risk reduction actions, such as advocating for higher building code requirements or the use of flood resilient designs and construction materials;
- Inform decision makers where to prioritize mitigation activities and resources;
- Help visually communicate flood risk to the public; and
- Improve risk communication and outreach.

## **2:15 PM: 10-minute break**

## **2:25 PM: Mitigation Implementation Ideas**

This session will review mitigation topics including:

- 5 year planning wheel;
- Use of FRP products;
- Plan integration opportunities;
- Discussion of the cumulative economic impact of mitigation; and
- Ideas from mitigation implementation from small to big projects.

## **2:45 PM: Erie County 2017 Hazard Mitigation Plan Update**

This session will provide an overview of the 2017 update and steps to finalize the plan and submit to PEMA and FEMA.

## **3:00 PM: Breakout Session**

This session will focus on ideas for mitigation action implementation and actions for hazards in addition to flood mitigation. Resources to refer to in the breakout sessions will include a list of hazards profiled in the 2017 HMP update, statistics on NFIP and public and individual assistance, and FEMA's Mitigation Ideas booklet.

## **3:45 PM: Next Steps and Conclusion**

## **4:00 PM: Adjourn**

For follow-up questions or comments, contact Sarah Bowen at [sbowen@mbakerintl.com](mailto:sbowen@mbakerintl.com) or 215-430-5517.



# Erie County Multi-Jurisdictional Hazard Mitigation Plan

2017 Update

Planning Meeting #1

October 27, 2016 ~ 10:00 a.m. & 6:00 p.m.

# Agenda

1. Welcome & Introductions
2. Overview of the Hazard Mitigation Process
3. Hazard Review
  - Hazards in the Existing Plan
  - Hazards to Add?
  - Committee Member Homework!
4. Preparation for Next Stakeholder Committee Meeting
  - Discussion of Date
  - Introduction: Asset Inventorying
5. Q&A

# What is a Hazard Mitigation Plan?

- Formal document that identifies risk to all hazards (e.g., Flooding, High Winds, Winter Storms, Land Subsidence, Wildfires, Earthquakes, etc.). It will also incorporate mitigation strategies and risk reduction strategies. It is a LIVING document!
- Plan must be reviewed/updated/re-adopted and submitted to FEMA every 5 years. The plan expires in 2017.

# Hazard Mitigation Planning Process

- |   |   |   |
|---|---|---|
| <b>TASK 1</b> Determine the Planning Area and Resources | <b>TASK 4</b> Review Community Capabilities | <b>TASK 9</b> Create a Safe and Resilient Community |
| <b>TASK 2</b> Build the Planning Team                   | <b>TASK 5</b> Conduct a Risk Assessment     |   |
| <b>TASK 3</b> Create an Outreach Strategy               | <b>TASK 6</b> Develop a Mitigation Strategy |   |
|   | <b>TASK 7</b> Keep the Plan Current         |   |
|   | <b>TASK 8</b> Review and Adopt the Plan     |   |



# Our Process – Committee

- Committee Review – Will need to meet regularly to work through the document in order to complete the timeline.
- Additional contact with committee members will be made through email, and teleconference as needed.
- Committee members will be asked to complete tasks specific to their jurisdiction.
- JHC planning staff will be primarily responsible for research and document drafting.

# Our Process – Public Input

- Public input is required per FEMA, and can be obtained in multiple ways.
  - Hazard Mitigation meetings in each jurisdiction for the public to comment on the process.
  - Copies of the plan placed at county offices/libraries for public review and comment.
  - Online surveys regarding the current plan, public thoughts on hazard mitigation, and comments on the updated plan draft.
    - Social media presence is very important for these surveys to be successful.

# Multi-Jurisdictional Requirements

- The Hazard Risk Assessment and Multi-Jurisdictional Mitigation Plan will cover all 38 municipalities in Erie County.
- There are certain requirements that municipalities must meet for inclusion in the plan.
  - Anything above and beyond the required participation is welcomed and appreciated.
  - The more input there is, the more (and better) the plan will serve the county and municipalities.

## Hazards In Current Plan

- Coastal Erosion
- Drought
- Earthquake
- Floods
- Invasive Species
- Landslide
- Tornado & Windstorm
- Winter Storm
- Dam Failure
- Nuclear Incident
- Transportation Accident
- Urban Fire & Explosion
- Utility Interruption

# Editing Hazards

- What on the previous list would you like to see changed?(Such as separating windstorms and tornados).
- Are there any hazards not on the previous list that should be? (Hazardous materials for example).
- Are there any hazards that you don't think belong on the list/in the plan?

# Probability vs. Severity

## Hazard Probability Classifications

Description	Frequency
Frequent	Continuously experienced
Probable	Experienced several times
Occasional	Experienced
Remote	Unlikely that it has been experienced.
Improbable	Not experienced.

# Probability vs. Severity

## Hazard Severity Classifications

Description	Mishap Definition
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness or marginal structural damage
Marginal	Minor injury, minor illness or structural damage
Negligible	Less than minor injury, illness or structural damage.

# Probability vs. Severity

## Risk Assessment Matrix

HAZARD SEVERITY	PROBABILITY				
	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic	Red	Red	Red	Yellow	White
Critical	Red	Red	Yellow	White	White
Marginal	Yellow	Yellow	White	White	White
Negligible	White	White	White	White	White

Red	Risk reduction required
Yellow	Risk reduction suggested
White	Risk reduction not required



# Worksheet

- Please fill out the worksheet that has been distributed. This will allow us to see what the perception of vulnerability is in Erie County for the hazards discussed earlier.
- Please leave this worksheet behind after the meeting for us to collect.

# Asset Inventory

- Part of the process is to update the Asset Inventory included in the plan. Assets fall into one of the five categories below
  - *Critical Facilities*: Governmental facilities, water/wastewater facilities, emergency services facilities, military facilities, and the transportation infrastructure.
  - *Vulnerable Populations*: Schools, nursing homes, hospitals, and senior centers.
  - *Economic Assets*: Large commercial/industrial facilities or large employers (not covered in other categories).
  - *Special Considerations*: Residences, community outreach facilities, post offices, and libraries.
  - *Historical Considerations*: Areas/structures listed on the National Register of Historic Places.
- You will be receiving a list of the assets that were included for your jurisdiction in the existing plan. Need you to make revisions, deletions, and additions.

# Municipal Committee Member Homework

- Asset Inventory Pages
  - Confirm
  - Add
  - Delete
- Project Discussions
  - Lists will be emailed out
  - Note projects for:
    - Status
    - Narrative explanation of the status.

# Adjournment

- Thanks for your input!
- Look for survey links and asset inventories to be sent out soon.



# Erie County Multi-Jurisdictional Hazard Mitigation Plan

2017 Update

Planning Meeting #2

May 2, 2017 ~ 9:00 a.m. & 6:00 p.m.

# Agenda

1. Welcome & Introductions
2. Update: Where We Are in the Process
3. Existing Projects
  - Distribute lists
  - Status labels
  - Status narratives
4. Mitigation Goals
  - Overview and samples
  - Activity: Determination of goals
5. New Projects
6. Q&A

# Update: Where We Are in the Process

- Hazard Profiles
  - Drafts under review by steering committee
  - Drafts to be distributed to remaining committee members
- Asset Lists
  - No asset lists returned from municipalities
    - If anyone has updated lists with them today, thank you!
    - If you would like a printed list for your municipality, see one of us after the meeting.
  - We will begin telephone follow-ups next week

# Hazard Mitigation Planning Process

**TASK 1** Determine the Planning Area and Resources

**TASK 2** Build the Planning Team

**TASK 3** Create an Outreach Strategy

**TASK 4** Review Community Capabilities

**TASK 5** Conduct a Risk Assessment

**TASK 6** Develop a Mitigation Strategy

**TASK 7** Keep the Plan Current

**TASK 8** Review and Adopt the Plan

**TASK 9** Create a Safe and Resilient Community



# Existing Projects

- Distribute Lists
- Status Options
  - Completed
  - Deleted
  - Deferred
  - On-Going
- Status Narratives

# Existing Projects: Discussion

- Who has undertaken traditional mitigation projects such as buy-outs?
  - Was the project started after 2012?
- Who has undertaken non-traditional mitigation projects?
  - Example: Stormwater management and/or system upgrades
  - Example: Educate the public about hazard mitigation
  - Example: Safe rooms

# Existing Projects: Status Update Samples

Greenbrier 9	Flooding	7	Continue to apply for HMPG funds for acquisitions, elevations, or relocations of identified at risk, repetitive loss, non-repetitive loss, or substantial damaged properties in Greenbrier County	November 2016	November 2021	GCEMA	Greenbrier County Commission, Greenbrier County Floodplain Manager	Prevention	Approx. \$71,300 per purchase	HMPG
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Status: ON-GOING. 15 properties have been acquired since the last HMP update and 58 have been acquired in total. The County does not currently distribute funds for elevation projects but the program is now changing to include elevation and mitigation reconstruction.

Greenbrier 28	Misc.	5	Purchase and install generators at emergency shelter sites (some of which co-exist with fire departments) and critical facilities.	February 2017	December 2021	GCHSEM	Greenbrier County Commission	Emergency Services	Up to \$80,000 per installation	HMGP funds
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Status: ON-going. The project was not included in the prior HMP update but has been initiated within that cycle. One generator has been installed through HMGP funding for a county shelter and one for the emergency shelter in the Town of Alderson. Three more applications have been submitted for shelters.

# Existing Projects: Status Update Samples

Ansted 1	Misc.	N/A	Develop more in depth municipal asset list to better understand the value of structures within the town	N/A	N/A	Municipal Council	Fayette County Office of Emergency Services (FCOES)	Emergency Services	Part of regular operations	N/A
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Status: COMPLETED. A community asset inventory was completed by WVU Capstone Students Identifying historical and tourism assets for long term economic opportunities. The Town has successfully removed eight dilapidated structures from the community.

# Mitigation Goals

- Overview
  - What long term outcomes do you want to achieve?
- Samples
  - “Minimize loss of life, injury, and damage to property, the economy, and the environment from natural hazards.”
  - “Reduce economic losses.”
  - “Increase cooperation and coordination among private entities, local agencies, state agencies, and federal agencies.”
  - “Protect natural and cultural resources.”

# Mitigation Goals: Determination of Goals

- Nomination of Potential Goals
  - Think of your jurisdiction
  - Tell us how the goal contributes to mitigation
    - Think about the dollar losses you have experienced from any hazard
    - How does this goal help that number get to zero?

# New Projects

- **Mitigation Action:** A specific action, project, activity, or process taken to reduce or eliminate long-term risk to people and property from hazards and their impacts.
- Types
  - Local plans and regulations
  - Structure and infrastructure projects
  - Natural systems protection
  - Education and awareness programs

# New Projects

- We need to be able to *align new projects with the goals* we just worked to develop.



# Moving Forward

- Capabilities Survey
- Future Meetings
  - Project prioritization
  - Draft review
- Final Review
- Approval and Adoption

# Municipal Committee Member Homework

- Update Status of Existing Projects
  - Status label
  - Status narrative
- Generate New Projects
  - Recommended: Who might be a coordinating agency and a support agency?
  - Recommended: Potential funding sources?
  - Recommended: Potential cost estimate?

# Adjournment

- Thanks for your input!
- Look for capabilities survey links and draft profiles soon.



### LOCAL HAZARD MITIGATION PLANNING

#### Hazard Mitigation Planning for Resilient Communities

Disasters can cause loss of life; damage buildings and infrastructure; and have devastating consequences for a community’s economic, social, and environmental well-being. Hazard mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. In other words, hazard mitigation keeps natural hazards from becoming natural disasters.

Hazard mitigation is best accomplished when based on a comprehensive, long-term plan developed before a disaster strikes. Mitigation planning is the process used by state, tribal, and local leaders to understand risks from natural hazards and develop long-term strategies that will reduce the impacts of future events on people, property, and the environment.

#### The Local Mitigation Planning Process

The mitigation plan is a community-driven, living document. The planning process itself is as important as the resulting plan because it encourages communities to integrate mitigation with day-to-day decision making regarding land use planning, floodplain management, site design, and other functions. Mitigation planning includes the following elements:

**Public Involvement** – Planning creates a way to solicit and consider input from diverse interests, and promotes discussion about creating a safer, more disaster-resilient community. Involving stakeholders is essential to building community-wide support for the plan. In addition to emergency managers, the planning process involves other government agencies, businesses, civic groups, environmental groups, and schools.

**Risk Assessment** – Mitigation plans identify the natural hazards and risks that can impact a community based on historical experience, estimate the potential frequency and magnitude of disasters, and assess potential losses to life and property. The risk assessment process provides a factual basis for the activities proposed in the mitigation strategy.

**Mitigation Strategy** – Based on public input, identified risks, and available capabilities, communities develop mitigation goals and objectives as part of a strategy for mitigating hazard-related losses. The strategy is a community’s approach for implementing mitigation activities that are cost-effective, technically feasible, and environmentally sound as well as allowing strategic investment of limited resources.

#### Disaster Mitigation Act of 2000

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by the Disaster Mitigation Act of 2000, is intended to “reduce the loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from natural disasters.”

Under this legislation, state, tribal, and local governments must develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance through the Hazard Mitigation Assistance Programs. The regulatory requirements for local hazard mitigation plans can be found at Title 44 Code of Federal Regulations §201.6.

For more information about FEMA’s Hazard Mitigation Assistance Grants, visit: [www.fema.gov/hazard-mitigation-assistance](http://www.fema.gov/hazard-mitigation-assistance).

## Benefits of Hazard Mitigation

Mitigation is an investment in your community's future safety and sustainability. Mitigation planning helps you take action now, before a disaster, to reduce impacts when a disaster occurs. Hazard mitigation planning helps you think through how you choose to plan, design, and build your community and builds partnerships for risk reduction throughout the community. Consider the critical importance of mitigation to:

- Protect public safety and prevent loss of life and injury.
- Reduce harm to existing and future development.
- Maintain community continuity and strengthen the social connections that are essential for recovery.
- Prevent damage to your community's unique economic, cultural, and environmental assets.
- Minimize operational downtime and accelerate recovery of government and business after disasters.
- Reduce the costs of disaster response and recovery and the exposure to risk for first responders.
- Help accomplish other community objectives, such as capital improvements, infrastructure protection, open space preservation, and economic resiliency.

Having a hazard mitigation plan will increase awareness of hazards, risk, and vulnerabilities; identify actions for risk reduction; focus resources on the greatest risks; communicate priorities to state and federal officials; and increase overall awareness of hazards and risks.

## Mitigation Activities for Risk Reduction

Possible mitigation activities may include:



Adoption and enforcement of regulatory tools, including ordinances, regulations, and building codes, to guide and inform land use, development, and redevelopment decisions in areas affected by hazards.



Acquisition or elevation of flood-damaged homes or businesses retrofit public buildings, schools, and critical facilities to withstand extreme wind events or ground shaking from earthquakes.



Creating a buffer area by protecting natural resources, such as floodplains, wetlands, or sensitive habitats. Additional benefits to the community may include improved water quality and recreational opportunities.



Implement outreach programs to educate property owners and the public about risk and about mitigation measures to protect homes and businesses.

## Mitigation Plan Implementation & Monitoring

History shows that hazard mitigation planning and the implementation of risk reduction activities can significantly reduce the physical, financial, and emotional losses caused by disasters. Putting the plan into action will be an ongoing process that may include initiating and completing mitigation projects and integrating mitigation strategies into other community plans and programs. Monitoring the plan's implementation helps to ensure it remains relevant as community priorities and development patterns change.

## Planning Guidance, Tools, and Resources

FEMA provides a variety of guidance, tools, and resources to help communities develop hazard mitigation plans. These resources and more can be found online at: [www.fema.gov/hazard-mitigation-planning-resources](http://www.fema.gov/hazard-mitigation-planning-resources).

- [Hazard mitigation planning laws, regulations, and policies](#) guide development of state, local, and tribal FEMA-approved hazard mitigation plans.
- The [Local Mitigation Planning Handbook](#) is the official guide for governments to develop, update, and implement local plans. The Handbook includes guidance, tools, and examples communities can use to develop their plans.
- [Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards](#) provides ideas for mitigation actions.
- Visit [www.fema.gov/hazard-mitigation-planning-training](http://www.fema.gov/hazard-mitigation-planning-training) for more information on available online and in-person mitigation planning training.

*"FEMA's mission is to support our citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards."*

## ERIE COUNTY HAZARD MITIGATION PLAN UPDATE

### WHAT IS MITIGATION?

According to the Federal Emergency Management Agency (FEMA), which oversees the hazard mitigation process at the local, regional, state, and national levels, “mitigation is the effort to reduce loss of life and property by lessening the impact of disasters” (FEMA.gov, 2016). Generally, we think of mitigation as any strategy or action that can be taken now (or in the near future) to reduce the impact of a future disaster. These strategies and actions are developed into projects during the hazard mitigation process, where coordinating agencies are identified, potential costs are estimated, and potential funding sources are identified.

### WHY IS PARTICIPATION IN MITIGATION PLANNING IMPORTANT?

1	Local governments have a responsibility to provide for the public safety.
2	There is also a specific regulatory driver for participation. Communities that do not adopt an approved hazard mitigation plan will not be eligible for the following federal funding: Flood Mitigation Assistance (FMA), Hazard Mitigation Grant Program (HMGP), or Pre-Disaster Mitigation (PDM).
3	The mitigation plan contains more than just projects that can be funded by FEMA. By participating, you may realize that other community initiatives, such as storm water management, coastal management, and even some infrastructure projects have hazard mitigation components. As such, by including those in the mitigation plan, you may identify alternate or extra sources of funding for your projects.

### ASSET INVENTORY

One major role that municipalities play in the process is updating asset inventories. Asset inventories list all the facilities that a municipality feels is important. These assets fall into one of the five categories, shown below. The current list will be provided, and we ask that you check that the facilities are still in existence and still located at the address noted. If there are additional assets you wish to add, we need to the name of the facility, its address, and the category under which it falls.

- **Critical Facilities:** Governmental facilities, water/wastewater facilities, emergency services facilities, medical facilities (hospitals/clinics), and transportation infrastructure.
- **Vulnerable Populations:** Schools, nursing homes, and senior centers.
- **Economic Assets:** Large commercial/industrial facilities or large employers not covered in other categories.
- **Special Considerations:** Residences, community outreach facilities, post offices, and libraries.
- **Historical Considerations:** Areas/structures listed on the National Register of Historic Places.



## MITIGATION PROJECTS

For a municipality to be included in the hazard mitigation plan, and thus be eligible for hazard mitigation funding, it must have at least one mitigation project listed in the plan. These projects fall into one of four categories shown in the table below, from the FEMA *Local Mitigation Planning Handbook*. It is important to note that these projects are aimed at directly reducing risks a community faces from a given hazard. For example, planning for a response to disaster, while an important aspect in preparedness, is not generally considered a mitigation project.

Category	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies or codes that influence the way land and buildings are developed and built	Comprehensive Plans, Land Use Ordinances, NFIP, Community Rating System, Open Space Preservation, etc.
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard, or remove them from a hazard area. This can also include constructing structures to reduce the impacts of hazards	Acquisitions, elevations, or relocations of structures in flood zones, utility undergrounding, flood walls and retaining walls, culverts, safe rooms, etc.
Natural Systems Protection	These are actions that minimize damage and losses, while also preserving or restoring the functions of natural systems	Sediment and erosion control, stream restoration, forest management, wetland restoration and preservation, etc.
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.	Radio or television spots, websites with maps and information, presentations to school groups or other organizations, participating in national programs such as StormReady, etc.

The project update process will be done in two phases. The first is the updating phase, which involves updating the status of the projects listed in the current plan. Each municipality, plus the county, has at least one project listed in the plan. For this, please list which of the following statuses the project falls under.

- **COMPLETED:** The project, as it is written, has been completed in its entirety. Any reporting and/or paperwork has been closed out
- **DELETED:** The project no longer aligns with local priorities or has been deemed unfeasible/beyond the scope of mitigation. The project is being removed from the plan.
- **DEFERRED:** The project is still a viable project; however, other priorities have forced its consideration to be moved into the future.
- **ON-GOING:** The project has been started; work is currently being completed on the project and it is not anticipated to be done before the date current plan expires.

In addition to this status, we need a brief description of the project. What has been done to date? If the project is completed, when was it completed? If the final project is different than written, please explain the difference. If deleting or deferring the project, why? In order to win approval for the hazard mitigation plan, both the Pennsylvania Emergency Management Agency and FEMA expect to see these updates.

The second phase of the project list is the development of new projects. This will occur later in the process, and you may begin thinking about new projects for your jurisdiction.





## Mitigation's Value to Society

### Building Stronger and Safer

*Mitigation is the effort to reduce the loss of life and property by lessening the impact of disasters. A recent study by the Multihazard Mitigation Council (MMC)\* shows that each dollar spent on mitigation saves an average of \$4.00.*

### Value to Society

Mitigation yields benefits to society and therefore:

- It creates safer communities by reducing loss of life and property;
- It enables individuals to recover more rapidly from floods and other disasters; and
- It lessens the financial impact on the Federal Treasury, States, Tribes, and communities.

FEMA's Federal Insurance and Mitigation Administration implements numerous congressionally authorized programs that address the effects of natural hazards through mitigation activities.

### Mitigation Creates Safer Communities

In any disaster, buildings constructed to a higher standard not only reduce property damage but can also save lives. Homes constructed to National Flood Insurance Program (NFIP) standards incur 80 percent less damage from floods than structures not built to those standards.

### Mitigation Speeds Recovery

Mitigation is key to decreasing the time it takes to rebuild and recover after a disaster. By using existing, proven plans and building standards, mitigation allows individuals and communities to lessen post-disaster disruption and rebuild more quickly. Long-term hazard mitigation planning and projects enable communities and individuals to break the cycle of disaster damage, reconstruction, and repeated loss.

### Mitigation Saves Money

Mitigation activities have been proven to lessen the financial impact on individuals, communities, and society as a whole. Floodplain management actions save the country more than \$1 billion in prevented damages each year.

### Mitigation is Cost-Effective

In December 2005, the MMC of the National Institute of Building Sciences (NIBS) released *Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities*. The report was the culmination of a 3-year, congressionally mandated independent study.

Key findings included:

- A dollar spent on mitigation saves society an average of \$4.00, with positive benefit-cost ratios for all hazard types studied.
- In addition to savings to society, the Federal Treasury can redirect an average of \$3.65 for each dollar spent on mitigation resulting from disaster relief costs and tax losses avoided.

### Case Study: Grand forks, North Dakota

In 1997, the Red River flooded 8,600 homes in Grand Forks, North Dakota, causing \$3.7 billion in flood losses. Following the disaster, the State of North Dakota, local governments, and FEMA worked together to buy out almost 700 of the most vulnerable homes in the State with FEMA mitigation grant program funds. The Red River flooded again in 2006, yet losses were kept to \$6.5 million as a result of the mitigation projects and studies. Demonstrating mitigation's cost-effectiveness is critical to the continued success of FEMA mitigation



## Mitigation is Cost-Effective

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Key findings included:

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- In addition to savings to society, the Federal Treasury can redirect an average of \$3.65 for each dollar spent on mitigation resulting from disaster relief costs and tax losses avoided.
- In each of the eight communities studied in-depth, FEMA mitigation grants were a significant part of the community's mitigation history and often led to additional loss reduction activities.
- Mitigation is sufficiently cost-effective to warrant federal funding both before disasters occur and during post-disaster recovery.

## MMC Report Recommendations

The MMC report demonstrated through statistical and community analyses that positive net benefits result from hazard mitigation. In addition, the MMC report included three basic recommendations:

- Mitigation should continue to be federally funded on an ongoing basis. It should encompass projects that relate to enforcing strong building codes and land use measures, and promote development of comprehensive plans to limit damage and reduce losses.
- Mitigation is most effective when carried out on a comprehensive, community-wide, and long-term basis. Implementing coordinated mitigation activities over time is the best way to ensure that communities will be physically, socially, and economically resilient to future hazard impacts.
- The effectiveness of mitigation activities must continue to be studied and analyzed. Systematic data collection and assessment of various mitigation approaches are required to ensure that lessons learned are incorporated into disaster public policy.

### For More Information

The two-volume study report is available for free download at:  
<http://www.nibs.org/index.php/mmc/projects/nhms>.

# MITIGATION PROJECT IDEAS

## Types of Mitigation Actions

1. Local Planning and Regulations
2. Structure and Infrastructure Projects
3. Natural Systems Protection
4. Education and Awareness Programs

*General examples are planning and zoning, floodplain protection, property acquisition and relocation, or public outreach projects.*

## FLOODING

**Local Planning & Regulations:** Comprehensive planning and floodplain management can mitigate flooding by influencing development.

- **Objective:** INCORPORATE FLOOD MITIGATION IN LOCAL PLANNING.
  - **Strategy:** Pass and enforce an ordinance that regulates dumping in streams and ditches.

**Structure & Infrastructure Projects:** Rainwater and snowmelt can cause flooding and erosion in developed areas.

- **Objective:** IMPROVE STORM WATER DRAINAGE SYSTEM CAPACITY.
  - **Strategy:** Require developers to construct on-site retention basins for storm water and as a firefighting water source.

**Natural Systems Protection:** Natural resources provide floodplain protection, riparian buffers, and other ecosystem services that mitigate flooding.

- **Objective:** PROTECT & RESTORE NATURAL FLOOD MITIGATION FEATURES.
  - **Strategy:** Establish and manage riparian buffers along rivers and streams.

**Education & Awareness Programs:** Support mitigation by educating property owners regarding options for mitigating their own properties.

- **Objective:** EDUCATE PROPERTY OWNERS ABOUT FLOOD MITIGATION TECHNIQUES.
  - **Strategy:** Educate the public about securing debris, propane tanks, yard items, or stored objects that might otherwise be swept away, damaged, or pose a hazard if picked up and washed away by floodwaters.

