MCM Consulting Group, Inc.

Indiana County 2018 Hazard Mitigation Plan

Indiana County Emergency Management Agency

Certification of Annual Review Meetings

YEAR	DATE OF MEETING	PUBLIC OUTREACH ADDRESSED?*	SIGNATURE
2019			
2020			
2021			
2022			
2023			

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

Record of Changes

DATE	DESCRIPTION OF CHANGE MADE, MITIGATION ACTION COMPLETED, OR PUBLIC OUTREACH PERFORMED	CHANGE MADE BY (PRINT NAME)	CHANGE MADE BY (SIGNATURE)

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

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1. Introduction

1.1. Background

The Indiana County Board of Commissioners, in response to the Disaster Mitigation Act of 2000 (DMA 2000), organized a countywide hazard mitigation planning effort to prepare, adopt and implement a multi-jurisdictional hazard mitigation plan (HMP) for Indiana County and all of its thirty-eight municipalities. The Indiana County Emergency Management Agency (EMA) was charged by the County Board of Commissioners to prepare the 2012 plan. The 2012 HMP has been utilized and maintained during the 5-year life cycle.

In 2017, the Indiana County Commissioners were successful in securing hazard mitigation grant funding to update the county hazard mitigation plan. The hazard mitigation grant program (HMGP) funding was administered by the Pennsylvania Emergency Management Agency and provided to Indiana County as a sub-grantee. The Indiana County Commissioners assigned the Indiana County Emergency Management Agency with the primary responsibility to update the hazard mitigation plan. MCM Consulting Group, Inc. was selected to complete the update of the HMP. A local hazard mitigation planning team was developed comprised of government leaders and citizens from Indiana County. This updated HMP will provide another solid foundation for the Indiana County Hazard Mitigation Program.

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

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

1.2. Purpose

The purpose of this All-Hazard Mitigation Plan (HMP) is:

- To protect life, safety and property by reducing the potential for future damages and economic losses that result from natural and human-caused hazards;

- To qualify for additional grant funding, in both the pre-disaster and the post-disaster environment;
- To speed recovery and redevelopment following future disaster events;
- To demonstrate a firm local commitment to hazard mitigation principles; and
- To comply with both state and federal legislative requirements for local hazard mitigation plans.

1.3. Scope

This Indiana County Multi-Jurisdictional Hazard Mitigation Plan serves as a framework for saving lives, protecting assets and preserving the economic viability of the thirty eight municipalities in Indiana County. The HMP outlines actions designed to address and reduce the impact of a full range of natural hazards facing Indiana County, including drought, earthquakes, flooding, tornados, hurricanes/tropical storms and severe winter weather. Human-caused hazards such as transportation accidents, hazardous materials spills and fires are also addressed.

A multi-jurisdictional planning approach was utilized for the Indiana County HMP update, thereby eliminating the need for each municipality to develop its own approach to hazard mitigation and its own planning document. Further, this type of planning effort results in a common understanding of the hazard vulnerabilities throughout the county, a comprehensive list of mitigation projects, common mitigation goals and objectives and an evaluation of a broad capabilities assessment examining policies and regulations throughout the county and its municipalities. Indiana University of Pennsylvania (IUP) was involved with the HMP update throughout the entire process. Recently, funding to update the IUP Disaster Resistant Hazard Mitigation Plan has been discontinued for state owned and operated universities. IUP will function in the HMP update as another municipality.