## SEVERE WEATHER

**Local Planning & Regulations:** Adopt regulations governing residential construction to prevent wind and other weather damage.

- **Objective:** ADOPT & ENFORCE BUILDING CODES.
  - **Strategy:** Review building codes and structural policies to ensure they are adequate to protect older structures from severe weather damage.

**Structure & Infrastructure Projects:** Power lines can be protected from the impacts of severe weather.

- **Objective:** PROTECT POWER LINES.
  - **Strategy:** Install redundancies and loop feeds.

**Education & Awareness Programs:** Support mitigation by lessening impacts to a community's vulnerable populations.

- **Objective:** ASSIST VULNERABLE POPULATIONS.
  - **Strategy:** Identify specific at-risk populations that may be exceptionally vulnerable in the event of long-term power outages.

## MULTIPLE HAZARDS

**Local Planning & Regulations:** Understanding community vulnerability and level of risk is important to identify and prioritize mitigation alternatives.

- **Objective:** ASSESS COMMUNITY RISK.
  - **Strategy:** Develop and maintain a database to track community vulnerability (i.e., exposure in known hazard areas).

**Structure & Infrastructure Projects:** Lessening damage to structures supports mitigation.

- **Objective:** PROTECT STRUCTURES.
  - **Strategy:** Retrofit fire and police stations to become hazard resistant.

**Education & Awareness Programs:** Encouraging private mitigation reduces the potential strain on public sources.

- **Objective:** PROMOTE PRIVATE MITIGATION EFFORTS.
  - **Strategy:** Use outreach programs to: (a) advise homeowners of risks to life, health, and safety; (b) facilitate technical assistance programs that address measures citizens can take; or (c) facilitate funding for mitigation measures.

## EARTHQUAKE

**Local Planning & Regulations:** Support mitigation by better understanding and assessing local vulnerability to earthquakes.

- **Objective:** MAP AND ASSESS COMMUNITY VULNERABILITY TO SEISMIC HAZARDS.
  - **Strategy:** Develop an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage, including pre-1940s homes and homes with cripple wall foundations.

**Structure & Infrastructure Projects:** Reduce potential damage to critical facilities and infrastructure from future seismic events through structural upgrades.

- **Objective:** PROTECT CRITICAL FACILITIES & INFRASTRUCTURE.
  - **Strategy:** Require bracing of generators, elevators, and other vital equipment at hospitals.

**Education & Awareness Programs:** Support mitigation through increasing awareness of the hazard.

- **Objective:** INCREASE EARTHQUAKE RISK AWARENESS.
  - **Strategy:** Offer GIS hazard mapping online for residents and design professionals.

## LAND SUBSIDENCE

**Local Planning & Regulations:** Support mitigation by ensuring that development efforts consider the soil conditions of an area.

- **Objective:** MANAGE DEVELOPMENT IN HIGH-RISK AREAS.
  - **Strategy:** Restrict develop in areas with soil that is considered poor or unsuitable for development.

**Structure & Infrastructure Projects:** To prevent property loss, acquire and demolish or relocate buildings and infrastructure in high-risk areas.

- **Objective:** REMOVE EXISTING STRUCTURES FROM SUBSIDENCE HAZARD AREAS.
  - **Strategy:** Identify and offer buyouts and other incentives for property owners who relocate from subsidence-prone areas.

**Education & Awareness Programs:** Support mitigation by increasing residents' knowledge of subsidence.

- **Objective:** EDUCATE RESIDENTS ABOUT SUBSIDENCE.
  - **Strategy:** Promote community awareness of subsidence risks and impacts.

## DROUGHT

**Local Planning & Regulations:** Monitoring drought conditions can provide early warning for policymakers and planners to make decisions.

- **Objective:** MONITOR DROUGHT CONDITIONS.
  - **Strategy:** Identify local drought indicators, such as precipitation, temperature, surface water levels, soil moisture, etc. Establish a regular schedule to monitor and report conditions on at least a monthly basis.

**Structure & Infrastructure Projects:** Improving water supply and delivery systems helps to save water.

- **Objective:** RETROFIT WATER SUPPLY SYSTEMS.
  - **Strategy:** Develop new or upgrade existing water delivery systems to eliminate breaks and leaks.

**Natural Systems Protection:** Certain landscaping and civil design techniques can encourage a drought-tolerant landscape.

- **Objective:** ENHANCE LANDSCAPING & DESIGN MEASURES.
  - **Strategy:** Use permeable driveways and surfaces to reduce runoff and promote groundwater discharge.

**Education & Awareness Programs:** Encourage practices that foster soil health and improve soil quality to help increase resiliency and mitigate the impacts of droughts.

- **Objective:** EDUCATE FARMERS ON SOIL & WATER CONSERVATION PRACTICES.
  - **Strategy:** Encourage rotation of crops by growing a series of different types of crops on the same fields every season to reduce soil erosion.

## Jeffery Harvey

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**From:** Bowen, Sarah <sbowen@mbakerintl.com>  
**Sent:** Wednesday, July 19, 2017 11:33 AM  
**To:** McGranor, John; Wyrosdick, Kathy; Anderson, Ryan; Mesaros, Brian; Robinson, Dale; Jeffery Harvey (jharvey@jhcreparedness.com); Kelly, John  
**Cc:** Radford, Mari; Baker, Charles; Pierson, Robert; Hodges, Race; Geoghan, Alyssa  
**Subject:** Final Logistics for Erie County Resiliency Workshop  
**Attachments:** RSVP-2017-07-17T0726.xlsx

Hello County Partners,  
We are all set and ready for tomorrow and I just wanted to reach out on a few items.

We have fantastic County, State and Federal representation and are light on municipalities. If you want to email a reminder to the municipalities you invited today that would be great. RSVPs are attached.

**Workshop Location:** The Erie County Conservation District, 1927 Wager Rd, Erie, PA 16509

**Workshop Time:** 1:00 to 4:00 PM, I will arrive at 11:30 AM to setup

**Cell:** My cell is 215-715-4652 if you have any day of changes. I am in Erie now through early Friday morning. If you have questions just let me know.

### Agenda:

**11:30 AM to 12:45 PM: Set up, Sarah**

**1:00 PM: Sign In, Sarah**

**1:15 PM: Welcome and Introductions, Sarah**

I'll ask the county to say a few words to kick-off and then I will facilitate this section.

**1:25 PM: Quick Overview of Risk MAP and Agency Programs, Charlie**

**1:45 PM: Introduction of Non-Regulatory Flood Risk Products, Alaurah with Bob**

**2:15 PM: 10-minute break**

**2:25 PM: Mitigation Implementation Ideas, Sarah**

**2:45 PM: Erie County 2017 Hazard Mitigation Plan Update, Jeff Harvey**

Jeff please email your presentation or bring it on a thumb drive.

### **3:00 PM: Breakout Session**

In the break-out sessions, we will facilitate a conversation on resiliency, how to use flood risk products and hazard mitigation implementation. There will be hand outs on the table including statistics on the NFIP, IA and PA for each community in the county and the FEMA's Mitigation Ideas booklet. Jeff, please just bring anything that you think would be a helpful reference in the discussion. The goal output would be key ways that would implement mitigation and build resiliency and conversely challenges to implementation where they need more help and resources. I have divided groups so that there is as even a distribution of County Planning, Public Safety and others in each group due to your local expertise. The group facilitators follow:

- **Group 1 Facilitators**
  - **Sarah Bowen**, Interim CERC Liaison, Resilience Action Partners
  - **Fred Chapman**, State NFIP Coordinating Office, PA Department of Community and Economic Development
  - **Laura Ortiz**, Buffalo District, US Army Corps of Engineers
  - **Robert Pierson**, Risk Analysis Project Officer, FEMA Region III
  
- **Group 2 Facilitators**
  - **Charles Baker**, Floodplain Management and Insurance Planner, FEMA Region III
  - **Alaurah Moss**, Coastal Scientist, Dewberry
  - **Ernie Szabo**, Hazard Mitigation Planner, PA Emergency Management Agency

**3:45 PM: Next Steps and Conclusion, Sarah**

Each group will report back on discussion. A participant may volunteer or it may be one of facilitators reporting back.

**4:00 PM: Adjourn, Sarah**

Please let me know if you have any questions or need anything else.

Take care,  
Sarah

**Sarah K. Bowen, AICP/PP, CFM** | Director, Planning & Environmental Services | Michael Baker International  
1818 Market Street, Suite 3110 | Philadelphia, PA 19103 | [O] 215-430-5517 | [M] 215-715-4652  
[sbowen@mbakerintl.com](mailto:sbowen@mbakerintl.com) | [www.mbakerial.com](http://www.mbakerial.com)

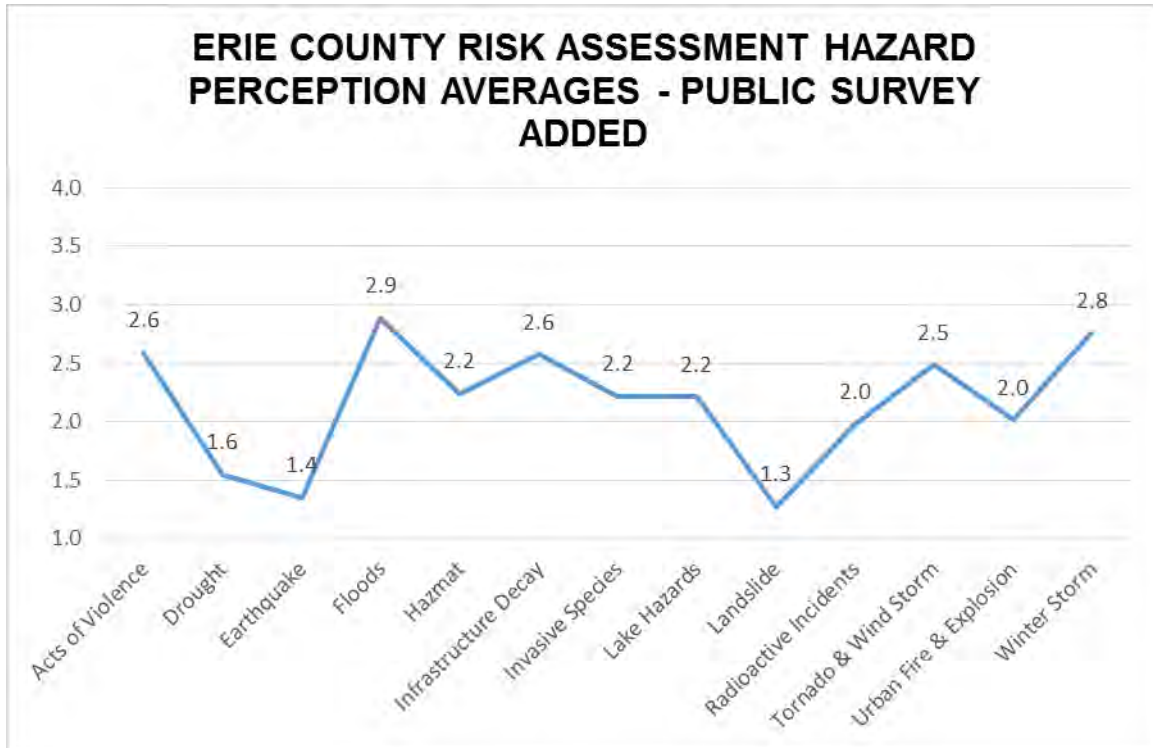
## ERIE COUNTY HAZARD MITIGATION PLAN (2017 UPDATE)

### HAZARD PERCEPTIONS

The 2017 update of the *Erie County Hazard Mitigation Plan* considers the following hazards.

Name	Description
Acts of Violence	Includes but is not limited to acts of terrorism (domestic and international), active shooter situations, and acts of school violence.
Drought	Considers agricultural and livestock impacts.
Earthquake	Includes earthquakes with epicenters in Erie County as well as those from the wider region felt in Erie County.
Floods	Includes river floods, coastal floods, storm surges, inland flooding, flash flooding, stormwater backups, etc.
Hazardous Materials	Includes incidents at fixed facilities involving hazardous materials and incidents during transport by highway or rail.
Infrastructure Decay	Considers the decay and/or failure of critical infrastructure including dams, bridges, water systems, etc. Includes utility interruptions that are not cascading effects of another hazard.
Invasive Species	Includes both land and water types.
Lake Hazards	Includes coastal erosion, harmful algae blooms (HABs), high lake levels, and seiche waves.
Landslide	Includes land subsidence, landslides, mud flows, expansive soils, etc.
Radioactive Incidents	Includes incidents at fixed facilities such as the Perry Nuclear Power Plant and transportation incidents involving radioactive/nuclear materials.
Tornado & Windstorm	Includes high winds, strong winds, thunderstorms, and tornadoes.
Urban Fire & Explosion	Includes large structure fires, multi-structure fires, and explosions of all types.
Winter Storms	Includes heavy snow, ice storms, and lake effect snow as well as cascading effects such as utility failures and transportation incidents.





Rankings correspond to the following scale:

- 1 – Not at All Concerned
- 2 – Somewhat Concerned
- 3 – Concerned
- 4 – Very Concerned

Top 10 Hazards by Perception

1. Floods
2. Winter Storm
- T3. Acts of Violence
- T3. Infrastructure Decay
5. Tornado and Windstorms
- T6. Hazardous Materials Incidents
- T6. Invasive Species
- T6. Lake Hazards
- T9. Radioactive Incidents
- T9. Urban Fire and Explosions

Top 10 Hazards by Potential Loss (\$)¹

1. Tornado and Windstorm² (\$800,020)
2. Floods (\$424,760)
3. Winter Storm (\$149,450)
4. Hazmat (\$34,000)
5. Drought (\$8,000)
6. Radiological (\$4,200)
7. Infrastructure Decay³ (\$3,400)
8. Earthquake (Minimal per MMI)
9. ---
10. ---

¹ List only includes those hazards for which *potential per-incident dollar losses* could be calculated.

² Per-incident historical tornado losses may reach \$800,000; per-incident historical windstorm losses reach levels of approximately \$80,000.

³ Figure represents average per-household dollar loss impacts.



## **ERIE COUNTY HAZARD MITIGATION PLAN (2017 UPDATE)**

### **FREQUENTLY-APPEARING STRATEGIES**

The following are the four strategies that appear most frequently in the updated mitigation plan.

- Floodplain management – i.e., enforcement of floodplain development regulations.
- Consider participation in the Community Rating System (CRS).
- MS4 permitting considerations (to include considering applying for an MS4 permit as well as continuing to meet obligations under the permit).
- Public outreach as to personal flood mitigation.

The planning process has yielded the following opportunities that could enhance implementation of mitigation strategies.

- General education and outreach as to the departments, offices, and individuals at the local government level that could (or should) be responsible for coordinating mitigation projects.
  - For example, would the responsibility best lie with the emergency management coordinator, zoning officials, etc.?

See the attached handout for additional strategy ideas.





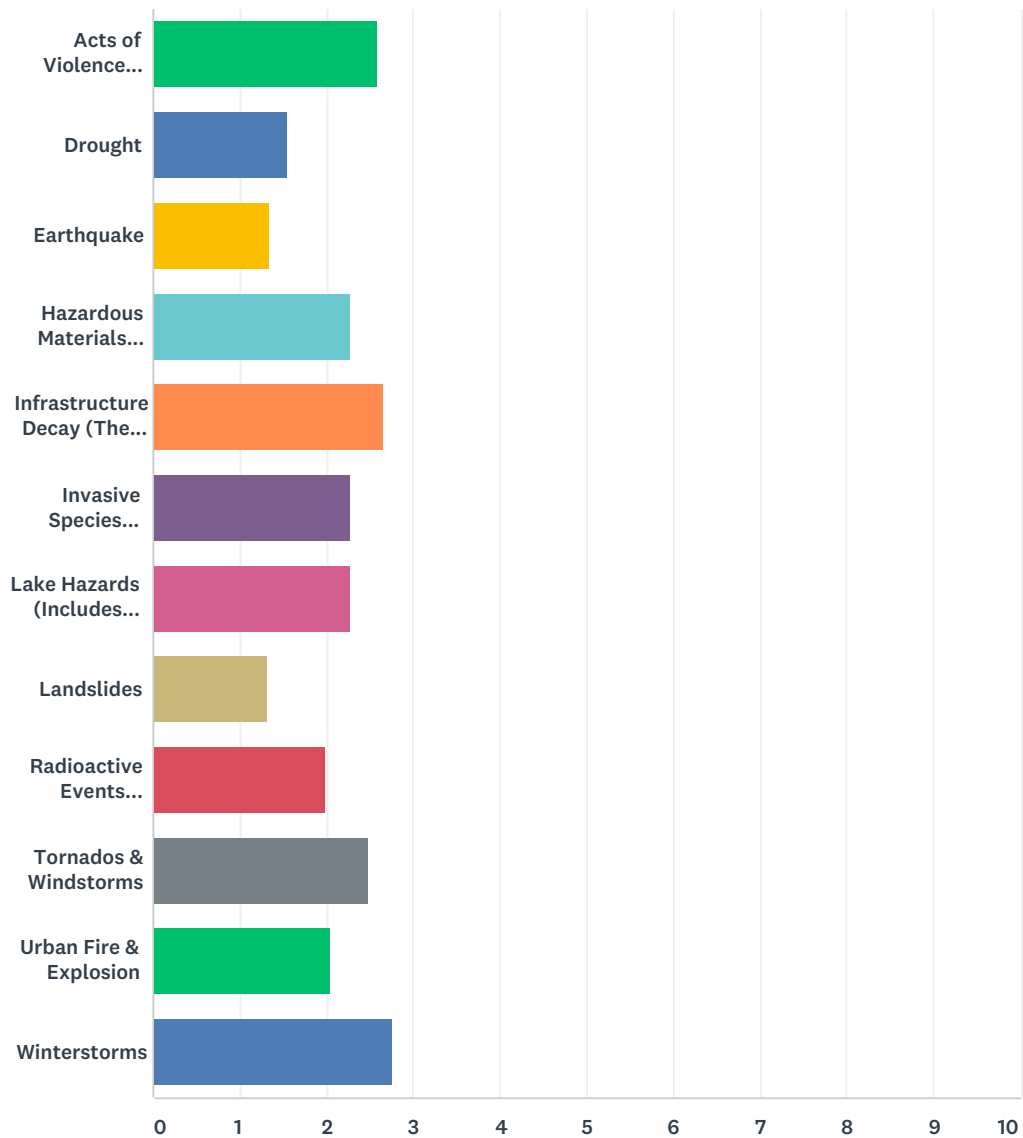
## **APPENDIX 2: PUBLIC SURVEY**

This appendix contains raw data from both public surveys conducted as part of the plan update.



Q1 Please indicate how concerned you are about the following hazards, specifically where you live.

Answered: 326 Skipped: 0



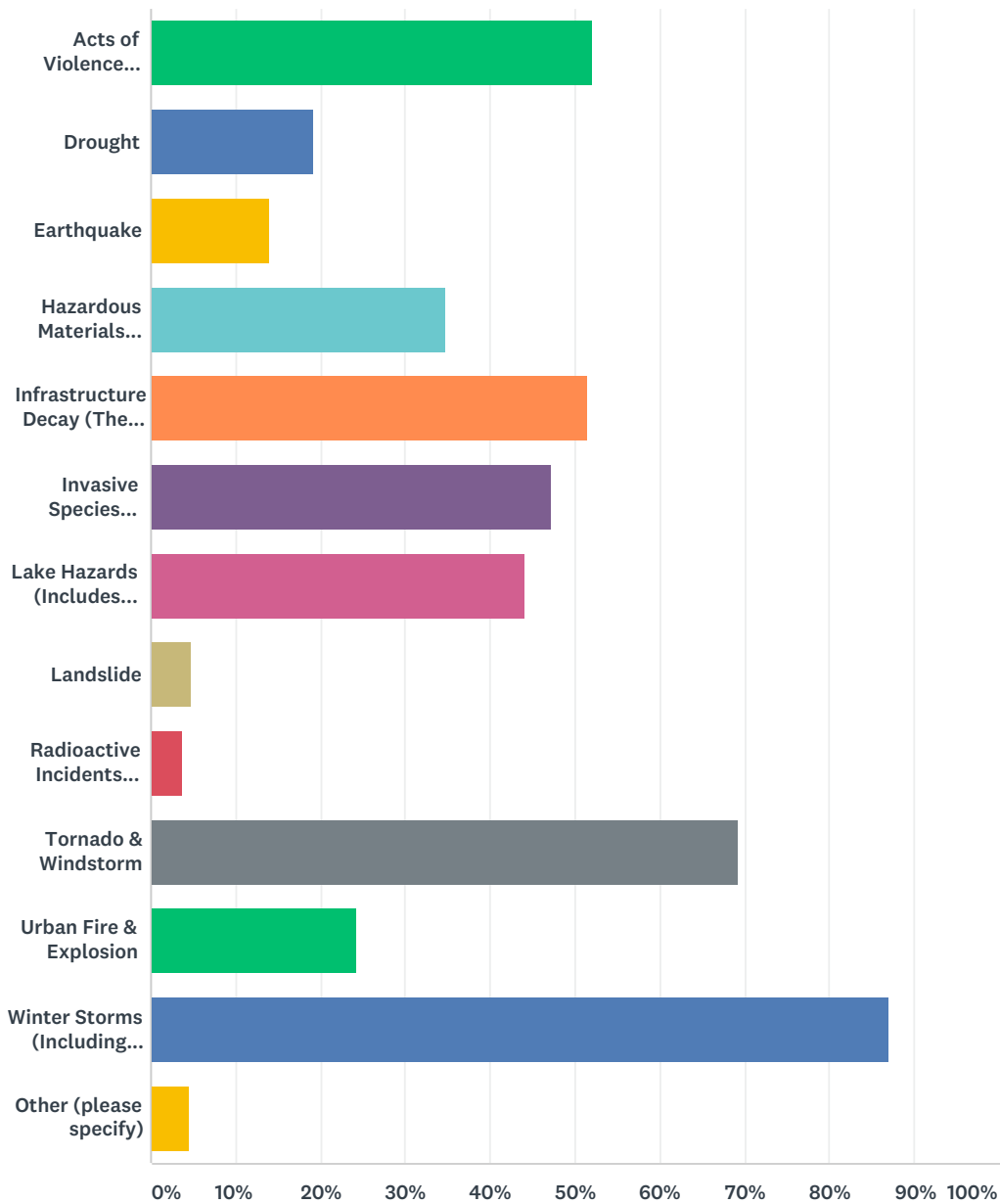
	NOT AT ALL CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	TOTAL	WEIGHTED AVERAGE
Acts of Violence (Including but not limited to acts of terrorism [domestic and international], active shooter situations, and acts of school violence)	10.84% 35	39.01% 126	29.41% 95	20.74% 67	323	2.60
Drought	59.32% 191	28.88% 93	9.01% 29	2.80% 9	322	1.55
Earthquake	72.36% 233	22.36% 72	4.04% 13	1.24% 4	322	1.34

## Erie County Hazard Mitigation Survey

Hazardous Materials (Includes incidents at fixed facilities involving hazardous materials and incidents during transport by highway or rail [including crude oil trains])	20.81% 67	41.30% 133	25.78% 83	12.11% 39	322	2.29
Infrastructure Decay (The decay and/or failure of critical infrastructure including dams, bridges, water systems, etc. Includes utility interruptions that are not related to another hazard)	14.51% 47	29.94% 97	31.17% 101	24.38% 79	324	2.65
Invasive Species (Including both land and water borne)	19.50% 63	42.72% 138	29.41% 95	8.36% 27	323	2.27
Lake Hazards (Includes coastal erosion, harmful algae blooms (HABs) high lake levels, and seiche waves)	22.22% 72	38.89% 126	28.70% 93	10.19% 33	324	2.27
Landslides	75.39% 242	19.31% 62	4.67% 15	0.62% 2	321	1.31
Radioactive Events (Includes incidents at fixed facilities such as the Perry Nuclear Power Plant and transportation incidents involving radioactive/nuclear materials)	34.78% 112	40.37% 130	17.08% 55	7.76% 25	322	1.98
Tornados & Windstorms	12.00% 39	40.92% 133	34.15% 111	12.92% 42	325	2.48
Urban Fire & Explosion	33.02% 106	36.76% 118	23.68% 76	6.54% 21	321	2.04
Winterstorms	12.42% 40	25.47% 82	35.40% 114	26.71% 86	322	2.76

## Q2 In the past 10 years, which hazards do you recall having occurred in your community? (Check all that apply)

Answered: 326 Skipped: 0



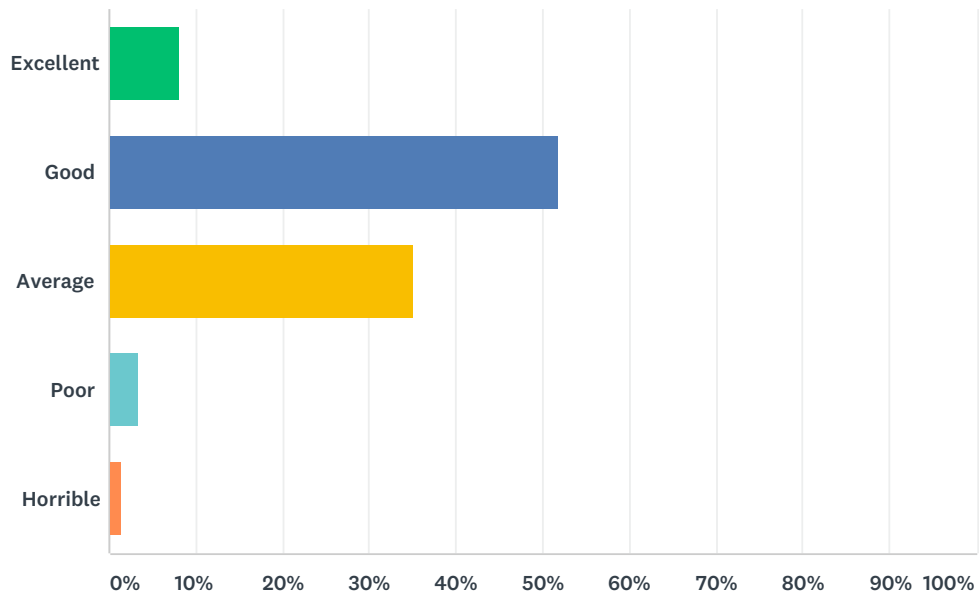
ANSWER CHOICES	RESPONSES
Acts of Violence (Including but not limited to acts of terrorism (domestic and international), active shooter situations, and acts of school violence)	52.15% 170
Drought	19.33% 63
Earthquake	14.11% 46
Hazardous Materials (Includes incidents at fixed facilities involving hazardous materials and incidents during transport by highway or rail [including crude oil trains])	34.66% 113

## Erie County Hazard Mitigation Survey

Infrastructure Decay (The decay and/or failure of critical infrastructure including dams, bridges, water systems, etc. Includes utility interruptions that are not cascading effects of another hazard)	51.53%	168
Invasive Species (Including both land and water types)	47.24%	154
Lake Hazards (Includes coastal erosion, harmful algae blooms [HABs], high lake levels, and seiche waves)	44.17%	144
Landslide	4.91%	16
Radioactive Incidents (Includes incidents at fixed facilities such as the Perry Nuclear Power Plant, and transportation incidents involving radioactive/nuclear materials)	3.68%	12
Tornado & Windstorm	69.33%	226
Urban Fire & Explosion	24.23%	79
Winter Storms (Including cascading effects such as utility failures and transportation incidents)	87.12%	284
Other (please specify)	4.60%	15
Total Respondents: 326		

Q3 Think back to a recent hazard occurrence (any from questions 1 or 2.)  
How would you rate your community's ability to handle the hazard event?

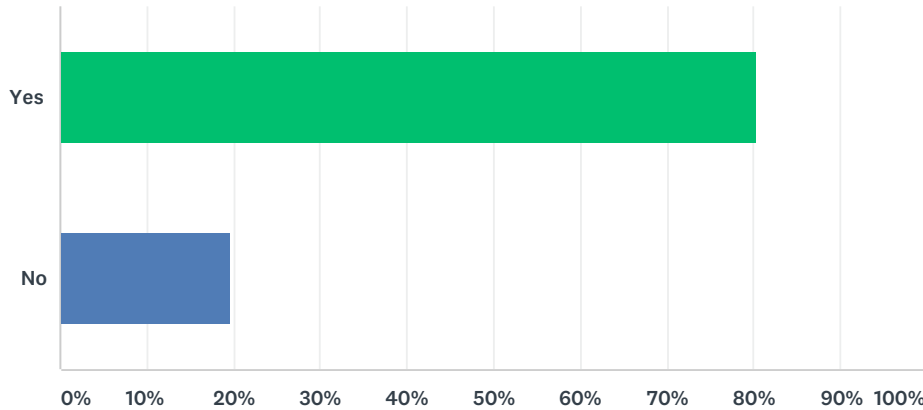
Answered: 322 Skipped: 4



ANSWER CHOICES	RESPONSES
Excellent	8.07% 26
Good	51.86% 167
Average	35.09% 113
Poor	3.42% 11
Horrible	1.55% 5
TOTAL	322

**Q4 During this event did you receive information or warnings from local media (TV, Radio, Text) or social media (Facebook/Twitter) that was either from or forwarded from your local public officials / emergency management officials?**

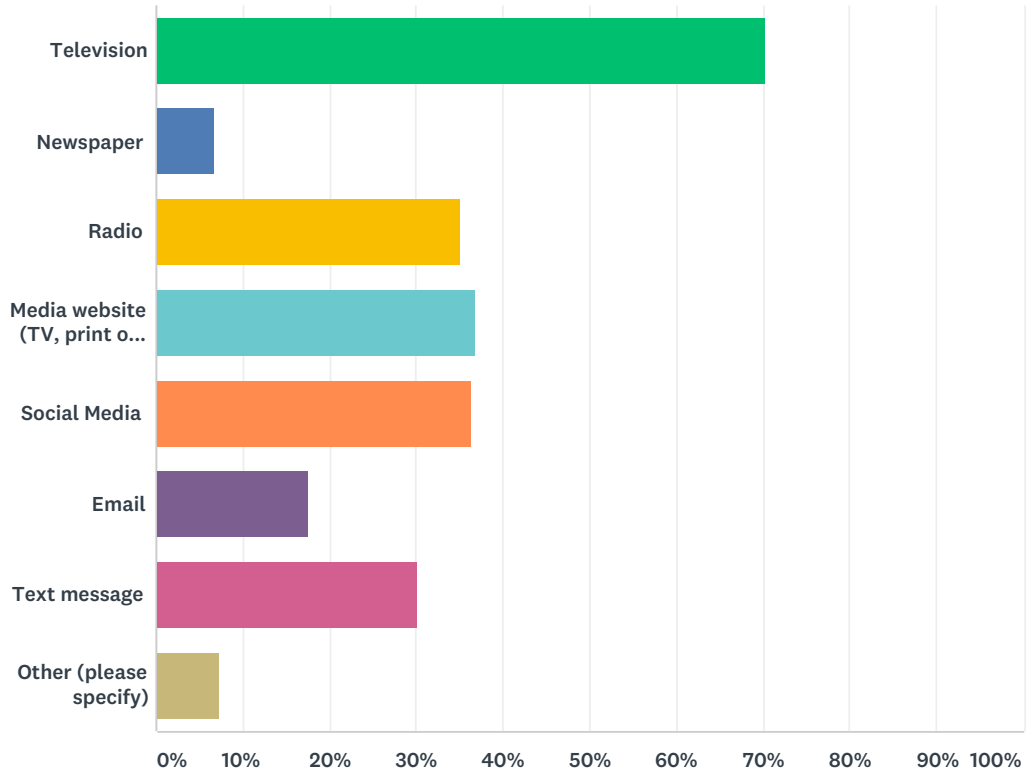
Answered: 322 Skipped: 4



ANSWER CHOICES	RESPONSES	
Yes	80.43%	259
No	19.57%	63
TOTAL		322

### Q5 How did you receive this information?

Answered: 256 Skipped: 70

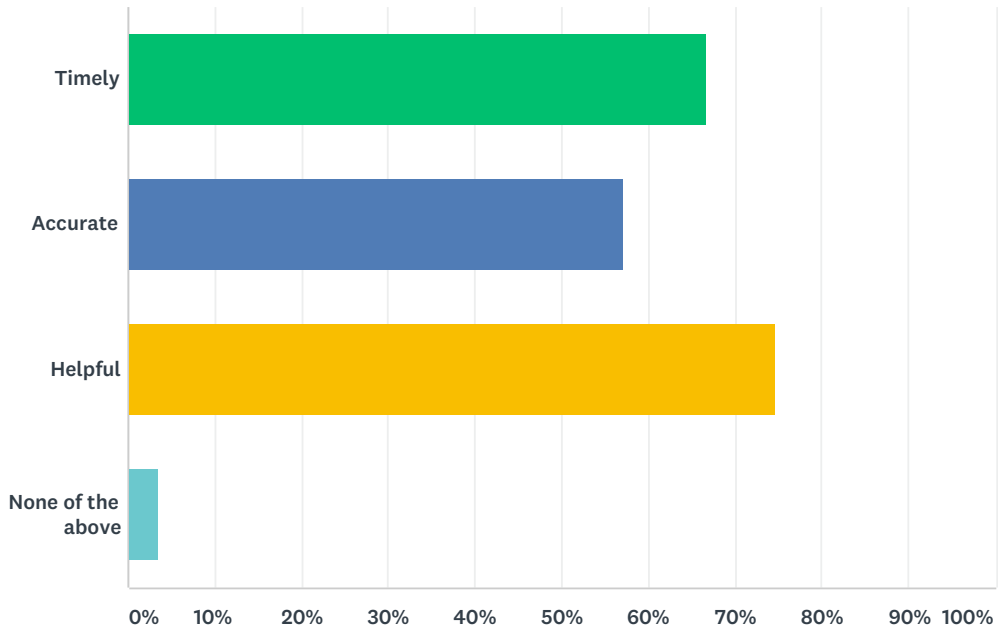


ANSWER CHOICES	RESPONSES	
Television	70.31%	180
Newspaper	6.64%	17
Radio	35.16%	90
Media website (TV, print or radio)	36.72%	94
Social Media	36.33%	93
Email	17.58%	45
Text message	30.08%	77
Other (please specify)	7.42%	19
Total Respondents: 256		



### Q6 Was this information timely, accurate and helpful? (choose as many as apply)

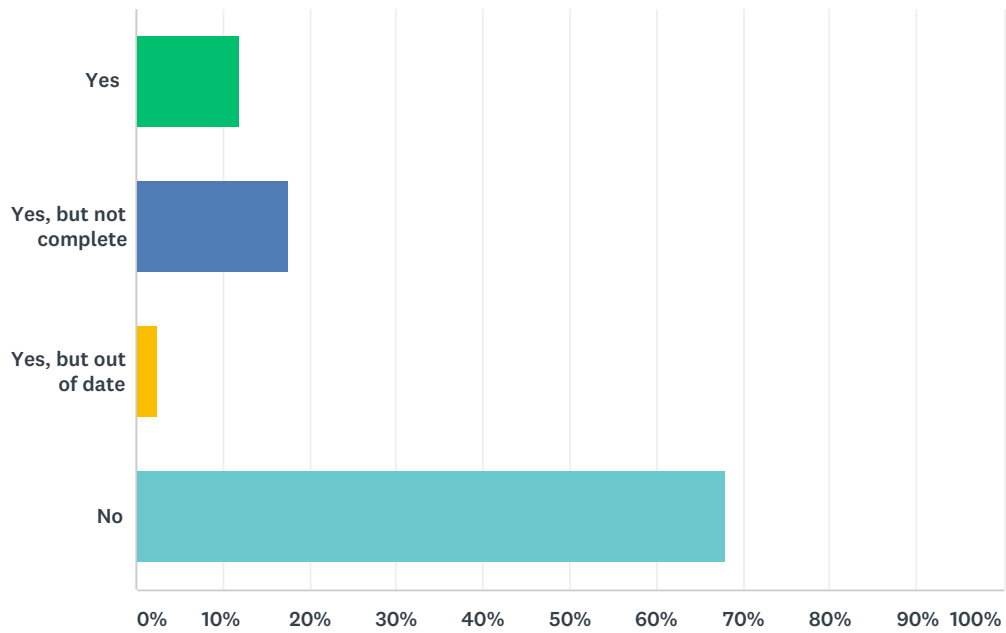
Answered: 256 Skipped: 70



ANSWER CHOICES	RESPONSES	
Timely	66.80%	171
Accurate	57.03%	146
Helpful	74.61%	191
None of the above	3.52%	9
Total Respondents: 256		

### Q7 Do you / does your household have a 72-hour kit? (<http://www.ready.gov/build-a-kit> )

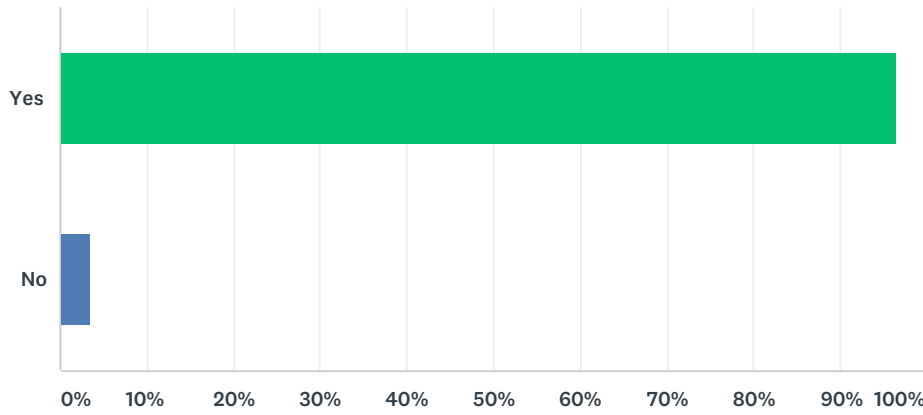
Answered: 318 Skipped: 8



ANSWER CHOICES	RESPONSES	
Yes	11.95%	38
Yes, but not complete	17.61%	56
Yes, but out of date	2.52%	8
No	67.92%	216
<b>TOTAL</b>		<b>318</b>

## Q8 Do you have homeowners/renters insurance?

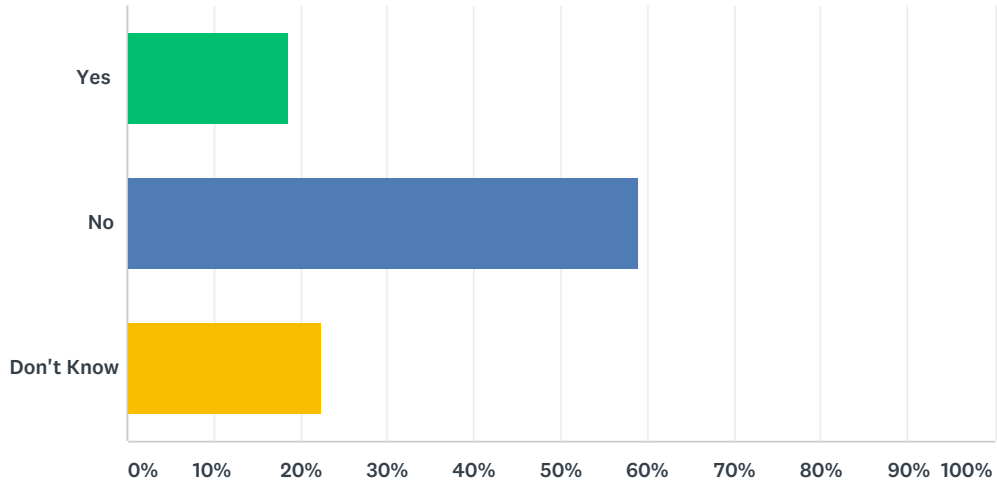
Answered: 318 Skipped: 8



ANSWER CHOICES	RESPONSES	
Yes	96.54%	307
No	3.46%	11
TOTAL		318

### Q9 Does your homeowner/renters insurance include flood insurance?

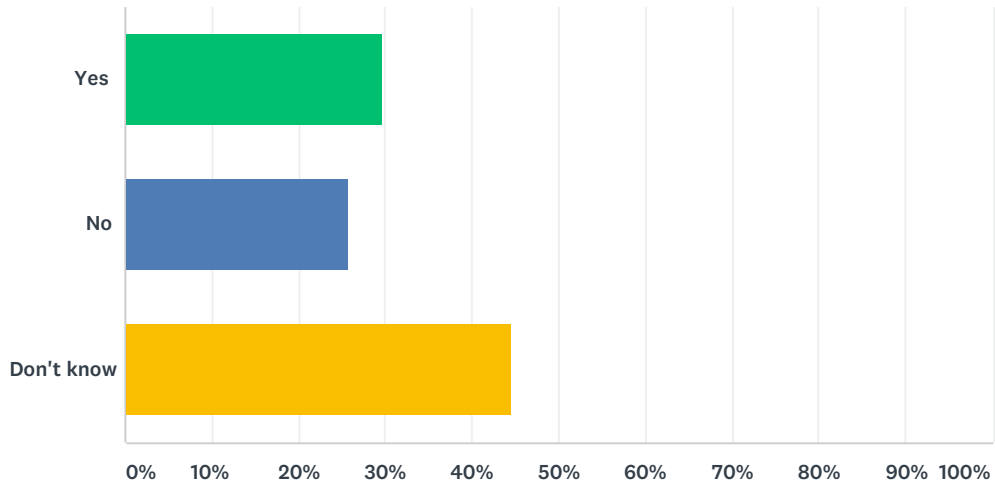
Answered: 307 Skipped: 19



ANSWER CHOICES	RESPONSES	
Yes	18.57%	57
No	58.96%	181
Don't Know	22.48%	69
<b>TOTAL</b>		<b>307</b>

## Q10 Does your policy include sewer back up insurance (or have a sewer back up policy rider)?

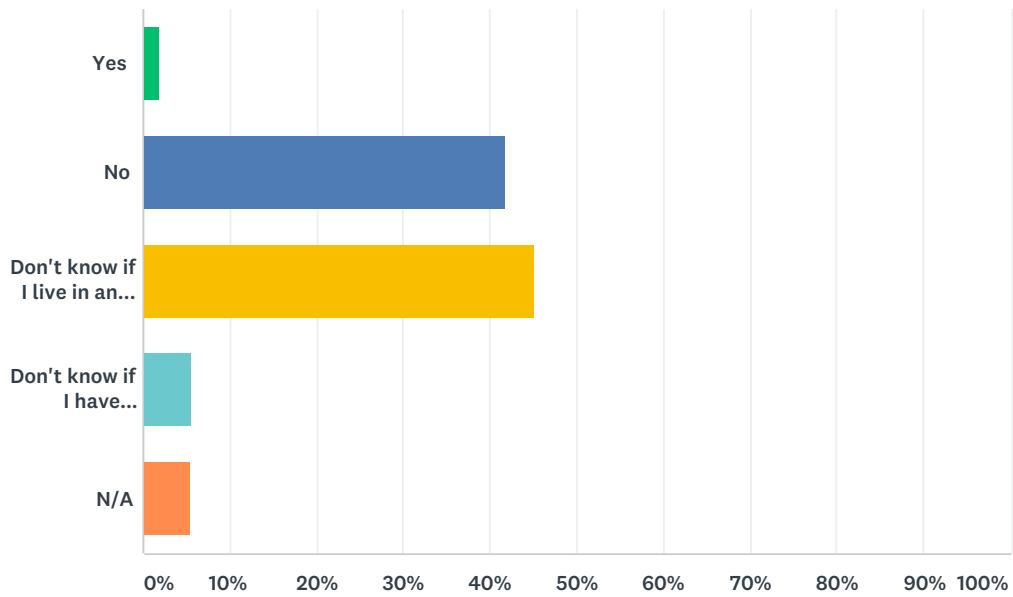
Answered: 307 Skipped: 19



ANSWER CHOICES	RESPONSES	
Yes	29.64%	91
No	25.73%	79
Don't know	44.63%	137
<b>TOTAL</b>		<b>307</b>

### Q11 If you live in a Special Flood Hazard Area (SFHA), do you have floodplain insurance?

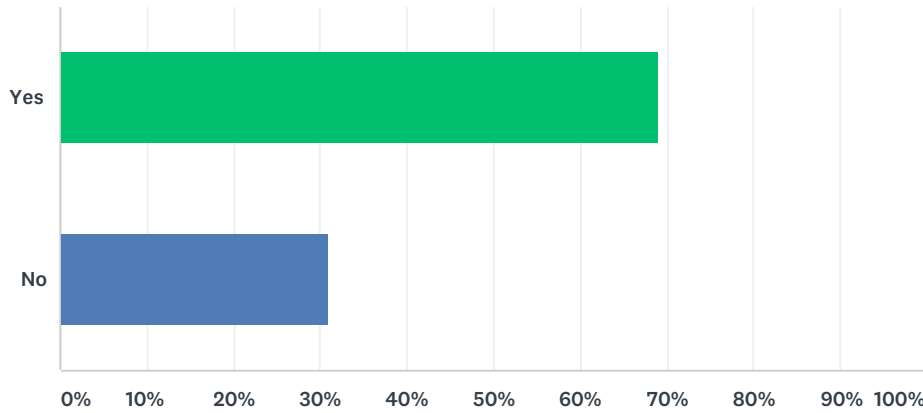
Answered: 316 Skipped: 10



ANSWER CHOICES	RESPONSES	
Yes	1.90%	6
No	41.77%	132
Don't know if I live in an SFHA	45.25%	143
Don't know if I have floodplain insurance	5.70%	18
N/A	5.38%	17
<b>TOTAL</b>		<b>316</b>

## Q12 Are you willing to spend your money on mitigation activities for your home?

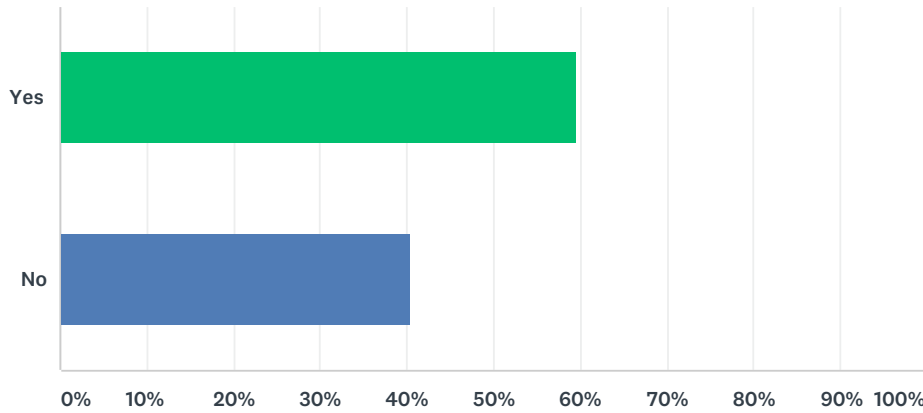
Answered: 310 Skipped: 16



ANSWER CHOICES	RESPONSES	
Yes	69.03%	214
No	30.97%	96
TOTAL		310

### Q13 Have you performed any improvements to your home to reduce your risk from a hazard?

Answered: 310 Skipped: 16

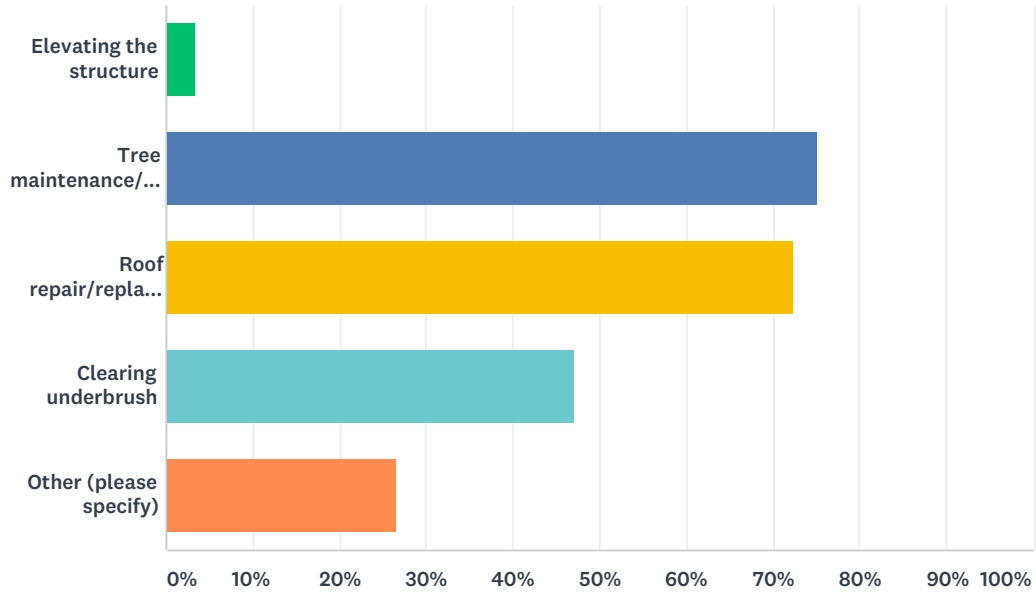


ANSWER CHOICES	RESPONSES	
Yes	59.68%	185
No	40.32%	125
TOTAL		310



### Q14 Please indicate what improvements you have made:

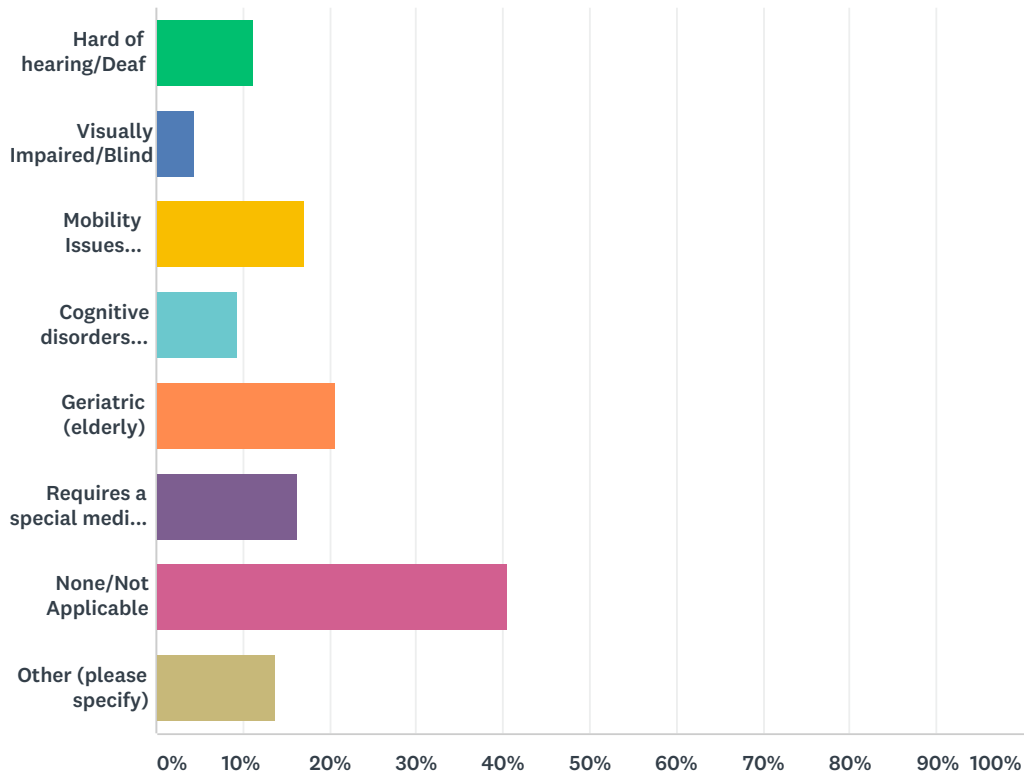
Answered: 185 Skipped: 141



ANSWER CHOICES	RESPONSES
Elevating the structure	3.24% 6
Tree maintenance/removal	75.14% 139
Roof repair/replacement	72.43% 134
Clearing underbrush	47.03% 87
Other (please specify)	26.49% 49
Total Respondents: 185	