1.4. Authority and Reference

Authority for this plan originates from the following federal sources:

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

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

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

The following Federal Emergency Management Agency (FEMA) guides and reference documents were used to prepare this document:

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

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

- PEMA: *Hazard Mitigation Planning Made Easy!*
- PEMA Mitigation Ideas: *Potential Mitigation Measures by Hazard Type: A Mitigation Planning Tool for Communities*. March 6, 2009
- PEMA: *Standard Operating Guide*. October 18, 2013

The following document produced by the National Fire Protection Association (NFPA) provided additional guidance for updating this plan:

- NFPA 1600: *Standard on Disaster/Emergency Management and Business Continuity Programs*. 2011

2. Community Profile

2.1. Geography and Environment

Indiana County covers approximately 834 square miles and is situated in the west-central portion of Pennsylvania. The county is bordered by Armstrong County to the west, Jefferson County to the north, Clearfield and Cambria counties to the east, and Westmoreland County to the south. Indiana County is located within the Allegheny Mountain section of the Appalachian Plateaus province. The county is the thirty-fourth ranked county in terms of population within the Commonwealth of Pennsylvania. There is a total of 827 square miles of land and seven square miles of water.

Indiana County's topography is composed of rolling hills and streams with the Conemaugh River, a major tributary to the Allegheny River, marking its southern boundary. Elevations in the county range from a high of 2,180(664 meters) feet to a low of 847 (258 meters) feet.

The climate in Indiana County is temperate, with seasonal variation in temperature. The weather is usually moderate, but may have occasional rapid changes resulting from frontal air mass movements. The temperatures in Indiana County typically fluctuate between a daily low of 20˚F to 60˚F and a daily high of 40˚F to 82˚F depending on the time of year. Yearly precipitation averages forty inches of rain per year, and thirty-two inches of snow.

River and stream valleys dominate the landscape of Indiana County. The most significant water feature is the Conemaugh River, which is a tributary of the Allegheny River. Other major water features include: Two Lick Creek, Black Lick Creek, Crooked Creek and Little Mahoning Creek.

Indiana County is comprised of twelve watersheds:

- Aultman/Stewart Run
- Backlegs Creek
- Blacklick Creek
- Canoe Creek
- Conemaugh River
- Cowanshannock Creek
- Crooked Creek
- Kiskiminetas River
- Little Mahoning Creek
- Mahoning Creek
- Two Lick Creek
- West Branch Susquehanna River

2.1. Community Facts

The first known history of Indiana County dates back to 1727, when James LeTort, a French Huguenot trader, established a trading post for the Indians near what is now the town of Shelocta. On March 30, 1803 Indiana County became its own entity from parts of Westmoreland and Clearfield counties. The core communities in Indiana County are Indiana Borough, White Township, Center Township, Burrell Township, Green Township, and Blairsville Borough.

The following boroughs and townships are located in Indiana County:

- Boroughs: Armagh, Blairsville, Cherry Tree, Clymer, Creekside, Ernest, Glen Campbell, Homer City, Indiana, Marion Center, Plumville, Saltsburgh, Shelocta, Smicksburg,
- Townships: Armstrong, Banks, Black Lick, Brush Valley Township, Buffington, Burrell, Canoe, Center, Cherryhill, Conemaugh, East Mahoning, East Wheatfield, Grant, Green, Montgomery, North Mahoning, Pine, Rayne, South Mahoning, Washington, West Mahoning, West Wheatfield, White, Young

Indiana County's leading major industries are coal mining, natural gas production, education, healthcare, and retail trade. The primary employment providers within Indiana County are displayed below in *Table 1 - Top Employers*.

Table 1 - Top Employers

Indiana County Top Employers	
Company	**Industry**
PA State System of Higher Education	Education
Indiana Regional Medical Center	Healthcare
State Government	Government
Diamond Drugs Inc	Medical Supply
S & T Bank	Financial Services
Indiana County	Government
Indiana Area School District	Education
NRG Energy Inc	Energy Provider
Specialty Tires of America	Tire Manufacturer
Wal-Mart Corporation	Retail services
Indiana Printing and Publishing Co	Commercial Printing
Rosebud Mining Company	Coal Provider
Federal Government	Government
William G. Satterlee & Sons Inc	Petroleum Services
Halliburton Energy Services Inc	Well Industry
Source: Pennsylvania Department of Labor & Industry	

Indiana County is closely linked to the production, processing and transportation of its abundant natural resources. The county is a major national center for energy production with three coal-fired power plants located within the county. Agriculture plays an important role in the landscape, culture, and economy in Indiana County. There is a total of forty two farms in this area that have been recognized by the Pennsylvania Department of Agriculture. In addition to being an agricultural county, vast resources of salt, coal, natural gas and timber contributed to the development and prosperity of the local economy. Furthermore, the county is known as the "Christmas Tree Capital of the World", supplying over a million trees annually to markets nationwide.