### Q15 Do you, or someone who resides in your residence, have a special need that emergency service providers should be aware of in an emergency? (Please pick all the apply)

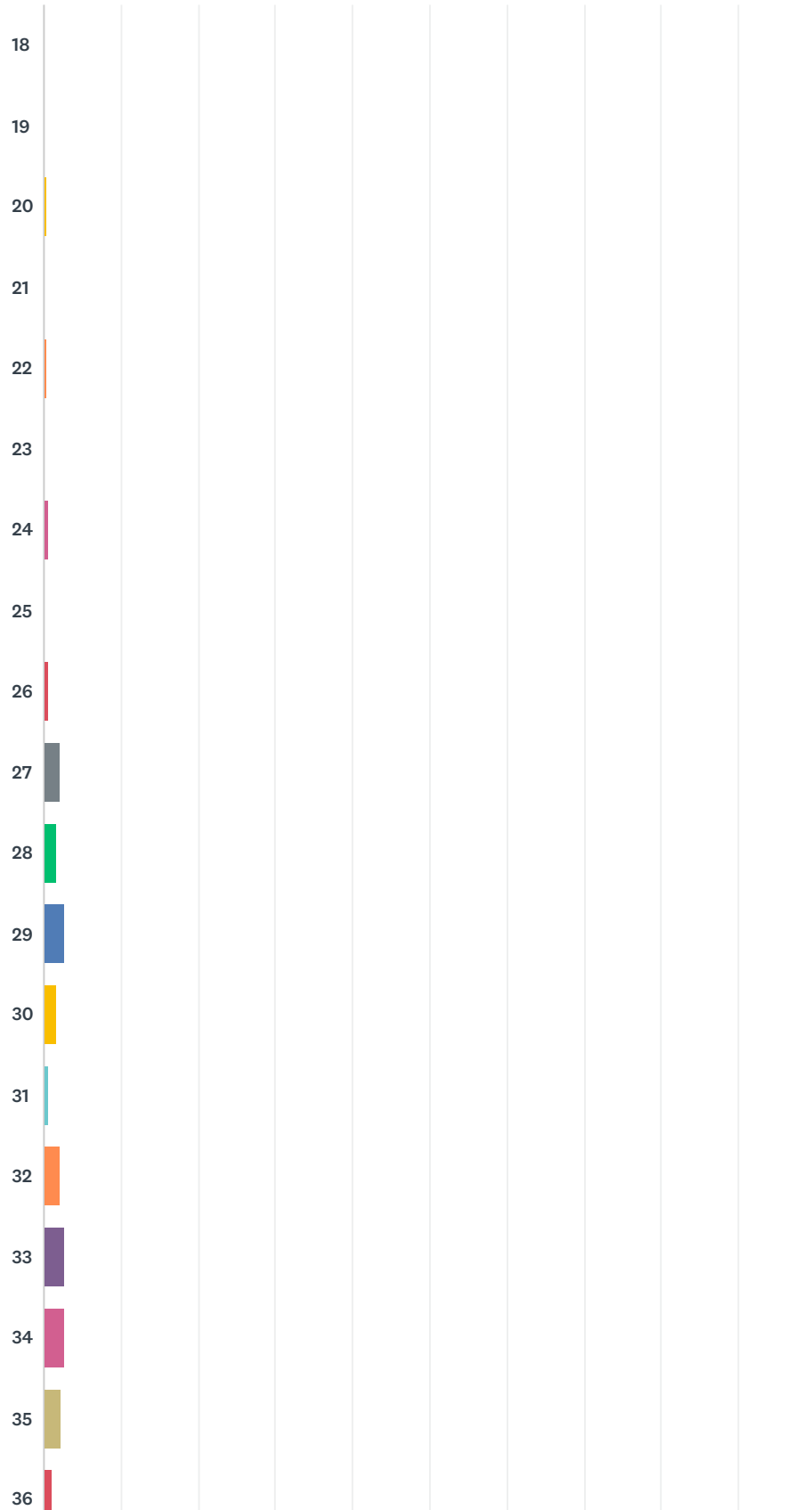
Answered: 116 Skipped: 210



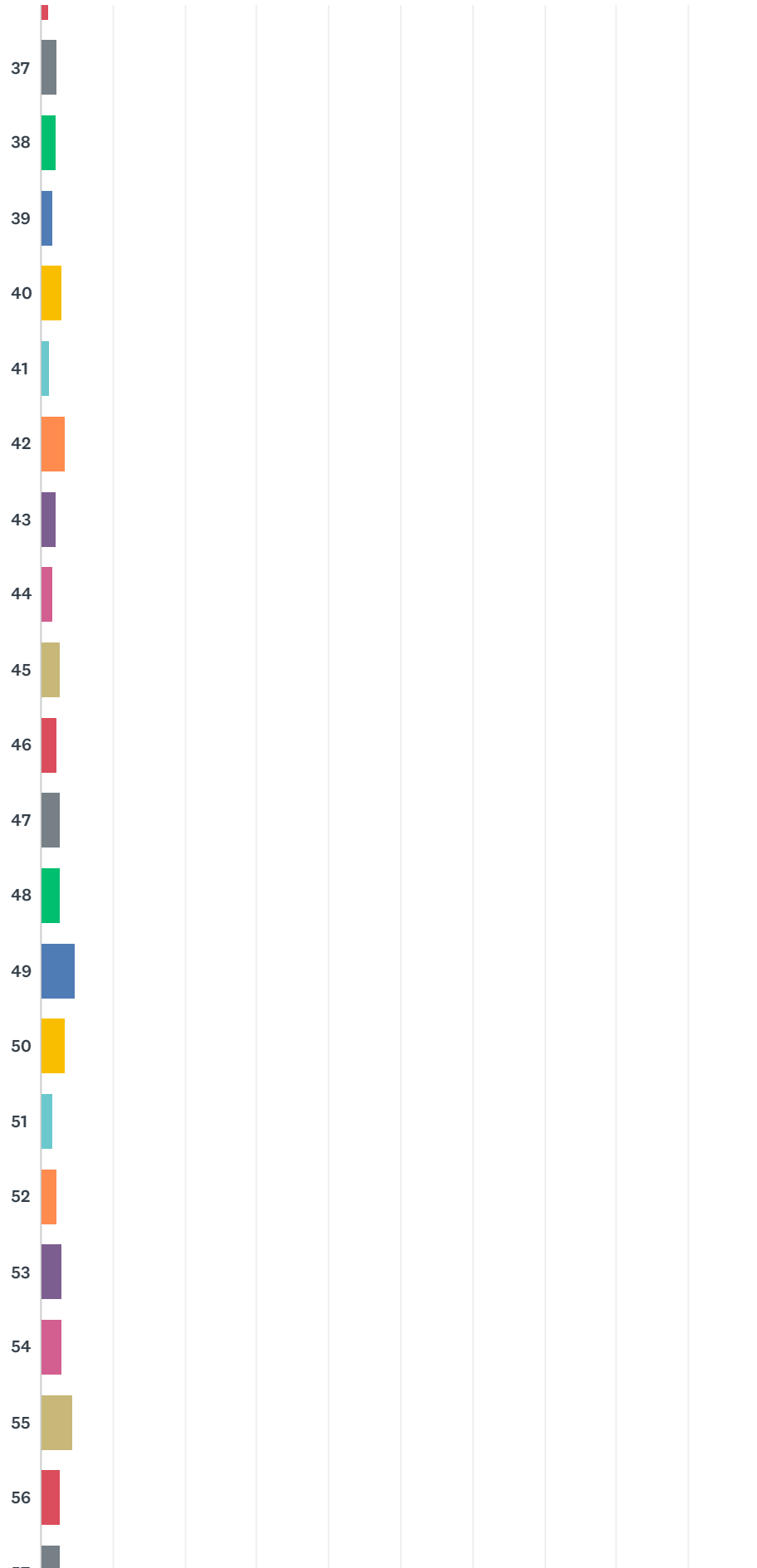
ANSWER CHOICES	RESPONSES	
Hard of hearing/Deaf	11.21%	13
Visually Impaired/Blind	4.31%	5
Mobility Issues (non-ambulatory, confined to a wheelchair, requires the use of a can or walker)	17.24%	20
Cognitive disorders (includes autism, depression, etc.)	9.48%	11
Geriatric (elderly)	20.69%	24
Requires a special medical device (such as a Ventilator, CPAP machine, or drugs that require refrigeration [I.E. insulin])	16.38%	19
None/Not Applicable	40.52%	47
Other (please specify)	13.79%	16
Total Respondents: 116		

# Q16 Please provide your age

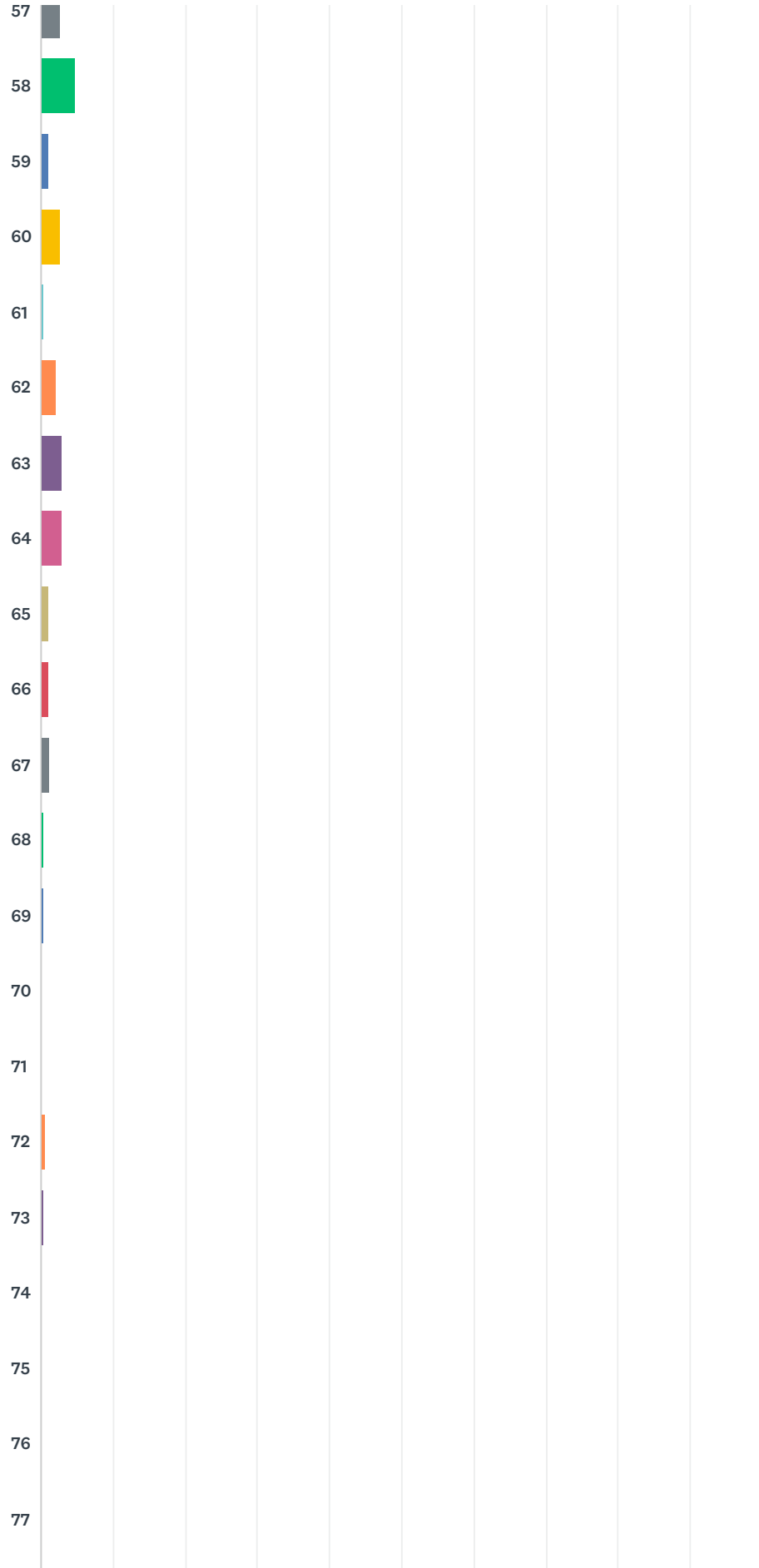
Answered: 297 Skipped: 29



# Erie County Hazard Mitigation Survey



# Erie County Hazard Mitigation Survey



# Erie County Hazard Mitigation Survey

78									
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# Erie County Hazard Mitigation Survey



ANSWER CHOICES	RESPONSES	
18	0.00%	0
19	0.00%	0
20	0.34%	1
21	0.00%	0
22	0.34%	1
23	0.00%	0
24	0.67%	2
25	0.00%	0
26	0.67%	2
27	2.02%	6
28	1.68%	5

## Erie County Hazard Mitigation Survey

29	2.69%	8
30	1.68%	5
31	0.67%	2
32	2.02%	6
33	2.69%	8
34	2.69%	8
35	2.36%	7
36	1.01%	3
37	2.36%	7
38	2.02%	6
39	1.68%	5
40	3.03%	9
41	1.35%	4
42	3.37%	10
43	2.02%	6
44	1.68%	5
45	2.69%	8
46	2.36%	7
47	2.69%	8
48	2.69%	8
49	4.71%	14
50	3.37%	10
51	1.68%	5
52	2.36%	7
53	3.03%	9
54	3.03%	9
55	4.38%	13
56	2.69%	8
57	2.69%	8
58	4.71%	14
59	1.01%	3
60	2.69%	8
61	0.34%	1
62	2.02%	6
63	3.03%	9



## Erie County Hazard Mitigation Survey

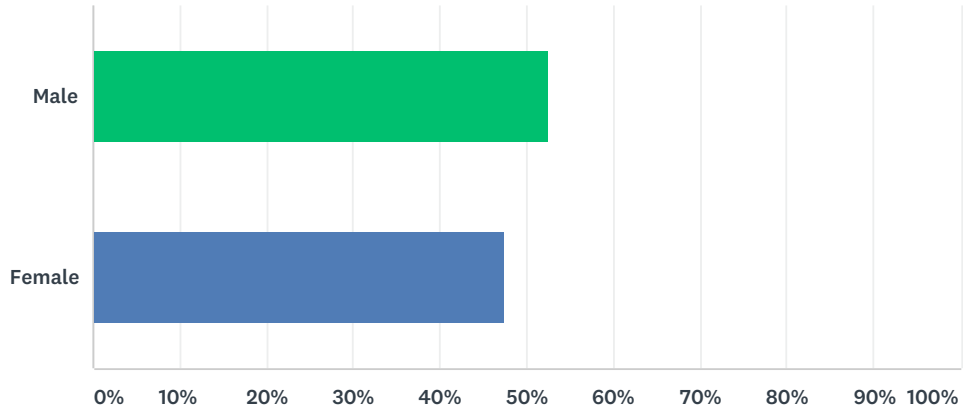
64	3.03%	9
65	1.01%	3
66	1.01%	3
67	1.35%	4
68	0.34%	1
69	0.34%	1
70	0.00%	0
71	0.00%	0
72	0.67%	2
73	0.34%	1
74	0.00%	0
75	0.00%	0
76	0.00%	0
77	0.00%	0
78	0.00%	0
79	0.00%	0
80	0.00%	0
81	0.00%	0
82	0.00%	0
83	0.00%	0
84	0.00%	0
85	0.00%	0
86	0.00%	0
87	0.00%	0
88	0.34%	1
89	0.00%	0
90	0.00%	0
91	0.00%	0
92	0.00%	0
93	0.00%	0
94	0.00%	0
95	0.00%	0
96	0.00%	0
97	0.00%	0
98	0.00%	0

## Erie County Hazard Mitigation Survey

99	0.00%	0
100	0.00%	0
101	0.00%	0
102	0.00%	0
103	0.00%	0
104	0.00%	0
105	0.00%	0
106	0.00%	0
107	0.00%	0
108	0.00%	0
109	0.00%	0
110	0.34%	1
TOTAL		297

### Q17 Gender

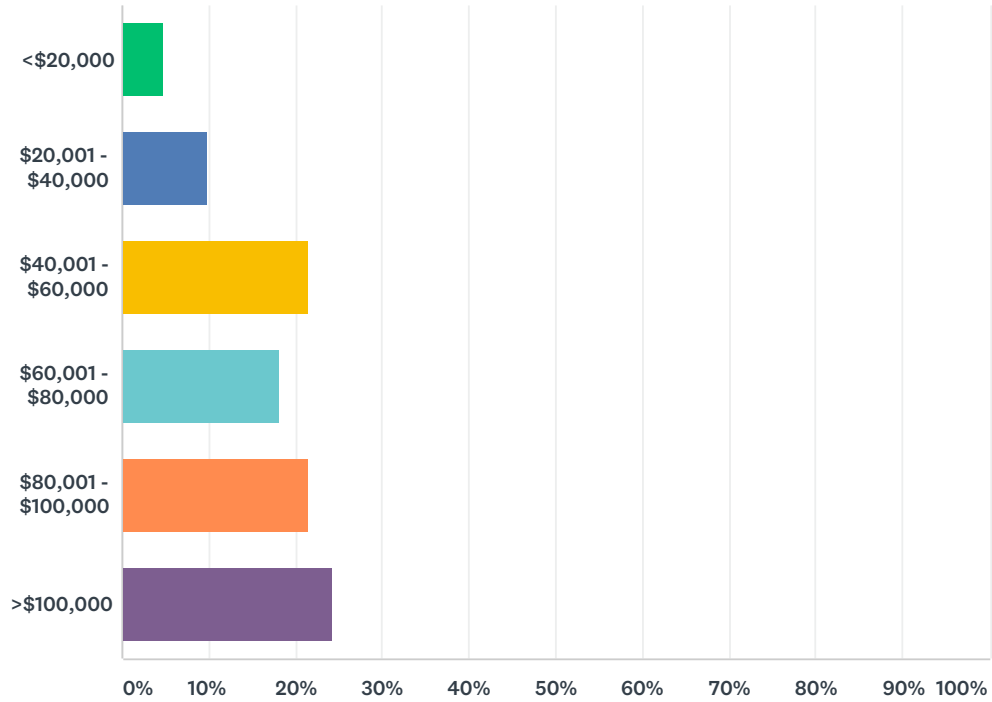
Answered: 297 Skipped: 29



ANSWER CHOICES	RESPONSES	
Male	52.53%	156
Female	47.47%	141
TOTAL		297

## Q18 Please indicate your household income:

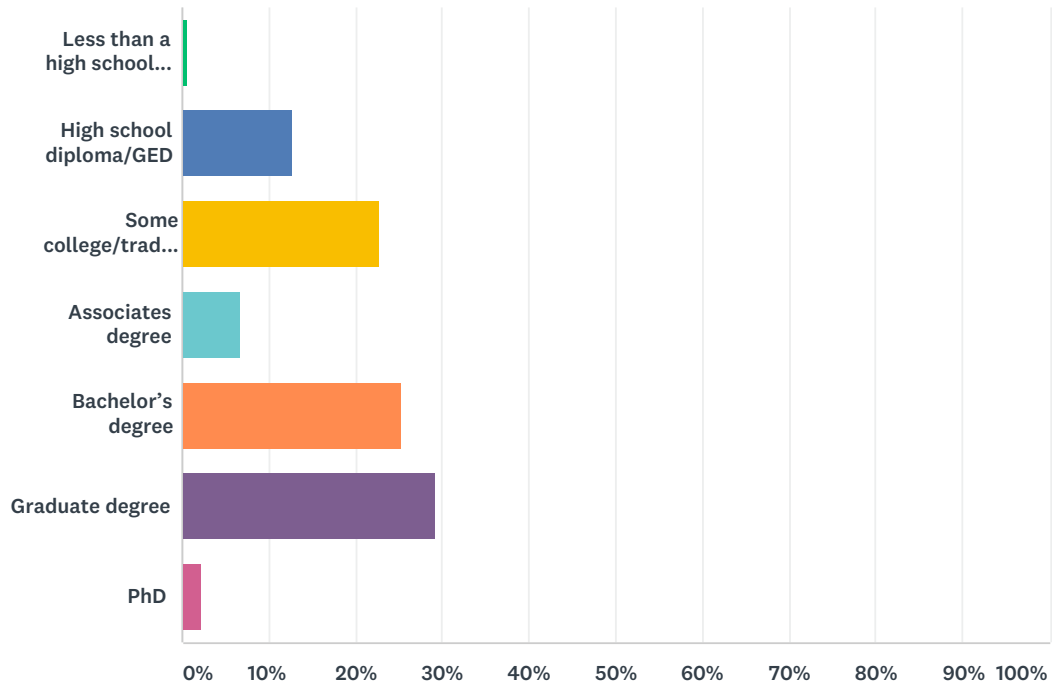
Answered: 297 Skipped: 29



ANSWER CHOICES	RESPONSES	
<\$20,000	4.71%	14
\$20,001 - \$40,000	9.76%	29
\$40,001 - \$60,000	21.55%	64
\$60,001 - \$80,000	18.18%	54
\$80,001 - \$100,000	21.55%	64
>\$100,000	24.24%	72
TOTAL		297

## Q19 Please indicate your level of education

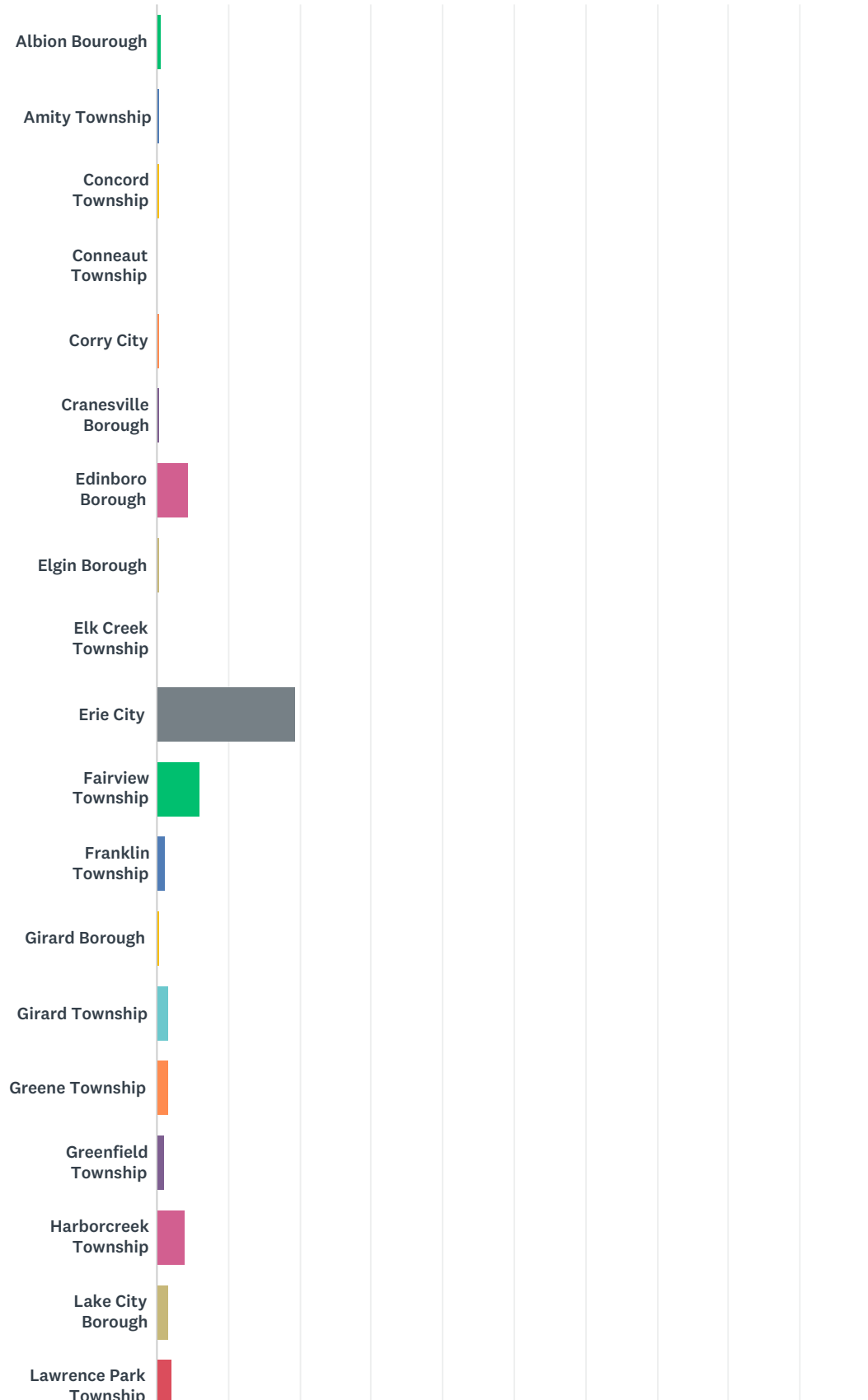
Answered: 297 Skipped: 29



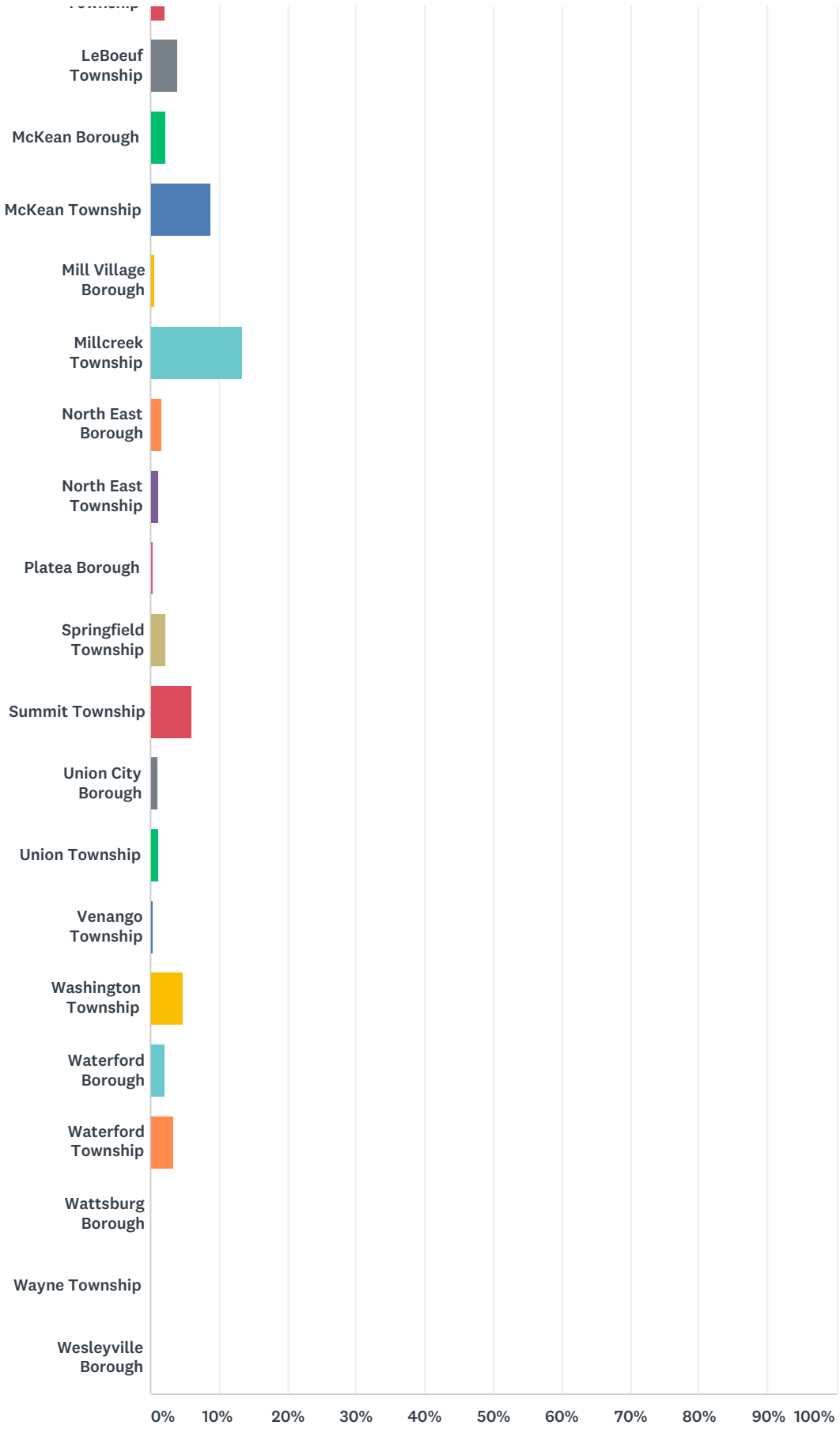
ANSWER CHOICES	RESPONSES	
Less than a high school diploma	0.67%	2
High school diploma/GED	12.79%	38
Some college/trade school	22.90%	68
Associates degree	6.73%	20
Bachelor's degree	25.25%	75
Graduate degree	29.29%	87
PhD	2.36%	7
<b>TOTAL</b>		<b>297</b>