Founded in 1875, Indiana University of Pennsylvania (IUP) is one of the two largest universities in the Pennsylvania State System of Higher Education (PASSHE). As of 2017, there are a total of 12,316 undergraduate and graduate students who attend IUP. IUP has largely influenced the growth of the local economy as well as the town of Indiana since it was formed.

2.3. Population and Demographics

Indiana County recorded a population of 88,880 during the 2010 U.S. Census, ranking the county in the thirty fourth position among Pennsylvania's sixty-seven counties. The population in this county is declining according to the U.S. Census Bureau whom estimated the population to be 86,364 in July of 2016, or -2.8% from the April 1, 2010 population census. The median income of households in Indiana County is $45,195. This is approximately $8,000 less than the national median household income (U.S. Census, 2014).

The populations per municipality are identified in *Table 2 - Municipal Population* below.

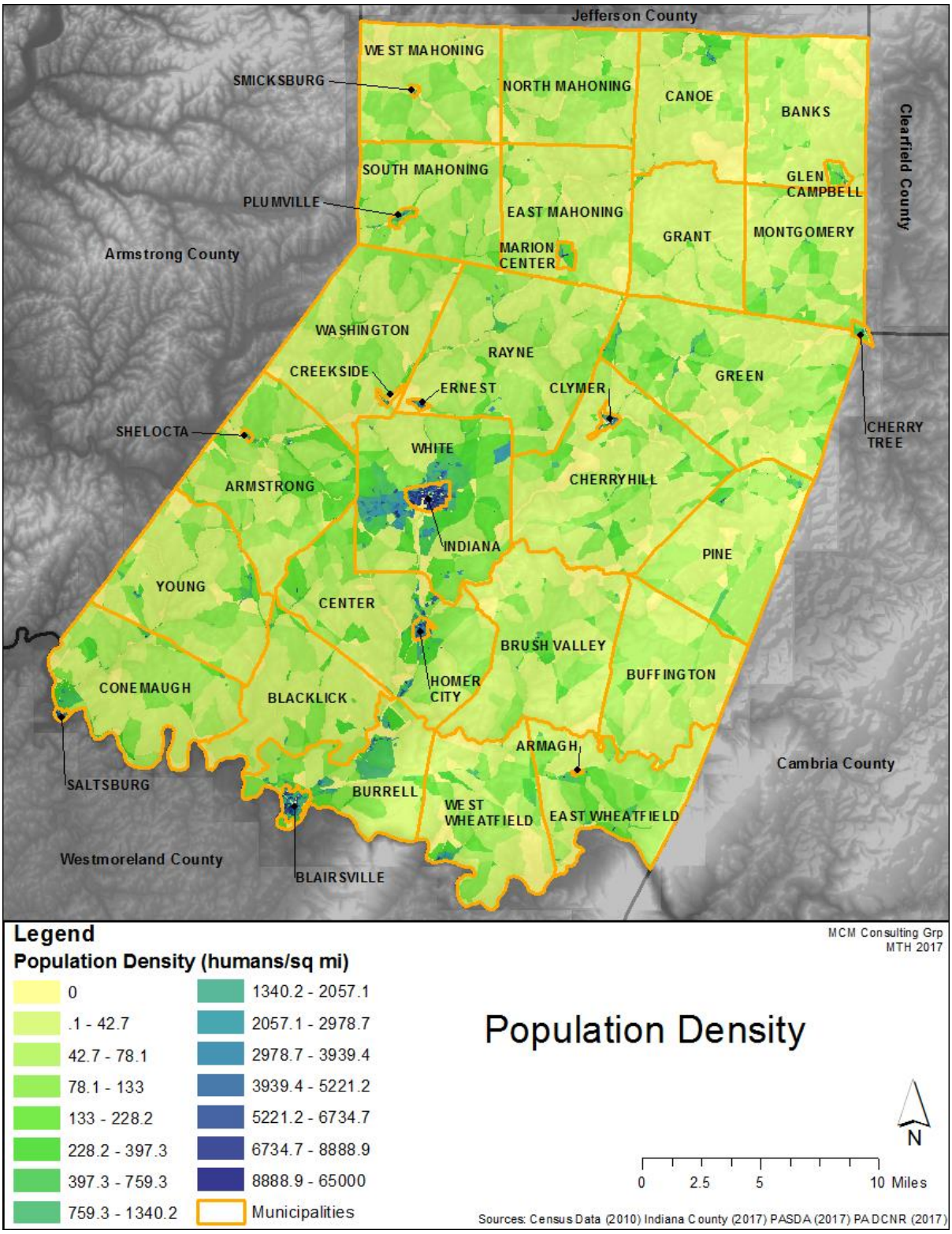
Table 2 - Municipal Population

Indiana County Municipality Populations			
Municipality	**Population**	**Municipality**	**Population**
Armagh Borough	122	Grant Township	741
Armstrong Township	2,998	Green Township	3,839
Banks Township	1,018	Homer City Borough	1,707
Black Lick Township	1,237	Indiana Borough	13,975
Blairsville Borough	3,412	Marion Center Borough	451
Brush Valley Township	1,858	Montgomery Township	1,568
Buffington Township	1,328	North Mahoning Township	1,428
Burrell Township	4,393	Pine Township	2,033
Canoe Township	1,505	Plumville Borough	307
Center Township	4,764	Rayne Township	2,992
Cherryhill Township	2,765	Saltsburgh Borough	873

Indiana County Municipality Populations			
Municipality	**Population**	**Municipality**	**Population**
Cherry Tree Borough	364	Shelocta Borough	130
Clymer Borough	1,357	Smicksburg Borough	46
Conemaugh Township	2,294	South Mahoning Township	1,841
Creekside Borough	309	Washington Township	1,808
East Mahoning Township	1,077	West Mahoning Township	1,357
East Wheatfield Township	2,366	West Wheatfield Township	2,314
Ernest Borough	462	White Township	15,821
Glen Campbell Borough	245	Young Township	1,775
Source: 2010 Census Bureau			

The median age in Indiana County is 38.9years old (according to the 2010 United States Census Bureau). As of September 2017, the largest population in Indiana County is 0 – 17 years old (19 percent). A total of 38,236 housing units were identified during the 2010 census. In total, 72,8% of homes within Indiana County are 1-unit attached/detached, 10.7% are mobile homes, and the remaining percent are homes that are 2 or more units.