## Q20 Which municipality do you reside in?

Answered: 297 Skipped: 29



# Erie County Hazard Mitigation Survey



## Erie County Hazard Mitigation Survey

ANSWER CHOICES	RESPONSES	
Albion Borough	0.67%	2
Amity Township	0.34%	1
Concord Township	0.34%	1
Conneaut Township	0.00%	0
Corry City	0.34%	1
Cranesville Borough	0.34%	1
Edinboro Borough	4.38%	13
Elgin Borough	0.34%	1
Elk Creek Township	0.00%	0
Erie City	19.53%	58
Fairview Township	6.06%	18
Franklin Township	1.35%	4
Girard Borough	0.34%	1
Girard Township	1.68%	5
Greene Township	1.68%	5
Greenfield Township	1.01%	3
Harborcreek Township	4.04%	12
Lake City Borough	1.68%	5
Lawrence Park Township	2.02%	6
LeBoeuf Township	4.04%	12
McKean Borough	2.36%	7
McKean Township	8.75%	26
Mill Village Borough	0.67%	2
Millcreek Township	13.47%	40
North East Borough	1.68%	5
North East Township	1.35%	4
Platea Borough	0.34%	1
Springfield Township	2.36%	7
Summit Township	6.06%	18
Union City Borough	1.01%	3
Union Township	1.35%	4
Venango Township	0.34%	1
Washington Township	4.71%	14
Waterford Borough	2.02%	6

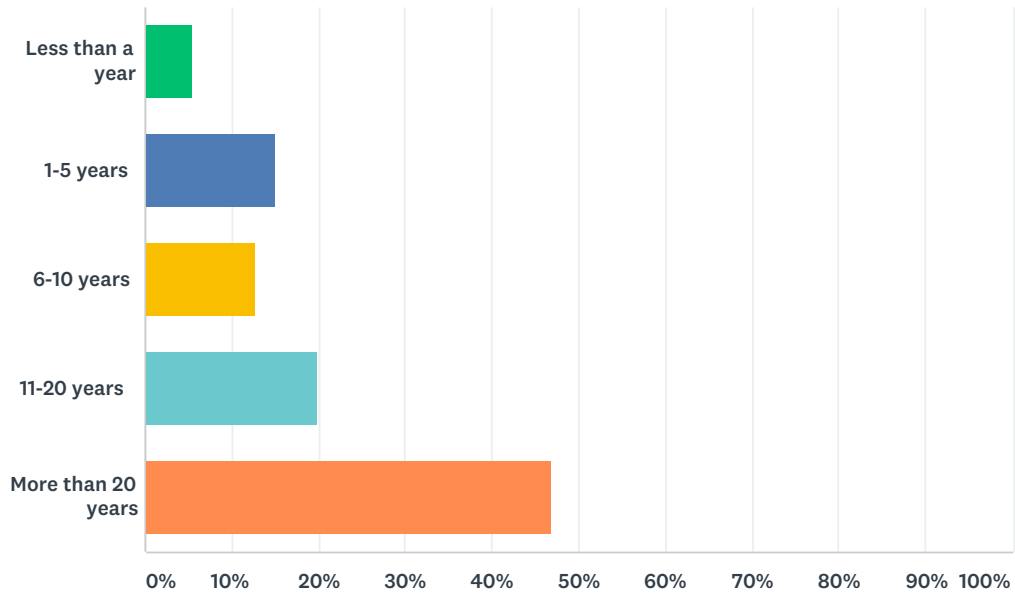


## Erie County Hazard Mitigation Survey

Waterford Township	3.37%	10
Wattsburg Borough	0.00%	0
Wayne Township	0.00%	0
Wesleyville Borough	0.00%	0
TOTAL		297

## Q21 How long have you resided in your community?

Answered: 297 Skipped: 29



ANSWER CHOICES	RESPONSES	
Less than a year	5.39%	16
1-5 years	15.15%	45
6-10 years	12.79%	38
11-20 years	19.87%	59
More than 20 years	46.80%	139
<b>TOTAL</b>		<b>297</b>

**Q22 If you would like to take part in additional surveys regarding potential hazard mitigation projects please provide a valid email address.**

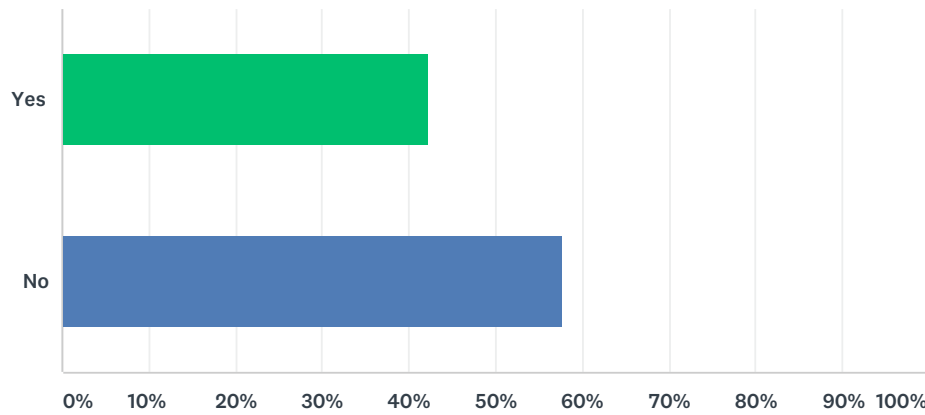
Answered: 41 Skipped: 285

## Q23 Please share any other comments you have

Answered: 9 Skipped: 317

# Q1 Did you respond to the Fall 2016 survey about risks and vulnerabilities?

Answered: 26 Skipped: 0



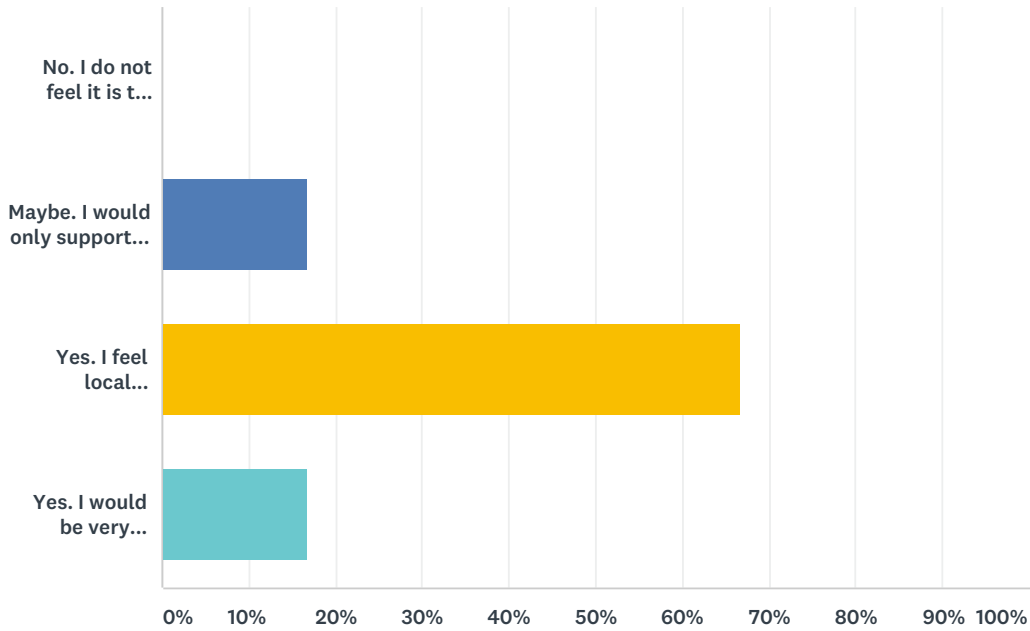
ANSWER CHOICES	RESPONSES	
Yes	42.31%	11
No	57.69%	15
TOTAL		26

**Q2 Our mitigation plan seeks to outline projects to lessen our exposure to these types of hazards. What do you feel our priorities should be?**

Answered: 19 Skipped: 7

### Q3 Would you be supportive of additional regulatory efforts to encourage or require mitigation actions?

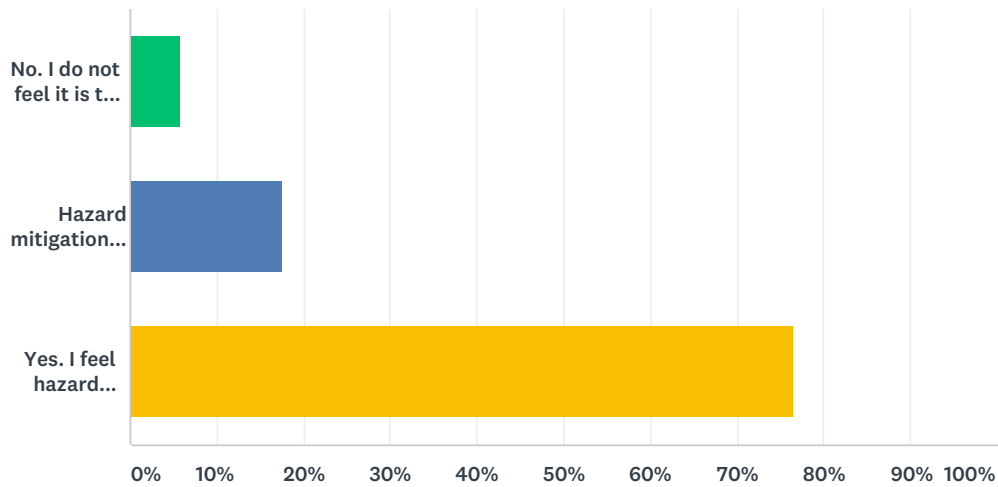
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES	
No. I do not feel it is the role of local government to encourage or require hazard mitigation.	0.00%	0
Maybe. I would only support encouragement of mitigation actions.	16.67%	3
Yes. I feel local government has a role in protecting publicly-owned assets and infrastructure.	66.67%	12
Yes. I would be very supportive of such efforts and feel that hazard mitigation should be mandatory.	16.67%	3
<b>TOTAL</b>		<b>18</b>

### Q4 Would you be supportive of the use of tax dollars for grant programs, construction of mitigating infrastructure, etc.?

Answered: 17 Skipped: 9

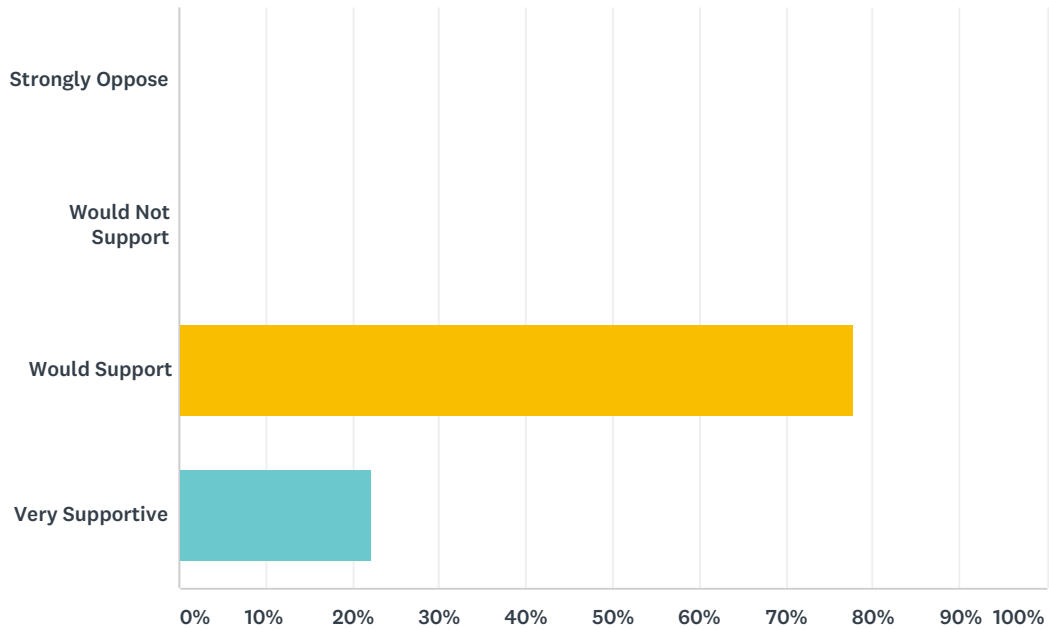


ANSWER CHOICES	RESPONSES	
No. I do not feel it is the role of government to encourage or require hazard mitigation.	5.88%	1
Hazard mitigation efforts should be funded entirely by property owners, whether those owners are public or private entities or individuals.	17.65%	3
Yes. I feel hazard mitigation could be a beneficial use of tax dollars.	76.47%	13
<b>TOTAL</b>		<b>17</b>



## Q5 Upgrading water systems to eliminate breaks and leaks.

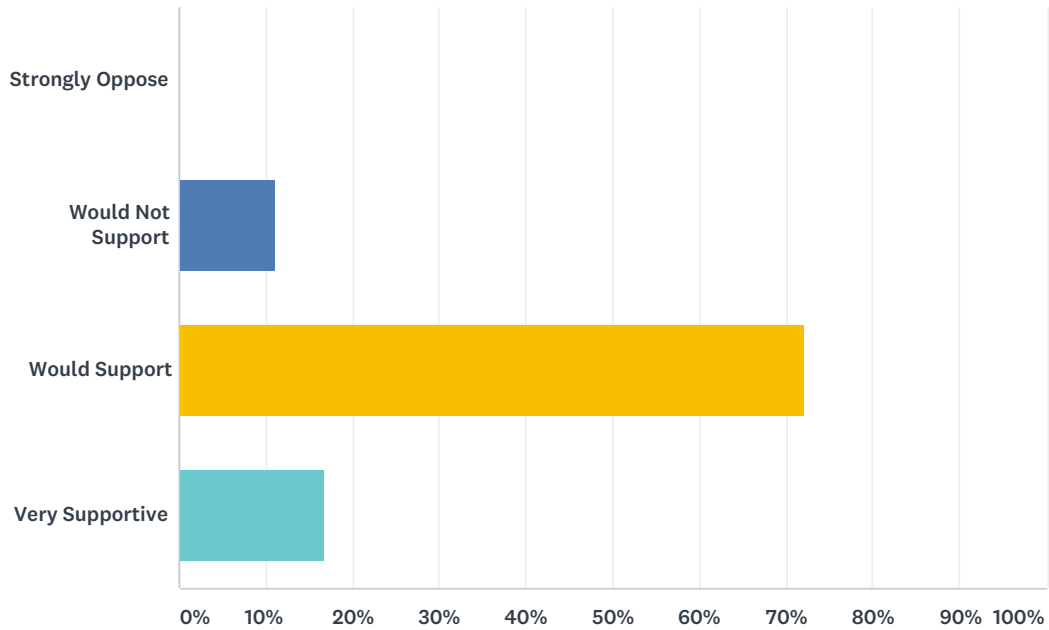
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES
Strongly Oppose	0.00% 0
Would Not Support	0.00% 0
Would Support	77.78% 14
Very Supportive	22.22% 4
<b>TOTAL</b>	<b>18</b>

## Q6 Grant programs or regulatory efforts to address stormwater problems.

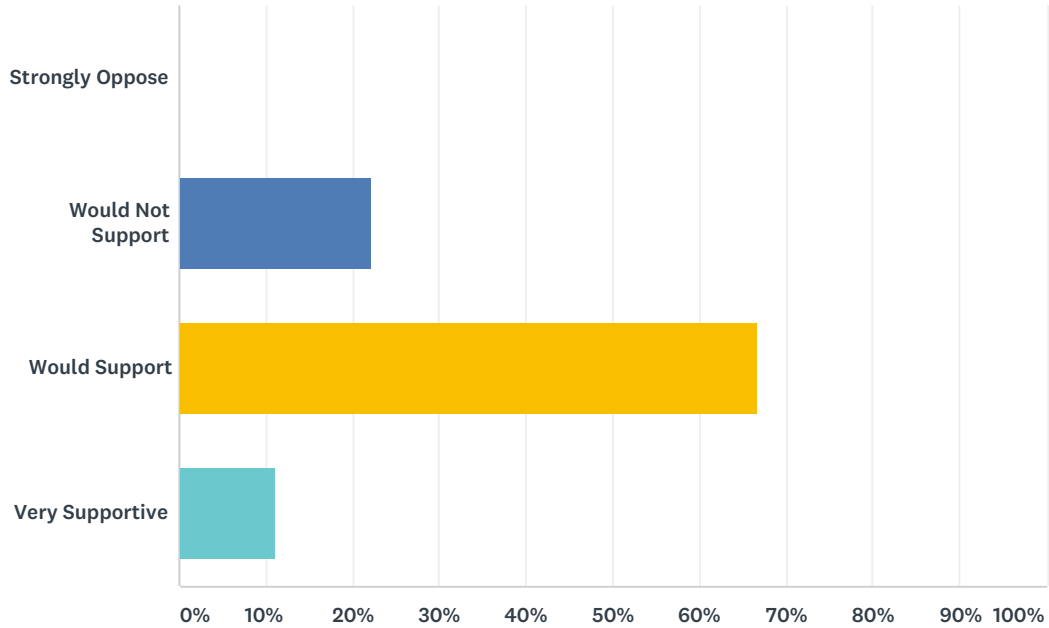
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES
Strongly Oppose	0.00% 0
Would Not Support	11.11% 2
Would Support	72.22% 13
Very Supportive	16.67% 3
<b>TOTAL</b>	<b>18</b>

## Q7 Regulatory-driven water conservation during drought conditions.

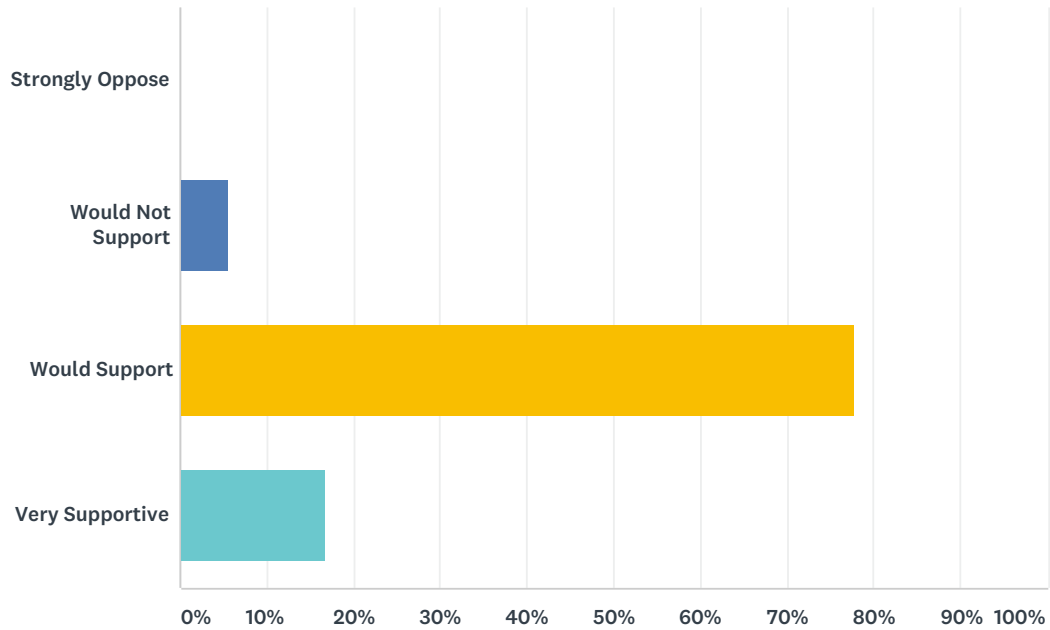
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES
Strongly Oppose	0.00% 0
Would Not Support	22.22% 4
Would Support	66.67% 12
Very Supportive	11.11% 2
TOTAL	18

### Q8 Educate residents on personal mitigation opportunities.

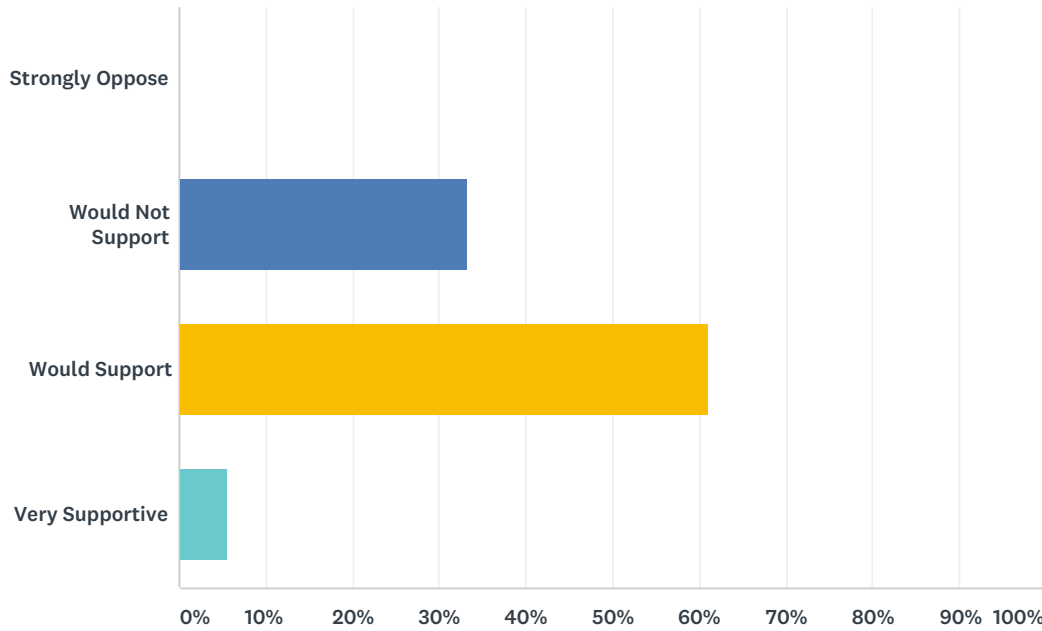
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES
Strongly Oppose	0.00% 0
Would Not Support	5.56% 1
Would Support	77.78% 14
Very Supportive	16.67% 3
TOTAL	18

### Q9 Provide grants or other incentive programs to encourage the installation of generators at public facilities, businesses, etc.