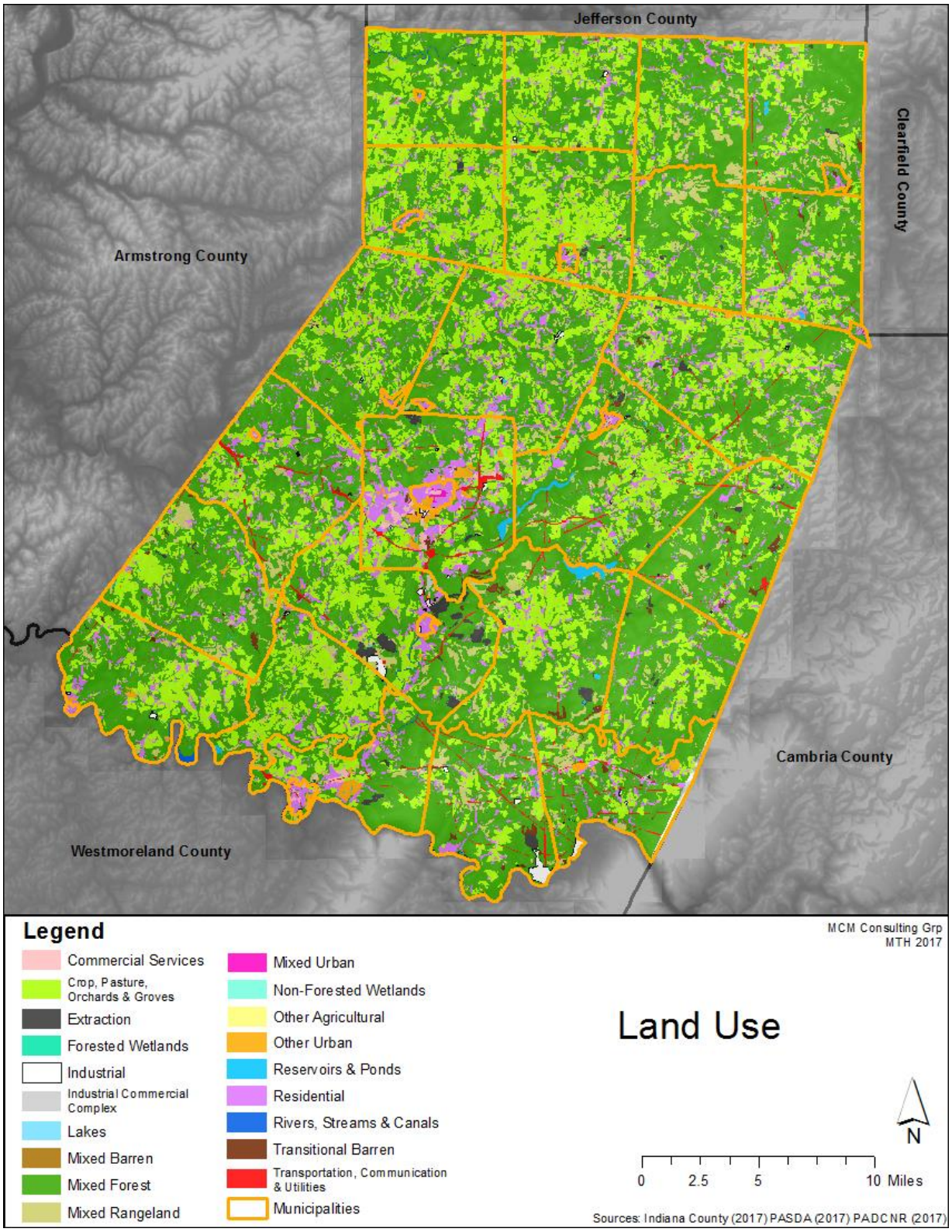
Figure 1 - Population Density Map



2.4. Land Use and Development

Indiana County is mostly a rural county as more than 90% of its total land area is classified as undeveloped countryside (woodland, farms, parks, etc.). An identified issue associated with land development in Indiana County is the increasing amount of land being developed farther away from traditional downtowns and boroughs. Costly new and improved highways, water and sewer infrastructure are required to accommodate development in these areas. These low-density development patterns contribute to increased costs for public services, increased use of vehicles, and increased emissions of carbon dioxide. They also contribute to a loss of farmland and open space in and adjacent to developing areas of the county, and a loss of community or sense of place.

Figure 2 - Land Use/Land Cover Map



2.5. Data Sources

- Where We Live…A Comprehensive Plan for Indiana County, Pennsylvania
- Indiana County Conservation District
- Indiana County Office of Planning and Development
- Pennsylvania State Data Center
- United States Census Bureau (2010)
- United States Department of Agriculture (2012)
- Pennsylvania Department of Labor and Industry
- Pennsylvania Spatial Data Access (PASDA)
- Pennsylvania Department of Conservation and Natural Resources
- National Oceanic and Atmospheric Administration
- Federal Emergency Management Agency
- Indiana University of Pennsylvania