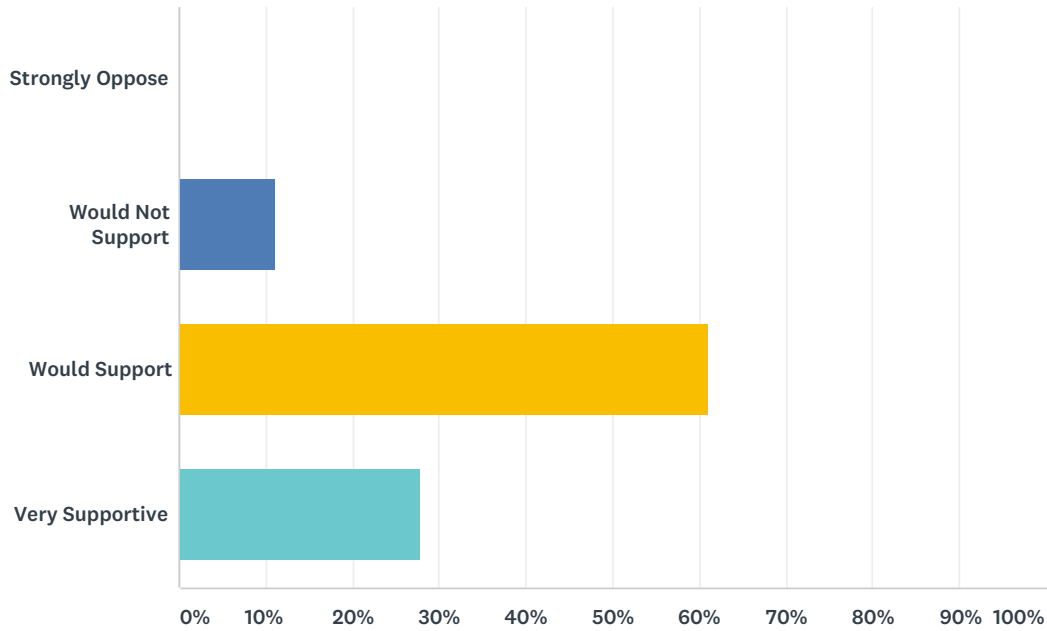
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES	
Strongly Oppose	0.00%	0
Would Not Support	33.33%	6
Would Support	61.11%	11
Very Supportive	5.56%	1
TOTAL		18

### Q10 Regulate the types of development permitted in areas highly vulnerable to various hazards.

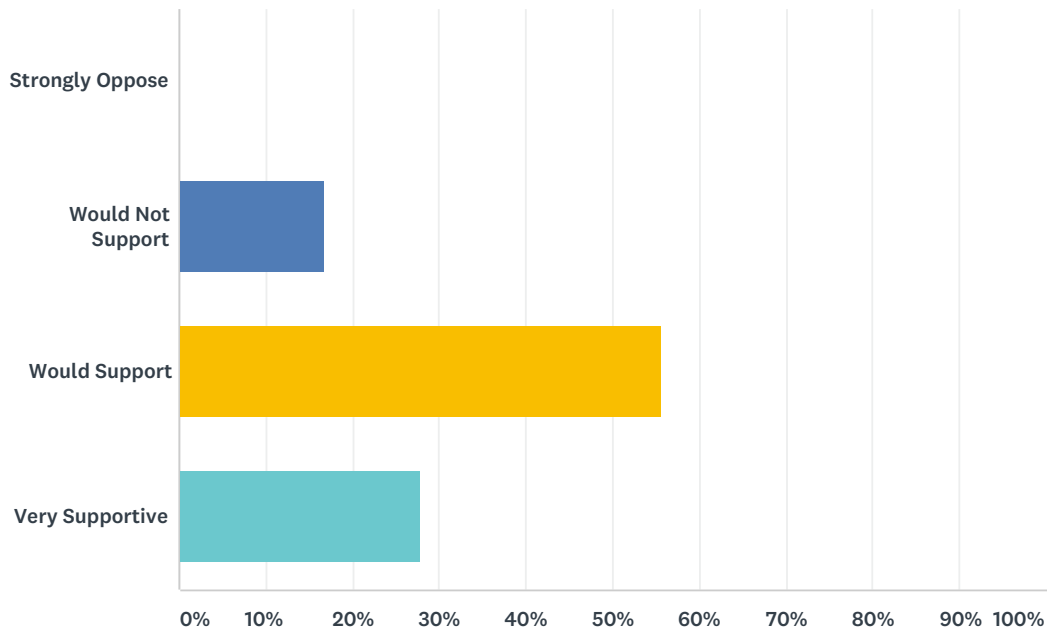
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES	
Strongly Oppose	0.00%	0
Would Not Support	11.11%	2
Would Support	61.11%	11
Very Supportive	27.78%	5
<b>TOTAL</b>		<b>18</b>

### Q11 Provide grants or incentives to encourage tree planting in or along parking areas, streets, etc.

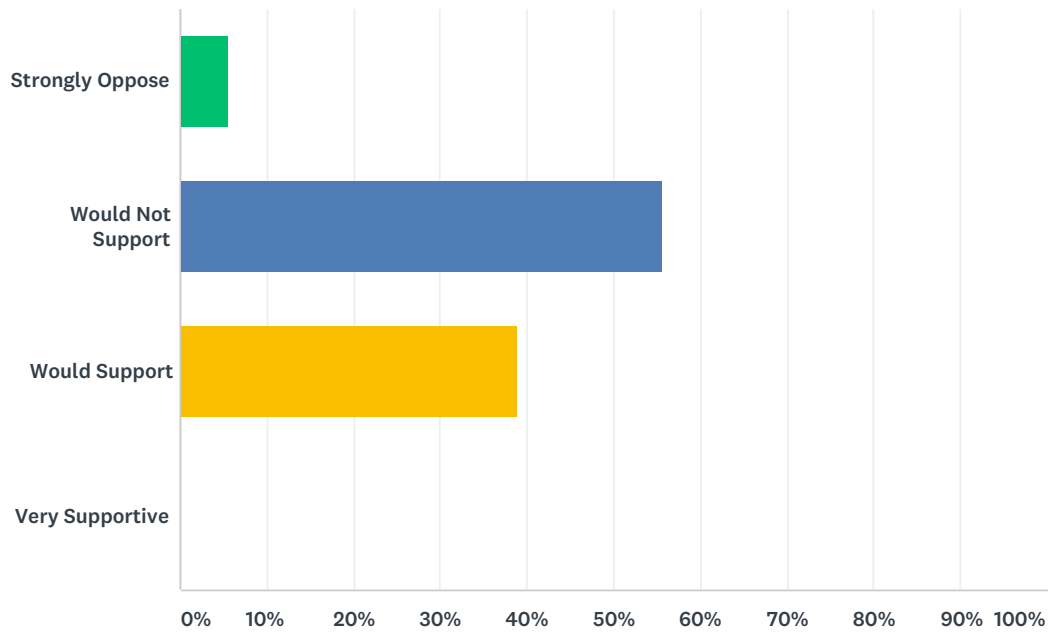
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES	
Strongly Oppose	0.00%	0
Would Not Support	16.67%	3
Would Support	55.56%	10
Very Supportive	27.78%	5
<b>TOTAL</b>		<b>18</b>

## Q12 Provide grants or incentives to residents to encourage elevation of flood-prone homes.

Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES	
Strongly Oppose	5.56%	1
Would Not Support	55.56%	10
Would Support	38.89%	7
Very Supportive	0.00%	0
<b>TOTAL</b>		<b>18</b>

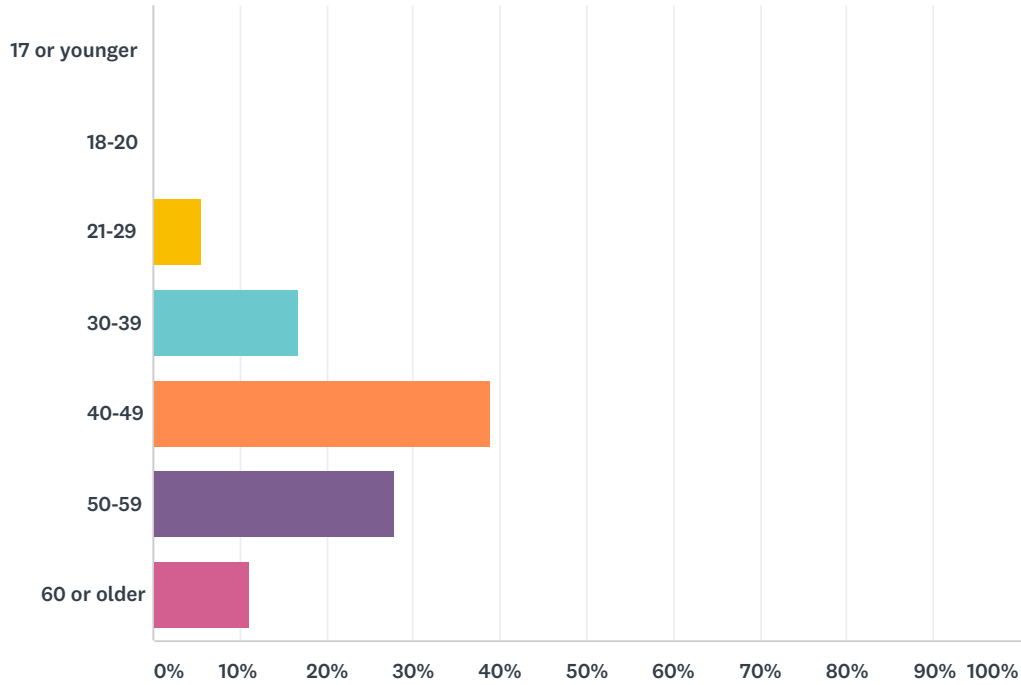


**Q13 What other mitigation actions not mentioned above (if any) would you support?**

Answered: 6 Skipped: 20

## Q14 What is your age?

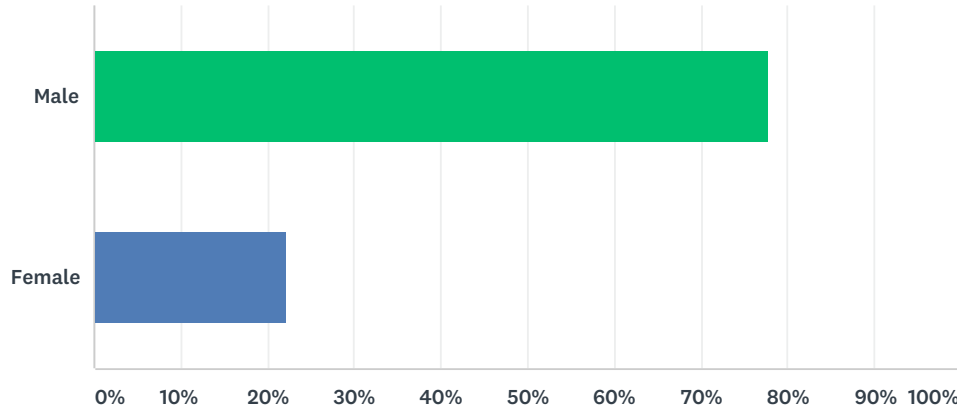
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES	
17 or younger	0.00%	0
18-20	0.00%	0
21-29	5.56%	1
30-39	16.67%	3
40-49	38.89%	7
50-59	27.78%	5
60 or older	11.11%	2
<b>TOTAL</b>		<b>18</b>

### Q15 Are you male or female?

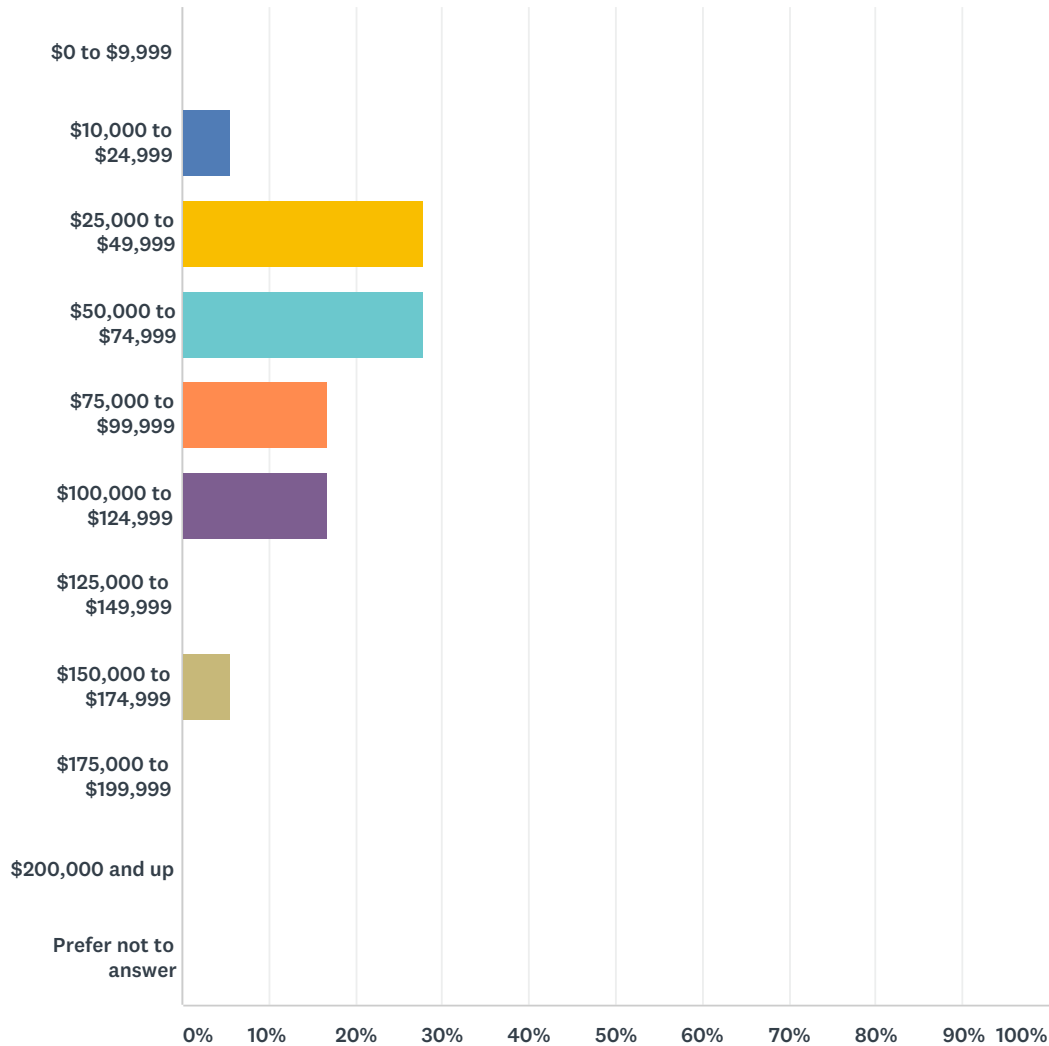
Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES	
Male	77.78%	14
Female	22.22%	4
TOTAL		18

## Q16 How much total combined money did all members of your HOUSEHOLD earn last year?

Answered: 18 Skipped: 8



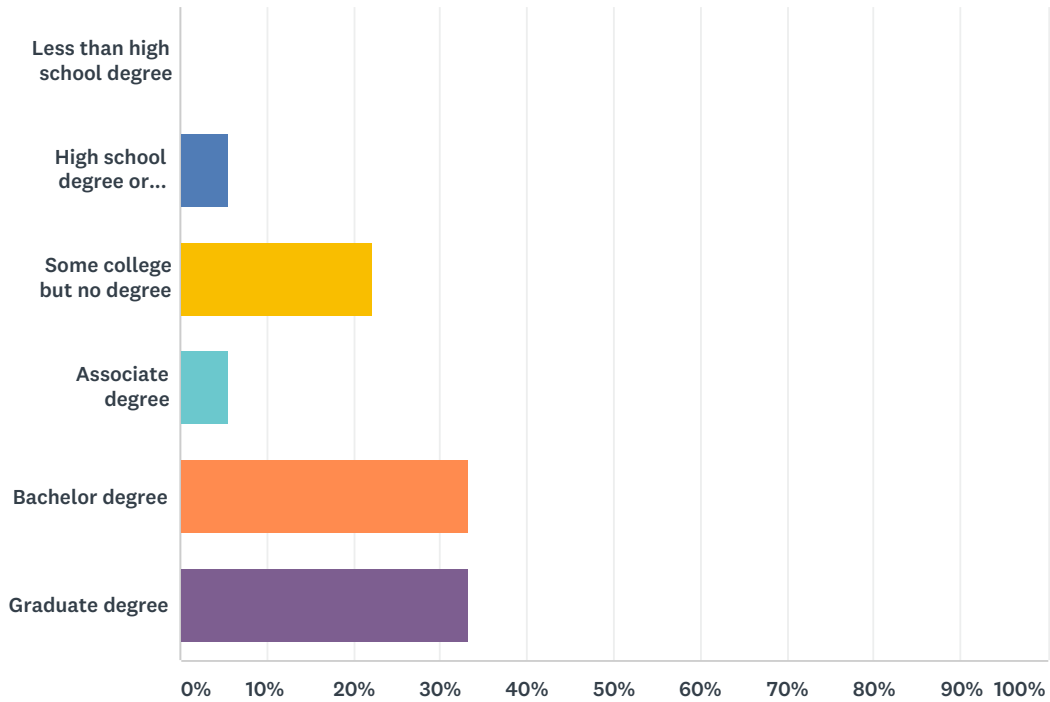
ANSWER CHOICES	RESPONSES	
\$0 to \$9,999	0.00%	0
\$10,000 to \$24,999	5.56%	1
\$25,000 to \$49,999	27.78%	5
\$50,000 to \$74,999	27.78%	5
\$75,000 to \$99,999	16.67%	3
\$100,000 to \$124,999	16.67%	3
\$125,000 to \$149,999	0.00%	0
\$150,000 to \$174,999	5.56%	1
\$175,000 to \$199,999	0.00%	0

## Erie County Hazard Mitigation Survey #2 (Mitigation Actions)

\$200,000 and up	0.00%	0
Prefer not to answer	0.00%	0
TOTAL		18

### Q17 What is the highest level of school you have completed or the highest degree you have received?

Answered: 18 Skipped: 8



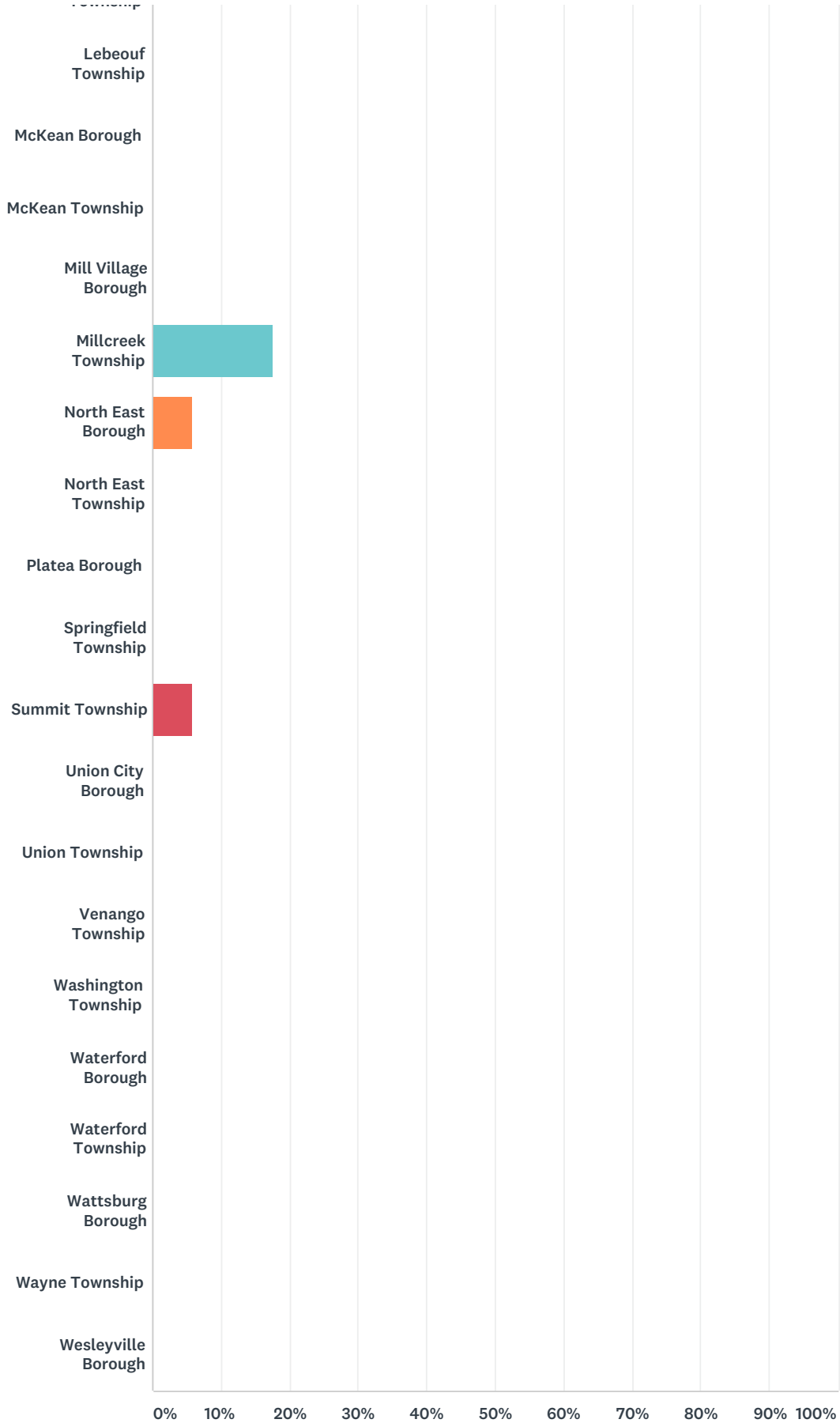
ANSWER CHOICES	RESPONSES	
Less than high school degree	0.00%	0
High school degree or equivalent (e.g., GED)	5.56%	1
Some college but no degree	22.22%	4
Associate degree	5.56%	1
Bachelor degree	33.33%	6
Graduate degree	33.33%	6
<b>TOTAL</b>		<b>18</b>

## Q18 Which municipality do you reside in?

Answered: 17 Skipped: 9



# Erie County Hazard Mitigation Survey #2 (Mitigation Actions)





## Erie County Hazard Mitigation Survey #2 (Mitigation Actions)

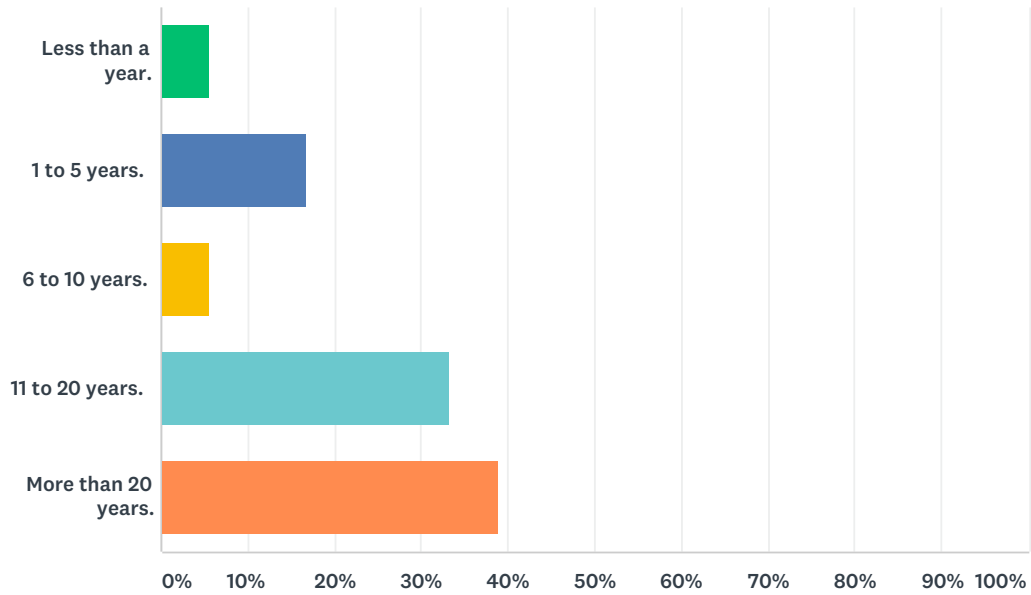
ANSWER CHOICES	RESPONSES	
Albion Borough	0.00%	0
Amity Township	0.00%	0
Concord Township	0.00%	0
Conneaut Township	0.00%	0
Corry City	0.00%	0
Cranesville Borough	0.00%	0
Edinboro Borough	0.00%	0
Elgin Borough	0.00%	0
Elk Creek Township	0.00%	0
Erie City	29.41%	5
Fairview Township	5.88%	1
Franklin Township	0.00%	0
Girard Borough	5.88%	1
Girard Township	0.00%	0
Greene Township	11.76%	2
Greenfield Township	5.88%	1
Harborcreek Township	11.76%	2
Lake City Borough	0.00%	0
Lawrence Park Township	0.00%	0
Lebeouf Township	0.00%	0
McKean Borough	0.00%	0
McKean Township	0.00%	0
Mill Village Borough	0.00%	0
Millcreek Township	17.65%	3
North East Borough	5.88%	1
North East Township	0.00%	0
Platea Borough	0.00%	0
Springfield Township	0.00%	0
Summit Township	5.88%	1
Union City Borough	0.00%	0
Union Township	0.00%	0
Venango Township	0.00%	0
Washington Township	0.00%	0
Waterford Borough	0.00%	0

## Erie County Hazard Mitigation Survey #2 (Mitigation Actions)

Waterford Township	0.00%	0
Wattsburg Borough	0.00%	0
Wayne Township	0.00%	0
Wesleyville Borough	0.00%	0
TOTAL		17

## Q19 How long have you resided in your community?

Answered: 18 Skipped: 8



ANSWER CHOICES	RESPONSES
Less than a year.	5.56% 1
1 to 5 years.	16.67% 3
6 to 10 years.	5.56% 1
11 to 20 years.	33.33% 6
More than 20 years.	38.89% 7
<b>TOTAL</b>	<b>18</b>

**Q20 Please share any other comments you have.**

Answered: 2 Skipped: 24

## APPENDIX 3: ACTIVE PROJECT PRIOTIZATION

This appendix contains a matrix that outlines the prioritization of projects included in Section 6.0: Mitigation Strategy above. The planning committee emphasized a benefit-cost comparison in the prioritization process. Committee members evaluated mitigation actions by their pros and cons, which were represented as costs and benefits. Prioritization criteria included the following. A higher score on all of the measures would indicate situations where benefits outweighed costs.

MITIGATION PROJECT PRIORITIZATION CRITERIA	
<i>Criterion</i>	<i>Definitions &amp; Notes on Scoring</i>
Cost Effectiveness	Sufficient funding is available (or can be obtained) that allows for project implementation at a cost that is manageable by a local government.  HIGHER SCORE = Lower cost projects
Social Impacts	Impacts that could adversely affect a segment of the population. For example, projects that result in displacement could adversely affect the population.  HIGHER SCORE = Fewer potential social impacts
Political Impacts	Negative perceptions of the project; the perception that a project is not in the best interest of the common good.  HIGHER SCORE = Projects with positive perceptions (i.e., generally considered a prudent, well-received action)
Environmental Impacts	Impacts to the surrounding environment or ecological community.  HIGHER SCORE = Projects that have the potential to benefit the surrounding environment
Risk Factor Weighting	Mathematical weighting for projects based on the hazard they could address. Those addressing a "high" hazard risk (see Sections 4.3 and 4.4) received a 30% weighting; those addressing a "moderate" hazard risk received a 15% weighting. Those addressing a "low" hazard risk did not receive a weighting.



## ERIE COUNTY ACTIVE PROJECT PRIORITIZATION MATRIX

Cost Effectiveness	3	4	3	2	4	4	4	2
Social Impacts	2	4	4	4	3	3	3	4
Political Impacts	2	2	3	4	4	4	3	4
Environmental Impacts	4	4	2	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>12.65</b>	<b>16.1</b>	<b>13.8</b>	<b>16.1</b>	<b>17.25</b>	<b>17.25</b>	<b>16.1</b>	<b>16.1</b>

**Erie County 1:** Pursue acquisition, demolition, and relocation; mitigation reconstruction; and/or elevation projects to support flood mitigation, where appropriate and when funding is available

**Erie County 2:** Increase awareness of, and participation in, FEMA's Community Rating System (CRS) program. County will assist municipalities with developing and enforcing higher standard ordinances

**Erie County 3:** Update the ingestion pathway plan with assistance from key stakeholders including municipal, county, and Commonwealth officials

**Erie County 4:** Identify and coordinate with appropriate partners and agencies to arrange for data collection of flood and structure data necessary to perform a Level 2 HAZUS analysis for the next hazard mitigation plan update (i.e., building value, lowest floor elevation, building type, occupancy type, foundation type, number of stories, and square footage).

**Erie County 5:** Provide Municipal Assistance Program related to stormwater management assistance.

**Erie County 6:** Continue assisting municipalities on enforcement of Bluff Recession Setback Act, and assist landowners with bluff management

**Erie County 7:** Work with municipalities to determine possible interest in alternative funding structures for stormwater infrastructure projects, such as user fees. County should assist interested municipalities with enacting the funding programs.

**Erie County 8:** Collect and analyze data in order to better predict urban flooding.

## ALBION BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	Albion 1: Pursue roadway widening along US 6N according to the "Moving Forward Along Route 6" plan through Edinboro, Union City, and Corry when the state route is due for betterment	Albion 2: Continue to participate in the National Flood Insurance Program (NFIP)	Albion 3: Continue to enforce current floodplain regulations	Albion 4: Continue to enforce stormwater management ordinance	Albion 5: Develop and maintain a database to track community vulnerability	Albion 6: Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	Albion 7: Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take
Cost Effectiveness	1	4	4	4	3	4	4
Social Impacts	4	3	3	3	4	2	4
Political Impacts	3	3	2	1	4	3	4
Environmental Impacts	2	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0	0	0
<b>TOTAL</b>	<b>11.5</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>15</b>	<b>13</b>	<b>16</b>

## AMITY TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Amity 1: Continue to participate in the National Flood Insurance Program (NFIP)	Amity 2: Continue to enforce current floodplain regulations	Amity 3: Continue to enforce stormwater management ordinance	Amity 4: Clear beaver dams blocking the channel near Lowe Road.	Amity 5: Resurfacing and/or restoration of SR 8 from Baldwin Road to one mile north of Casler Road
Cost Effectiveness	4	4	4	4	1
Social Impacts	3	3	3	4	4
Political Impacts	3	2	1	4	3
Environmental Impacts	4	4	4	3	3
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>17.25</b>	<b>12.65</b>



## CONCORD TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Concord 1: Continue to participate in the National Flood Insurance Program (NFIP)</b>	<b>Concord 2: Continue to enforce current floodplain regulations</b>	<b>Concord 3: Continue to enforce stormwater management ordinance</b>	<b>Concord 4: Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Cory when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace/remove guardrails, and add signage.</b>
Cost Effectiveness	4	4	4	1
Social Impacts	3	3	3	3
Political Impacts	3	2	1	3
Environmental Impacts	4	4	4	3
Risk Factor Weighting	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>11.5</b>

## CONNEAUT TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Conneaut 1:</b> Continue to participate in the National Flood Insurance Program (NFIP)	<b>Conneaut 2:</b> Continue to enforce current floodplain regulations	<b>Conneaut 3:</b> Continue to enforce stormwater management ordinance	<b>Conneaut 4:</b> Pursue roadway widening along US 6N according to the "Moving Forward Along Route 6" plan through Edinboro, Union City, and Corry when the state route is due for betterment	<b>Conneaut 5:</b> Study the need for warning sirens to warn residents of disasters and install when funds are available	<b>Conneaut 6:</b> Develop and maintain a database to track community vulnerability	<b>Conneaut 7:</b> Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	<b>Conneaut 8:</b> Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take
Cost Effectiveness	4	4	4	1	2	3	4	4
Social Impacts	3	3	3	4	4	4	2	4
Political Impacts	3	2	1	3	4	4	3	4
Environmental Impacts	4	4	4	2	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0	0	0	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>11.5</b>	<b>14</b>	<b>15</b>	<b>13</b>	<b>16</b>

## CORRY CITY ACTIVE PROJECT PRIORITIZATION MATRIX

	Corry 1: Continue to participate in the National Flood Insurance Program (NFIP)	Corry 2: Continue to enforce current floodplain regulations	Corry 3: Continue to enforce stormwater management ordinance	Corry 4: Address stormwater problem areas, as outlined in the Act 167 plan, at the following locations: Airport Road, Church Street, SR 6, at the railroad bridge and culvert, Corry Middle School, Washington Street, E. Columbus and Scotia Street, Main Street, White Street, Liberty Street, and Pleasant Street.	Corry 5: Improve stormwater sewer maintenance practices
Cost Effectiveness	4	4	4	1	4
Social Impacts	3	3	3	4	4
Political Impacts	3	2	1	3	4
Environmental Impacts	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>13.8</b>	<b>18.4</b>

## CRANESVILLE BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Cranesville 1:</b> Continue to participate in the National Flood Insurance Program (NFIP)	<b>Cranesville 2:</b> Continue to enforce current floodplain regulations	<b>Cranesville 3:</b> Continue to enforce stormwater management ordinance	<b>Cranesville 4:</b> Consider modification of culverts to allow for adequate hydraulic capacity	<b>Cranesville 5:</b> Lift station improvement including streambank stabilization, manhole reinforcement, and back-up generator installation	<b>Cranesville 6:</b> Develop and maintain a database to track community vulnerability	<b>Cranesville 7:</b> Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	<b>Cranesville 8:</b> Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	<b>Cranesville 9:</b> Provide educational information on WECEMA and its role in hazard mitigation	<b>Cranesville 10:</b> Purchase and install camera system to allow for monitoring stormwater drainage system
Cost Effectiveness	4	4	4	1	1	3	4	4	4	2
Social Impacts	3	3	3	4	4	4	2	4	4	4
Political Impacts	3	2	1	4	3	4	3	4	4	3
Environmental Impacts	4	4	4	4	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0	0	0	0	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>14.95</b>	<b>13.8</b>	<b>15</b>	<b>13</b>	<b>16</b>	<b>16</b>	<b>14.95</b>

## EDINBORO BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Edinboro 1: Continue to participate in the National Flood Insurance Program (NFIP)</b>	<b>Edinboro 2: Continue to enforce current floodplain regulations</b>	<b>Edinboro 3: Address stormwater problem areas, as identified in the Act 167 plan, at the following locations: Water Street and Green Oaks, West Plum and Willow Streets, Heather Road, Industrial Drive, Peach Street, north of the lake, Penn Union site, Wipple Creek entrance to lake, Elm Street, and South Main Street</b>	<b>Edinboro 4: Continue to enforce stormwater management ordinance</b>
Cost Effectiveness	4	4	1	4
Social Impacts	3	3	4	3
Political Impacts	3	2	3	1
Environmental Impacts	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>13.8</b>

# ELGIN BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	Elgin 1: Continue to participate in the National Flood Insurance Program (NFIP)	Elgin 2: Continue to enforce current floodplain regulations	Elgin 3: Continue to enforce stormwater management ordinance
Cost Effectiveness	4	4	4
Social Impacts	3	3	3
Political Impacts	3	2	1
Environmental Impacts	4	4	4
Risk Factor Weighting	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>

## ELK CREEK TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Elk Creek 1: Continue to participate in the National Flood Insurance Program (NFIP)										
Cost Effectiveness	4	4	4	1	1	1	1	1	3	4	4
Social Impacts	3	3	3	3	3	4	4	3	4	2	4
Political Impacts	3	2	1	3	3	3	3	3	4	3	4
Environmental Impacts	4	4	4	3	3	3	2	3	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0	0	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>11.5</b>	<b>11.5</b>	<b>12.65</b>	<b>11.5</b>	<b>11.5</b>	<b>15</b>	<b>13</b>	<b>16</b>
	Elk Creek 2: Continue to enforce current floodplain regulations										
	Elk Creek 3: Continue to enforce stormwater management ordinance										
	Elk Creek 4: Consider repair and/or replacement of Ivoray Road Bridge										
	Elk Creek 5: Consider repair and/or replacement of Fillingier Road Bridge										
	Elk Creek 6: Construct intersection improvements to address safety and congestion concerns at US 6N & Rt. 98 Intersection										
	Elk Creek 7: Pursue roadway widening along US 6N according to the Moving Forward Along Route 6 Plan through Edinboro, Union City, and Cory when the state route is due for betterment.										
	Elk Creek 8: Construct a retention pond at previously identified vulnerable area										
	Elk Creek 9: Develop and maintain a database to track community vulnerability										
	Elk Creek 10: Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage										
	Elk Creek 11: Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take										

## ERIE CITY ACTIVE PROJECT PRIORITIZATION MATRIX

	Erie 1: Continue to participate in the National Flood Insurance Program (NFIP)	Erie 2: Continue to enforce current floodplain regulations	Erie 3: Continue to enforce stormwater management ordinance	Erie 4: Continue to enforce bluff recession and setback regulations	Erie 5: Identify critical infrastructure that could be impacted by high lake levels
Cost Effectiveness	4	4	4	4	4
Social Impacts	3	3	3	4	4
Political Impacts	3	2	1	3	4
Environmental Impacts	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>17.25</b>	<b>18.4</b>



## FAIRVIEW TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Fairview 1: Continue to participate in the National Flood Insurance Program (NFIP)	Fairview 2: Continue to enforce current floodplain regulations	Fairview 3: Continue to enforce stormwater management ordinance	Fairview 4: Consider streambank stabilization on Walnut Creek	Fairview 5: Improve drainage in downtown Fairview along US 20 through streetscape elements	Fairview 6: Construct a five-foot berm for multimodal accessibility at Walnut Creek	Fairview 7: Remove debris on Trout Run	Fairview 8: Continue to enforce bluff recession and setback regulations
Cost Effectiveness	4	4	4	1	1	2	4	4
Social Impacts	3	3	3	3	3	3	4	4
Political Impacts	3	2	1	3	3	3	4	3
Environmental Impacts	4	4	4	3	4	3	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>11.5</b>	<b>12.65</b>	<b>12.65</b>	<b>18.4</b>	<b>17.25</b>

## FRANKLIN TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Franklin 1: Continue to participate in the National Flood Insurance Program (NFIP)	Franklin 2: Continue to enforce current floodplain regulations	Franklin 3: Continue to enforce stormwater management ordinance	Franklin 4: Consider installing box culverts in areas with inadequate hydraulic capacity.	Franklin 5: Increase capacity of cross pipes at nine previously identified vulnerable locations.	Franklin 6: Repair or purchase tornado warning sirens with radio receivers	Franklin 7: Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage
Cost Effectiveness	4	4	4	1	2	3	4
Social Impacts	3	3	3	4	3	4	2
Political Impacts	3	2	1	3	3	4	3
Environmental Impacts	4	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.3	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>13.8</b>	<b>13.8</b>	<b>19.5</b>	<b>13</b>

## GIRARD BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Girard Boro 1: Continue to participate in the National Flood Insurance Program (NFIP)</b>	<b>Girard Boro 2: Continue to enforce current floodplain regulations</b>	<b>Girard Boro 3: Continue to enforce stormwater management ordinance</b>	<b>Girard Boro 4: Improve maintenance of Sunset Drive North channel leading to Lake Erie.</b>	<b>Girard Boro 5: Consider repairing / replacing Sunset Drive North culvert to allow sufficient hydraulic capacity.</b>	<b>Girard Boro 6: Replace hazard siren.</b>	<b>Girard Boro 7: Obtain and install backup generator for municipal power.</b>	<b>Girard Boro 8: Construct retention tank for the waste water treatment plant.</b>	<b>Girard Boro 9: Develop and maintain a database to track community vulnerability</b>	<b>Girard Boro 10: Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage</b>	<b>Girard Boro 11: Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take</b>
Cost Effectiveness	4	4	4	2	1	3	3	1	3	4	4
Social Impacts	3	3	3	4	4	4	4	4	4	2	4
Political Impacts	3	2	1	3	3	4	4	4	4	3	4
Environmental Impacts	4	4	4	4	3	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0	0	0	0	0	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>14.95</b>	<b>12.65</b>	<b>15</b>	<b>15</b>	<b>13</b>	<b>15</b>	<b>13</b>	<b>16</b>

## GIRARD TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

Cost Effectiveness	4	4	4	4	3	1	3	1	1	2	4	3	4	4	4	4
Social Impacts	3	3	3	3	4	3	4	4	4	4	4	4	4	4	2	4
Political Impacts	3	2	3	1	4	3	4	3	3	4	3	4	4	3	4	4
Environmental Impacts	4	4	3	4	4	3	4	4	3	4	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15	0	0.15	0.15	0.3	0.3	0.15	0	0	0	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>14.95</b>	<b>13.8</b>	<b>17.25</b>	<b>11.5</b>	<b>15</b>	<b>13.8</b>	<b>12.65</b>	<b>16.9</b>	<b>18.2</b>	<b>17.25</b>	<b>15</b>	<b>13</b>	<b>16</b>	
	<b>Girard Twp 1:</b> Continue to participate in the National Flood Insurance Program (NFIP)	<b>Girard Twp 2:</b> Continue to enforce current floodplain regulations	<b>Girard Twp 3:</b> Repair and improve maintenance practices on bridges to allow for proper stormwater flow.	<b>Girard Twp 4:</b> Continue to enforce stormwater management ordinance	<b>Girard Twp 5:</b> Study to develop an access management plan for US 20 from School Street to Imperial Parkway.	<b>Girard Twp 6:</b> Reduce crest of vertical curve on Fairplain Road to improve sight distance and update railroad crossing to enhance freight access, particularly for the Gravel Pit on the east and other industry as water and sewer expand.	<b>Girard Twp 7:</b> Purchase hand held radios for EOC and shelter.	<b>Girard Twp 8:</b> Tube replacement at four previously identified vulnerable locations.	<b>Girard Twp 9:</b> Stabilize and build up bank at two previously identified vulnerable locations to prevent road from washing out during flooding event.	<b>Girard Twp 10:</b> Obtain necessary equipment for pre-wetting of salt and anti-skid materials (Storage tank and 5 hopper tanks).	<b>Girard Twp 11:</b> Repair or purchase tornado warning sires with radio receivers.	<b>Girard Twp 12:</b> Continue to enforce bluff recession and setback regulations	<b>Girard Twp 13:</b> Develop and maintain a database to track community vulnerability	<b>Girard Twp 14:</b> Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	<b>Girard Twp 15:</b> Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	

# GREENE TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Greene 1: Continue to participate in the National Flood Insurance Program (NFIP)	Greene 2: Continue to enforce current floodplain regulations	Green 3: Continue to enforce stormwater management ordinance	Greene 4: Eliminate cross pipes at previously identified vulnerable locations.
Cost Effectiveness	4	4	4	1
Social Impacts	3	3	3	4
Political Impacts	3	2	1	3
Environmental Impacts	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>13.8</b>

## GREENFIELD TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Greenfield Twp 1: Continue to participate in the National Flood Insurance Program (NFIP)	Greenfield Twp 2: Continue to enforce current floodplain regulations	Greenfield Twp 3: Continue to enforce stormwater management ordinance	Greenfield Twp 4: Continue to monitor culverts and remove beaver dams to allow for sufficient hydraulic capacity.
Cost Effectiveness	4	4	4	4
Social Impacts	3	3	3	4
Political Impacts	3	2	1	4
Environmental Impacts	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>18.4</b>

## HARBORCREEK TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Harborcreek 1:</b> Continue to participate in the National Flood Insurance Program (NFIP)	<b>Harborcreek 2:</b> Continue to enforce current floodplain regulations	<b>Harborcreek 3:</b> Continue to enforce stormwater management ordinance	<b>Harborcreek 4:</b> Consider installing box culverts in Brookside area to lessen effects of flooding.	<b>Harborcreek 5:</b> Consider repairing/replacing culverts on Backus Road to lessen effects of flooding	<b>Harborcreek 6:</b> Implement the Depot Road study recommended improvements, including flattening the horizontal curve radius, adjusting vertical grades, adding turning lanes, shoulder widening, driveway tie-ins, installing snow fence, and intersection realignment.	<b>Harborcreek 7:</b> Study of traffic circulation, signal warrants, left turn lane and phase warrants at approximately 12 signals in Harborcreek and Wesleyville; study should include recommendations on equipment upgrades, traffic signal coordination, potential signals for removal, intersection improvements, and signal timing plans.	<b>Harborcreek 8:</b> Continue to enforce bluff recession and setback regulations
Cost Effectiveness	4	4	4	1	1	1	2	4
Social Impacts	3	3	3	4	4	3	4	4
Political Impacts	3	2	1	3	3	4	4	3
Environmental Impacts	4	4	4	4	4	3	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.3	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>13.8</b>	<b>13.8</b>	<b>14.3</b>	<b>16.1</b>	<b>17.25</b>

## LAKE CITY BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	Lake City 1: Continue to participate in the National Flood Insurance Program (NFIP)	Lake City 2: Continue to enforce current floodplain regulations	Lake City 3: Continue to enforce stormwater management ordinance	Lake City 4: Consider providing maintenance to Kelly Run channel by removing deteriorating foundation restricting water flow.	Lake City 5: Repair and increase capacity of stormwater system.	Lake City 6: Continue to enforce bluff recession and setback regulations
Cost Effectiveness	4	4	4	4	1	4
Social Impacts	3	3	3	4	3	4
Political Impacts	3	2	1	4	3	3
Environmental Impacts	4	4	4	3	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>17.25</b>	<b>12.65</b>	<b>17.25</b>



# LAWRENCE PARK TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Lawrence Park 1: Review and adopt floodplain management ordinance.	Lawrence Park 2: Consider stream bed restoration	Lawrence Park 3: Continue to enforce stormwater management ordinance	Lawrence Park 4: Construct intersection improvements and signal upgrades.	Lawrence Park 5: Continue to enforce bluff recession and setback regulations
Cost Effectiveness	4	2	4	2	4
Social Impacts	3	4	3	3	4
Political Impacts	1	3	1	3	3
Environmental Impacts	4	4	4	3	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>13.8</b>	<b>14.95</b>	<b>13.8</b>	<b>12.65</b>	<b>17.25</b>

## LeBOEUF TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	LeBoeuf 1: Continue to participate in the National Flood Insurance Program (NFIP)	LeBoeuf 2: Continue to enforce current floodplain regulations	LeBoeuf 3: Continue to enforce stormwater management ordinance	LeBoeuf 4: Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Cory when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace, remove guardrails and add signage.
Cost Effectiveness	4	4	4	1
Social Impacts	3	3	3	3
Political Impacts	3	2	1	3
Environmental Impacts	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>12.65</b>

## McKEAN BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>McKean Boro 1: Continue to participate in the National Flood Insurance Program (NFIP)</b>	<b>McKean Boro 2: Continue to enforce current floodplain regulations</b>	<b>McKean Boro 3: Study of potential improvements to Edinboro Road at West Road to address traffic congestion and safety concerns.</b>	<b>McKean Boro 4: Continue to enforce stormwater management ordinance</b>	<b>McKean Boro 5: Develop and maintain a database to track community vulnerability</b>	<b>McKean Boro 6: Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage</b>	<b>McKean Boro 7: Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take</b>
Cost Effectiveness	4	4	2	4	3	4	4
Social Impacts	3	3	4	3	4	2	4
Political Impacts	3	2	4	1	4	3	4
Environmental Impacts	4	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0	0	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>16.1</b>	<b>13.8</b>	<b>15</b>	<b>13</b>	<b>16</b>

## McKEAN TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	McKean Twp 1: Continue to participate in the National Flood Insurance Program (NFIP)	McKean Twp 2: Continue to enforce current floodplain regulations	McKean Twp 3: Stabilization of previously identified vulnerable locations.	McKean Twp 4: Continue to enforce stormwater management ordinance	McKean Twp 5: Develop and maintain a database to track community vulnerability	McKean Twp 6: Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	McKean Twp 7: Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take	McKean Twp 8: Purchase and install warning sirens with radio receivers.
Cost Effectiveness	4	4	1	4	3	4	4	2
Social Impacts	3	3	4	3	4	2	4	4
Political Impacts	3	2	3	1	4	3	4	3
Environmental Impacts	4	4	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0	0	0	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>13.8</b>	<b>15</b>	<b>13</b>	<b>16</b>	<b>13</b>

## MILL VILLAGE BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Mill Village 1: Continue to participate in the National Flood Insurance Program (NFIP)</b>	<b>Mill Village 2: Continue to enforce current floodplain regulations</b>	<b>Mill Village 3: Continue to enforce stormwater management ordinance</b>	<b>Mill Village 4: Re-install bridge and road and to dig creek bed down to a much lower level throughout the town.</b>	<b>Mill Village 5: Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Corry when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace, remove guardrails and add signage.</b>
Cost Effectiveness	4	4	4	1	1
Social Impacts	3	3	3	3	3
Political Impacts	3	2	1	2	3
Environmental Impacts	4	4	4	3	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>10.35</b>	<b>12.65</b>

## MILLCREEK TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Millcreek 1:</b> Continue to participate in the National Flood Insurance Program (NFIP)	<b>Millcreek 2:</b> Continue to enforce current floodplain regulations	<b>Millcreek 3:</b> Continue to enforce stormwater management ordinance	<b>Millcreek 4:</b> Traffic and safety study in the area around Old French Road due to many roadways intersecting at odd angles creating traffic circulation and safety concerns; study should recommend projects for implementation to address issues.	<b>Millcreek 5:</b> Study of traffic circulation and ramp configuration around interchange of I-90 at Route 8, to be pursued as development pressure occurs.	<b>Millcreek 6:</b> Complete stormwater conveyance and detention planning and construction.	<b>Millcreek 7:</b> Construct turn lanes and protected/permitted left-turn phasing for the northbound and southbound approaches at Zuck Road and W 23rd Street.	<b>Millcreek 8:</b> Safety and traffic study of interchange ramp configuration and access management at the interchange of I-79 and US 20 / W 26th Street.	<b>Millcreek 9:</b> Continue to enforce bluff recession and setback regulations	<b>Millcreek 10:</b> Identify critical infrastructure that could be impacted by high lake levels
Cost Effectiveness	4	4	4	2	2	2	2	2	4	4
Social Impacts	3	3	3	4	4	2	3	4	4	4
Political Impacts	3	2	1	4	4	3	3	4	3	4
Environmental Impacts	4	4	4	4	4	3	3	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>16.1</b>	<b>16.1</b>	<b>11.5</b>	<b>12.65</b>	<b>16.1</b>	<b>17.25</b>	<b>18.4</b>

## NORTH EAST BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	North East Boro 1: Continue to participate in the National Flood Insurance Program (NFIP)	North East Boro 2: Continue to enforce current floodplain regulations	North East Boro 3: Develop a public outreach campaign to increase community awareness about local mitigation actions	North East Boro 4: The building of infiltration galleys, porous pavement, directed downspout drainage, and landscaping to control stormwater runoff in municipal parking lots	North East Boro 5: Continue to enforce stormwater management ordinance
Cost Effectiveness	4	4	3	2	4
Social Impacts	3	3	2	4	3
Political Impacts	3	2	4	3	1
Environmental Impacts	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13</b>	<b>14.95</b>	<b>13.8</b>

## NORTH EAST TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>North East Twp 1: Continue to participate in the National Flood Insurance Program (NFIP)</b>	<b>North East Twp 2: Continue to enforce current floodplain regulations</b>	<b>North East Twp 3: Continue to enforce stormwater management ordinance</b>	<b>North East Twp 4: Repair and improve maintenance practices on bridges to allow for proper stormwater flow.</b>	<b>North East Twp 5: Full reconstruction and stormwater upgrades along Sidehill Road (SR 1008) to correct slope and embankment failure and remove the roadway weight restriction.</b>	<b>North East Twp 6: Construct road diet along the US 5 corridor near its intersection with SR 89 to reduce travel speeds through corridor, improve traffic and multimodal connectivity between downtown North East and Freeport Beach, when state route is due for betterment</b>	<b>North East Twp 7: Continue to enforce bluff recession and setback regulations</b>	<b>North East Twp 8: Develop a public outreach campaign to increase community awareness about local mitigation actions</b>
Cost Effectiveness	4	4	4	2	2	1	4	3
Social Impacts	3	3	3	4	3	4	4	4
Political Impacts	3	2	1	3	3	3	3	4
Environmental Impacts	4	4	4	4	4	3	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>14.95</b>	<b>13.8</b>	<b>12.65</b>	<b>17.25</b>	<b>15</b>



## PLATEA BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	Platea 1: Research and complete requirements to become an NFIP participating community.	Platea 2: Improve maintenance practices to alleviate flooding from runoff to lower railroad bed at Rt. 18 and W Peach Street	Platea 3: Repair or purchase tornado warning sirens with radio receivers.	Platea 4: Purchase hand held radios for EOC and shelters	Platea 5: Develop and maintain a database to track community vulnerability	Platea 6: Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	Platea 7: Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take
Cost Effectiveness	4	2	2	3	3	4	4
Social Impacts	4	4	4	4	4	2	4
Political Impacts	3	4	4	4	4	3	4
Environmental Impacts	4	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.3	0	0	0	0
<b>TOTAL</b>	<b>17.25</b>	<b>16.1</b>	<b>18.2</b>	<b>15</b>	<b>15</b>	<b>13</b>	<b>16</b>

## SPRINGFIELD TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Springfield 1:</b> Continue to participate in the National Flood Insurance Program (NFIP)	<b>Springfield 2:</b> Continue to enforce current floodplain regulations	<b>Springfield 3:</b> Pursue roadway widening along US 6N according to the Moving Forward Along Route 6 Plan through Edinboro, Union City, and Corry when the state route is due for betterment.	<b>Springfield 4:</b> Consider improving Tubbs Road culvert discharge.	<b>Springfield 5:</b> Continue to enforce stormwater management ordinance	<b>Springfield 6:</b> Continue to enforce bluff recession and setback regulations	<b>Springfield 7:</b> Develop and maintain a database to track community vulnerability	<b>Springfield 8:</b> Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage	<b>Springfield 9:</b> Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take
Cost Effectiveness	4	4	1	2	4	4	3	4	4
Social Impacts	3	3	4	4	3	4	4	2	4
Political Impacts	3	2	3	4	1	3	4	3	4
Environmental Impacts	4	4	2	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15	0	0	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>11.5</b>	<b>16.1</b>	<b>13.8</b>	<b>17.25</b>	<b>15</b>	<b>13</b>	<b>16</b>

## SUMMIT TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Summit 1:</b> Continue to participate in the National Flood Insurance Program (NFIP)	<b>Summit 2:</b> Continue to enforce current floodplain regulations	<b>Summit 3:</b> Conduct traffic analysis and design coordinated traffic signal system using adaptive signal control to account for changing traffic patterns such as holiday shopping season, emergency detour route diversion from I-90, and general weekday peak hour traffic. Analysis and recommendations should take into account operations of personal motor vehicles along with transit, commercial vehicles, pedestrians and bicycles.	<b>Summit 4:</b> Construct capacity enhancements such as widening on Oliver Road, additional turn lanes, traffic signal phasing changes, and accommodations for pedestrians to safely cross US 19 or Oliver Road	<b>Summit 5:</b> Continue to enforce stormwater management ordinance
Cost Effectiveness	4	4	2	1	4
Social Impacts	3	3	4	3	3
Political Impacts	3	2	4	3	1
Environmental Impacts	4	4	4	3	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>16.1</b>	<b>11.5</b>	<b>13.8</b>

## UNION TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Union Twp 1:</b> Continue to participate in the National Flood Insurance Program (NFIP)	<b>Union Twp 2:</b> Continue to enforce current floodplain regulations	<b>Union Twp 3:</b> Construct Pt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Corry when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace/remove guardrails, and add signage.	<b>Union Twp 4:</b> Continue to enforce stormwater management ordinance
Cost Effectiveness	4	4	1	4
Social Impacts	3	3	4	3
Political Impacts	3	2	3	1
Environmental Impacts	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>13.8</b>

## UNION CITY BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Union City 1: Continue to participate in the National Flood Insurance Program (NFIP)</b>	<b>Union City 2: Continue to enforce current floodplain regulations</b>	<b>Union City 3: Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Corry when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace/remove guardrails, and add signage.</b>	<b>Union City 4: Perform traffic analysis, upgrade equipment, and prepare signal timings at three traffic signals in Union City to improve operations and safety by reducing congestion.</b>	<b>Union City 5: Continue to enforce stormwater management ordinance</b>
Cost Effectiveness	4	4	1	2	4
Social Impacts	3	3	4	4	3
Political Impacts	3	2	3	4	1
Environmental Impacts	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>16.1</b>	<b>13.8</b>

## VENANGO TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Venango 1: Continue to participate in the National Flood Insurance Program (NFIP)	Venango 2: Continue to enforce current floodplain regulations	Venango 3: Add sluice pipes and elevate Knoyle Road	Venango 4: Continue to enforce stormwater management ordinance
Cost Effectiveness	4	4	2	4
Social Impacts	3	3	4	3
Political Impacts	3	2	3	1
Environmental Impacts	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>14.95</b>	<b>13.8</b>

## WASHINGTON TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Wash 1: Continue to participate in the National Flood Insurance Program (NFIP)</b>							
Cost Effectiveness	4	4	3	1	4	3	4	4
Social Impacts	3	3	4	4	3	4	2	4
Political Impacts	3	2	4	3	1	4	3	4
Environmental Impacts	4	4	3	2	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.3	0.15	0.15	0	0	0
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>18.2</b>	<b>11.5</b>	<b>13.8</b>	<b>15</b>	<b>13</b>	<b>16</b>
	<b>Wash 2: Continue to enforce current floodplain regulations</b>							
	<b>Wash 3: Repair or purchase tornado warning sirens with radio receivers</b>							
	<b>Wash 4: Pursue roadway widening along US 6N according to the Moving Forward Along Route 6 Plan through Edinboro, Union City, and Corry when the state route is due for betterment.</b>							
	<b>Wash 5: Continue to enforce stormwater management ordinance</b>							
	<b>Wash 6: Develop and maintain a database to track community vulnerability</b>							
	<b>Wash 7: Identify specific at-risk populations that may be exceptionally vulnerable in the event of a long-term power outage</b>							
	<b>Wash 8: Use outreach programs to inform homeowners of risks to life, health, and safety and facilitate programs where available to address measures citizens can take</b>							

## WATERFORD BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	Waterford Boro 1: Continue to participate in the National Flood Insurance Program (NFIP)	Waterford Boro 2: Continue to enforce current floodplain regulations	Waterford Boro 3: Restoration of US 19 (Waterford Pike) from the southern intersection with SR 97 to the northern intersection with SR 97	Waterford Boro 4: Continue to enforce stormwater management ordinance
Cost Effectiveness	4	4	1	4
Social Impacts	3	3	3	3
Political Impacts	3	2	3	1
Environmental Impacts	4	4	2	4
Risk Factor Weighting	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>10.35</b>	<b>13.8</b>



## WATERFORD TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Waterford Twp 1: Continue to participate in the National Flood Insurance Program (NFIP)	Waterford Twp 2: Continue to enforce current floodplain regulations	Waterford Twp 3: Continue to enforce stormwater management ordinance	Waterford Twp 4: Replace cross pipe at Baghdad Road
Cost Effectiveness	4	4	4	2
Social Impacts	3	3	3	4
Political Impacts	3	2	1	3
Environmental Impacts	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>14.95</b>

## WATTSBURG BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	Wattsburg 1: Continue to participate in the National Flood Insurance Program (NFIP)	Wattsburg 2: Continue to enforce current floodplain regulations	Wattsburg 3: Consider repairing/replacing storm drains under Main Street	Wattsburg 4: Improve storm sewer maintenance practices	Wattsburg 5: Continue to enforce stormwater management ordinance	Wattsburg 6: Obtain signage for re-routing traffic during high water events.
Cost Effectiveness	4	4	2	4	4	3
Social Impacts	3	3	4	4	3	4
Political Impacts	3	2	3	4	1	4
Environmental Impacts	4	4	4	4	4	4
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>14.95</b>	<b>18.4</b>	<b>13.8</b>	<b>17.25</b>

## WAYNE TOWNSHIP ACTIVE PROJECT PRIORITIZATION MATRIX

	Wayne 1: Continue to participate in the National Flood Insurance Program (NFIP)	Wayne 2: Continue to enforce current floodplain regulations	Wayne 3: Continue to enforce stormwater management ordinance	Wayne 4: Use of improved design practices to prevent stormwater collection	Wayne 5: Construct improvements to remove obstructions to sight distance and improve intersection safety at the intersection of US 6 and Beaver Dam Road.	Wayne 6: Construct Rt. 6 master plan recommendations for a bikeway along US 6 from the Erie County line in LeBoeuf Township through Mill Village, Union City, and Cory when the state road is due for betterment. Project may include tasks to widen shoulders, move/replace/remove guardrails, and add signage.
Cost Effectiveness	4	4	4	4	1	1
Social Impacts	3	3	3	4	4	4
Political Impacts	3	2	1	4	4	4
Environmental Impacts	4	4	4	4	3	3
Risk Factor Weighting	0.15	0.15	0.15	0.15	0.15	0.15
<b>TOTAL</b>	<b>16.1</b>	<b>14.95</b>	<b>13.8</b>	<b>18.4</b>	<b>13.8</b>	<b>13.8</b>

## WESLEYVILLE BOROUGH ACTIVE PROJECT PRIORITIZATION MATRIX

	<b>Wesleyville 1: Research and complete requirements to become an NPIP participating community.</b>	<b>Wesleyville 2: Continue to enforce stormwater management ordinance</b>	<b>Wesleyville 3: Study of traffic circulation, signal warrants, left turn lane and phase warrants at approximately 12 signals in Harborcreek and Wesleyville; study should include recommendations on equipment upgrades, traffic signal coordination, potential signals for removal, intersection improvements, and signal timing plans.</b>
Cost Effectiveness	4	4	3
Social Impacts	4	3	3
Political Impacts	3	1	4
Environmental Impacts	4	4	2
Risk Factor Weighting	0.15	0.15	0.15
<b>TOTAL</b>	<b>17.25</b>	<b>13.8</b>	<b>13.8</b>

## APPENDIX 4: INACTIVE PROJECTS

This appendix contains jurisdictions' completed, deleted, or deferred projects. Jurisdictions with no projects in this appendix are considered to be ongoing and therefore outlined in Section 6.0 Mitigation Strategy.

INACTIVE PROJECTS		
INACTIVE PROJECTS NUMBER	STATUS	PROJECT
Action No: 1	Complete	Update and adopt floodplain management ordinance when new flood maps become available using guidance in Pennsylvania Suggested Floodplain Management Provision
<b>Status Narrative:</b> All municipalities have adopted floodplain management ordinances.		
Action No: 2	Complete	Update and adopt stormwater ordinance
<b>Status Narrative:</b> All municipalities adopted stormwater ordinance upon completion of the <i>Erie County Stormwater Management Plan</i> .		
Action No: 3	Deleted	Work to combine the resources (vehicles, fire equipment, communications, manpower, etc.) in an effort to mitigate future natural and man-made emergencies
<b>Status Narrative:</b> All municipalities share resources under mutual aid agreements.		
Action No: 4	Deleted	Develop and distribute an emergency services newsletter
<b>Status Narrative:</b> Deleted due to more cost effective ways to distribute information to the public (i.e., social media).		
Action No: 5	Deleted	Host public forum to discuss personal planning protection for citizens
<b>Narrative:</b> Deleted due to more effective ways to distribute information and receive feedback from the public (i.e., social media, online surveys, etc.).		
Action No: 6	Completed	Install generator at Corry Community Center for shelter operations
<b>Status Narrative:</b> Project completed by installation of emergency generator at shelter location.		
Action No: 9	Completed	Provide overtopping protection to Edinboro Dam Lake
<b>Status Narrative:</b> Bypass spillway expanded in 2015.		
Action No: 11	Completed	Obtain and install portable generators at critical facilities to ensure heat, meals, and medical equipment are available and operating
<b>Status Narrative:</b> Projected completed by installing generators at critical facilities.		
Action No: 12	Completed	BMP implementation at previously identified problem areas
<b>Status Narrative:</b> This project was included in the stormwater planning work done by Erie County Department of Planning (i.e., identifying problem areas). It has thus been integrated into other plans for implementation		
Action No: 13	Completed	Work with SCNR and FEMA to disseminate updated flood map information
<b>Status Narrative:</b> This project was completed as per updates to FIRMs (2014) and RiskMAP products (2017).		
Action No: 17	Completed	Install generator at emergency community shelter, Fairview School
<b>Status Narrative:</b> Project completed by installation of emergency generator at shelter facility.		
Action No: 27	Deleted	Purchase and installation of warning sirens to warn residents of disaster
<b>Status Narrative:</b> Project deleted due to not being economically efficient due to other means of notification (i.e., mass notification system, social media, etc.).		
Action No: 32	Completed	Purchase another used snowplow for snow removal
<b>Status Narrative:</b> Project completed by purchase of snowplow equipment.		
Action No: 34	Completed	Direct infiltration protection from flood waters into key sewage lift station (possibly dike)
<b>Status Narrative:</b> Project completed by protecting sewer lift stations.		
Action No: 38	Completed	Consider more restrictive provisions during zoning ordinance update
<b>Status Narrative:</b> Zoning ordinance updates completed in 2014.		
Action No: 41	Completed	Collect additional information (maintenance, ownership, inspection, etc.) about the fourteen dams in Erie County for inclusion in the next hazard mitigation plan update
<b>Status Narrative:</b> An updated dams list was included in the 2017 hazard mitigation plan update.		



Action No: 43	Completed	Develop a countywide winter storm task force to meet regularly to address winter storm preparedness and operations
<b>Status Narrative:</b> Erie County Department of Public Safety regularly supports municipal EMA coordinators in general, all-hazard preparedness (to include severe winter weather)		
Action No: 44	Completed	Work with municipalities to update local floodplain management ordinances and collect and record information on provisions for freeboard, restrictions of hazardous materials in the floodplain, and restriction of critical facilities in the floodplain
<b>Status Narrative:</b> This project was completed as per information shared at the 2017 resiliency workshop. In instances where discrepancies were highlighted or a municipality was suspended from the NFIP, a new project was added to the active project list under those municipalities.		



## APPENDIX 5: CITATIONS

This appendix lists the research materials collected throughout the planning process. As a general note, citations for some resources appear in the hazard profiles (e.g., websites or local media references) or in relevant tables (e.g., listing the plans, reports, and technical guidance used as resources during the planning process).

Alice Training Institute. (2017). Active shooter. Retrieved from <https://www.alicetraining.com/active-shooter/>

Bates, Samuel P. (1884). History of Erie County, Pennsylvania. Retrieved from <https://archive.org/details/cu31924096783489>

Broad Band Now. (2016). Internet Service Providers. Retrieved from <http://broadbandnow.com/Pennsylvania/Erie>

Byrne, D. (2017). Public Education: Fire as a Weapon. Retrieved from <http://www.firehouse.com/article/12295657/public-education-fire-as-a-weapon>

Centers for Disease Control and Prevention. (2014). Clean Up Safely After a Disaster. Retrieved from <https://www.cdc.gov/disasters/cleanup/facts.html>

Centers for Disease Control and Prevention. (2014). Preventing Chain Saw Injuries During Tree Removal After a Disaster. Retrieved from <https://www.cdc.gov/disasters/chainsaws.html>

Centers for Disease Control and Prevention. (2014). Prevent Injury After a Disaster. Retrieved from <https://www.cdc.gov/disasters/injury/facts.html>

Centers for Disease Control and Prevention. (2015). Protect Yourself from the Dangers of Winter Weather. Retrieve from <https://www.cdc.gov/nceh/toolkits/winterweather/>

Centers for Disease Control and Prevention. (2015). Tetanus Prevention after a Disaster. Retrieved from <https://www.cdc.gov/disasters/disease/tetanus.html>

Centinari, M. (2016). Notes on the 2016 Growing Season and Drought Conditions. Retrieved from <https://psuwineandgrapes.wordpress.com/tag/water-stressed-vines/>

City of Erie. (2011). Review of Finances and Management Practices. Retrieved from <http://www.corrypa.com/wp-content/uploads/2016/03/Corry-EIP-Part-2.pdf>

Conrad Jr., M.J. (1997, June 2). [Letter to John C. Lyons]. Copy in possession of Erie County Department of Public Safety.



- Cornell University. (2006). Soil Erosion Threatens Environment and Human Health, Study Reports. *ScienceDaily*, 23. Online.  
<https://www.sciencedaily.com/releases/2006/03/060322141021.htm>
- Defensivedriving .com. (2014). How to Drive Safely In Strong Winds. Retrieved from  
<https://www.defensivedriving.com/blog/how-to-drive-safely-in-strong-wind/>
- Extension Disaster Education Network. (2015). Earthquakes: Disaster Fact Sheet. Retrieved from  
<http://eden.lsu.edu/Topics/Hazards/Earthquake/Pages/default.aspx>
- Ewing, T. (2016). Lake Erie's Icebreaker Offshore Wind Project Moves to Scoping Phase. Retrieved from  
<http://www.renewableenergyworld.com/articles/2016/10/lake-erie-s-project-icebreaker-moves-to-scoping-phase.html>
- Federal Bureau of Investigations. (2017). Active Shooter Resources. Retrieved from  
<https://www.fbi.gov/about/partnerships/office-of-partner-engagement/active-shooter-resources>
- Federal Emergency Management Agency. (2006) guide for All-Hazard Emergency Operations Planning. Retrieved from:  
<https://www.fema.gov/pdf/plan/6-ch-f-1.pdf>
- Federal Emergency Management Agency. (2016). National Flood Insurance Program: Who's Eligible. Retrieved from  
<https://www.fema.gov/news-release/2016/01/30/national-flood-insurance-program-whos-eligible>
- Flanagan, B.E., Gregory, E.W., Hallisey, E.J., Heitgerd, J.L., & Lewis, B. (2011). A Social Vulnerability Index for Disaster Management. Retrieved from  
<https://gis.cdc.gov/grasp/svi/a%20social%20vulnerability%20index%20for%20disaster%20management.pdf>
- Funk, J. (2017). First Energy Corp. to Sell or Close its Nuclear Power Plants. Retrieved from  
[http://www.cleveland.com/business/index.ssf/2017/02/firstenergy\\_corp\\_to\\_sell\\_or\\_cl.html](http://www.cleveland.com/business/index.ssf/2017/02/firstenergy_corp_to_sell_or_cl.html)
- Gelber, B. (2002). *The Pennsylvania Weather Book*. New Brunswick, NJ: Rutgers University Press.





- Insurance Institute for Business & Home Safety. (2017). Vulnerable Populations. Retrieved from <https://disastersafety.org/ibhs-public-policy/vulnerable-populations/>
- Kalis, M.A., Miller, M.D., & Wilson, R.A. (2009). Public Health and Drought. Journal of Environmental Health. Retrieved from [https://www.cdc.gov/nceh/ehs/docs/jeh/2009/july-aug\\_09\\_kalis\\_miller.pdf](https://www.cdc.gov/nceh/ehs/docs/jeh/2009/july-aug_09_kalis_miller.pdf)
- Keller, E.A., & DeVecchio, D.E. (2015). Natural Hazards. Earth's Processes as Hazards, Disasters and Catastrophes (4<sup>th</sup> ed.). Santa Barbara, CA: Pearson.
- Martinson, T., & Lakso, A. (2016). Grapes 101. How Grapevines Respond to Water Stress. Retrieved from <https://grapesandwine.cals.cornell.edu/newsletters/appellation-cornell/2016-newsletters/issue-26-august-2016/grapes-101>
- McGeehin, M.A., Mirabelli, M. (2001). The Potential Impacts of Climate Variability and Change on Temperature-related morbidity and mortality in the United States. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240665/>
- National Coalition for the Homeless. (2010). Winter Homeless Services: Bringing Our Neighbors In From the Cold. Retrieved from: [http://www.nationalhomeless.org/publications/winter\\_weather/report.html](http://www.nationalhomeless.org/publications/winter_weather/report.html)
- National Drought Mitigation Center. (2016). Types of Drought. Retrieved from <http://drought.unl.edu/DroughtBasics/TypesofDrought.aspx>
- National Institute of Environmental Health Sciences. (2016). Cardiovascular Disease and Stroke. Health Impacts of Climate Change. Retrieved from [https://www.niehs.nih.gov/research/programs/geh/climatechange/health\\_impacts/cardiovascular\\_diseases/index.cfm](https://www.niehs.nih.gov/research/programs/geh/climatechange/health_impacts/cardiovascular_diseases/index.cfm)
- National Science and Technology Council. (2016). Climate Change Impacts in the United States. Retrieved from <http://nca2014.globalchange.gov/report>
- National Weather Services. (2017). Beaufort Wind Scale. Retrieved from <https://www.weather.gov/mfl/beaufort>
- Pennsylvania Department of Environmental Protection. (2013). Municipal Reference Document: Guidance for the Implementation of the Chapter 85 Bluff Recession and Setback Regulations. Retrieved from <http://www.elibrary.dep.state.pa.us/dsweb/GetRendition/Document-94560/html>
- Pennsylvania Department of Environmental Protection. (2015). Coastal Resource Management Program: About the Program. Retrieved from



- <http://www.dep.pa.gov/Business/Water/Compacts%20and%20Commissions/Coastal%20Resources%20Management%20Program/Pages/About-the-Program.aspx>
- Pennsylvania Department of Labor and Industry. (2016). Top 50 Employers, 3<sup>rd</sup> Quarter 2016. Retrieved from [http://www.workstats.dli.pa.gov/Documents/Top%2050/Erie\\_County\\_Top\\_50.pdf](http://www.workstats.dli.pa.gov/Documents/Top%2050/Erie_County_Top_50.pdf)
- Pennsylvania Emergency Management Agency. (2013). 2013 Pennsylvania Statewide Hazard Mitigation Plan. Retrieved from <http://www.pema.pa.gov/responseandrecovery/Disaster-assistance/Documents/General%20Mitigation%20Forms%20and%20Information/Pennsylvania%20State%20Hazard%20Mitigation%20Plan%20-%20Oct%2031%202013.pdf>
- Pennsylvania Public Utility Commission. (2016). Telephone Carriers by County. Retrieved from [http://www.puc.state.pa.us/consumer\\_info/telecommunications/telephone\\_companies.aspx](http://www.puc.state.pa.us/consumer_info/telecommunications/telephone_companies.aspx)
- Pennsylvania Sea Grant. (2016). Climate Impacts to Lake Erie Agriculture. Retrieved from <http://seagrants.psu.edu/sites/default/files/Agriculture%20Infographic%20Print%202016.pdf>
- Pennsylvania Sea Grant. (2016). Climate Impacts To Pennsylvania's Lake Erie Tourism. Retrieved from <https://seagrants.psu.edu/sites/default/files/infographic%20PA.pdf>
- Ralston, E.P., Kite-Powell, H, and Beet, A. (2011). An Estimate of the Cost of Acute Food and Water Borne Health Effects from Marine Pathogens and Toxins in the United States. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5439350/>
- Stubbs, M. (2016). Agricultural Disaster Assistance. Retrieved from <https://fas.org/sqp/crs/misc/RS21212.pdf>
- Taleb, N.N. (2010). The Black Swan. The Impact of the Highly Improbable (2<sup>nd</sup> ed.). New York, NY: Random House Trade
- Trambley, P. (2017) What are Straight-Line Winds. Retrieved from <http://weatherology.com/articles/160/What+are+Straight-Line+Winds%3F.html>
- United States Army Corps of Engineers. (n.d.). Buffalo district Projects Story Map. Retrieved from <https://rsc->



- [agisu.usace.army.mil/s1portal/apps/MapTour/index.html?appid=b645d99aaa6c45f687004586b12cdc0f&webmap=dea7c5ab0fd24fe9a322a73a577fc14d#map](http://agisu.usace.army.mil/s1portal/apps/MapTour/index.html?appid=b645d99aaa6c45f687004586b12cdc0f&webmap=dea7c5ab0fd24fe9a322a73a577fc14d#map)
- United States Census Bureau. (2015). Quick Facts, Erie County Pennsylvania. Retrieved from <https://www.census.gov/quickfacts/table/PST045214/42049/embed/accessible>
- United States Department of Agriculture. (2012). Census of Agriculture County Profile. Retrieved from [https://www.agcensus.usda.gov/Publications/2012/Online\\_Resources/County\\_Profiles/Pennsylvania/cp42049.pdf](https://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Pennsylvania/cp42049.pdf)
- United States Department of Agriculture. (2016). National Invasive Species Information Center: Animals. Retrieved from <https://www.invasivespeciesinfo.gov/animals/main.shtml>
- United States Global Change Research Program. (2016). Human Health. Retrieved from <http://www.globalchange.gov/browse/federal-adaptation-resources/human-health>
- World Health Organization. (2008). Radiopharmaceuticals: Final text addition to *The International Pharmacopoeia*. Retrieved from <http://www.who.int/medicines/publications/pharmacopoeia/Radgenmono.pdf>



## **APPENDIX 6: ADOPTING RESOLUTIONS**

This appendix contains copies of the resolutions signed by participating jurisdictions, thereby officially adopting this update.

\*NOTE: This appendix will be empty during the PEMA/FEMA review and approval process.