Figure 3 - Indiana County Base Map

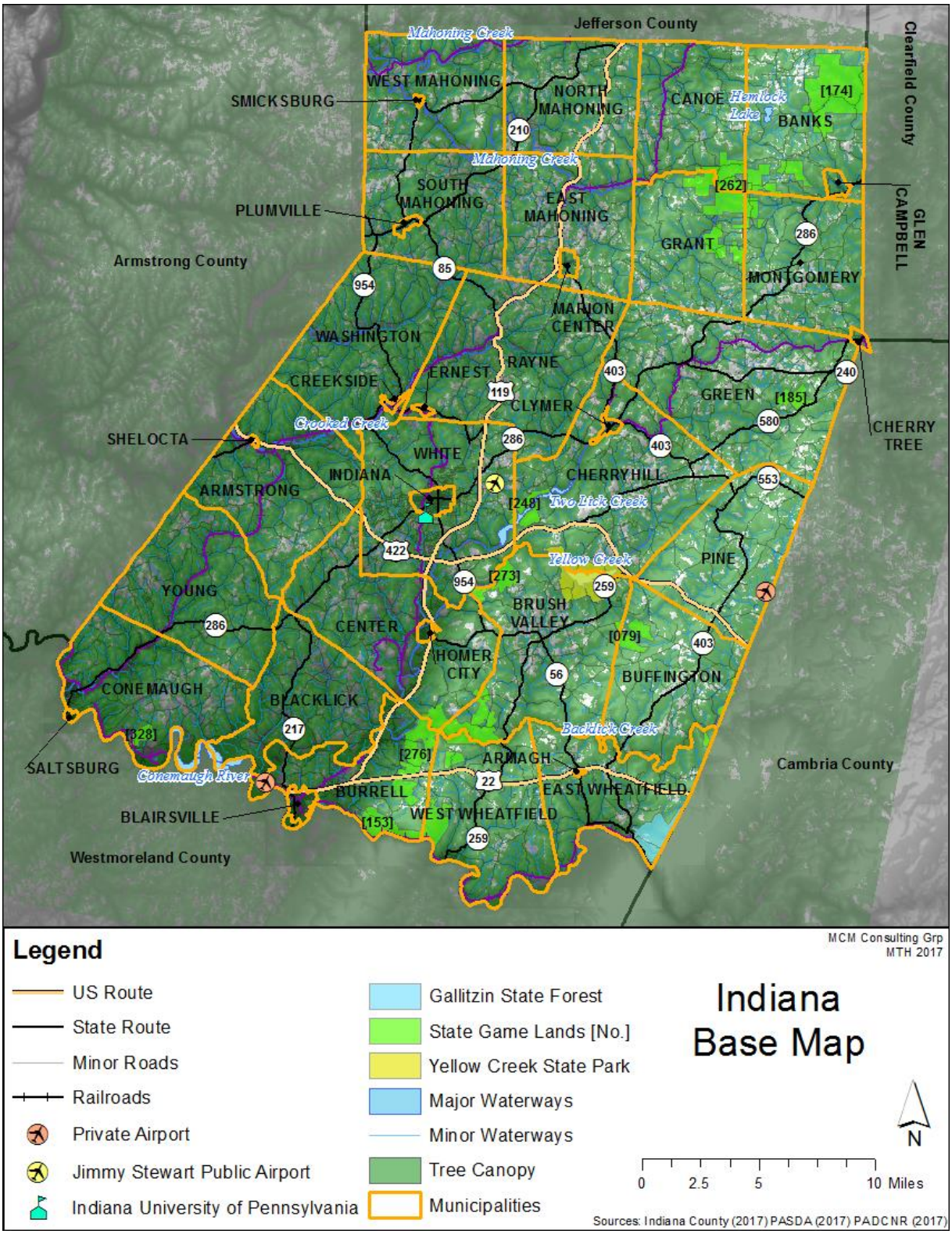


Figure 4 - Recreation Features

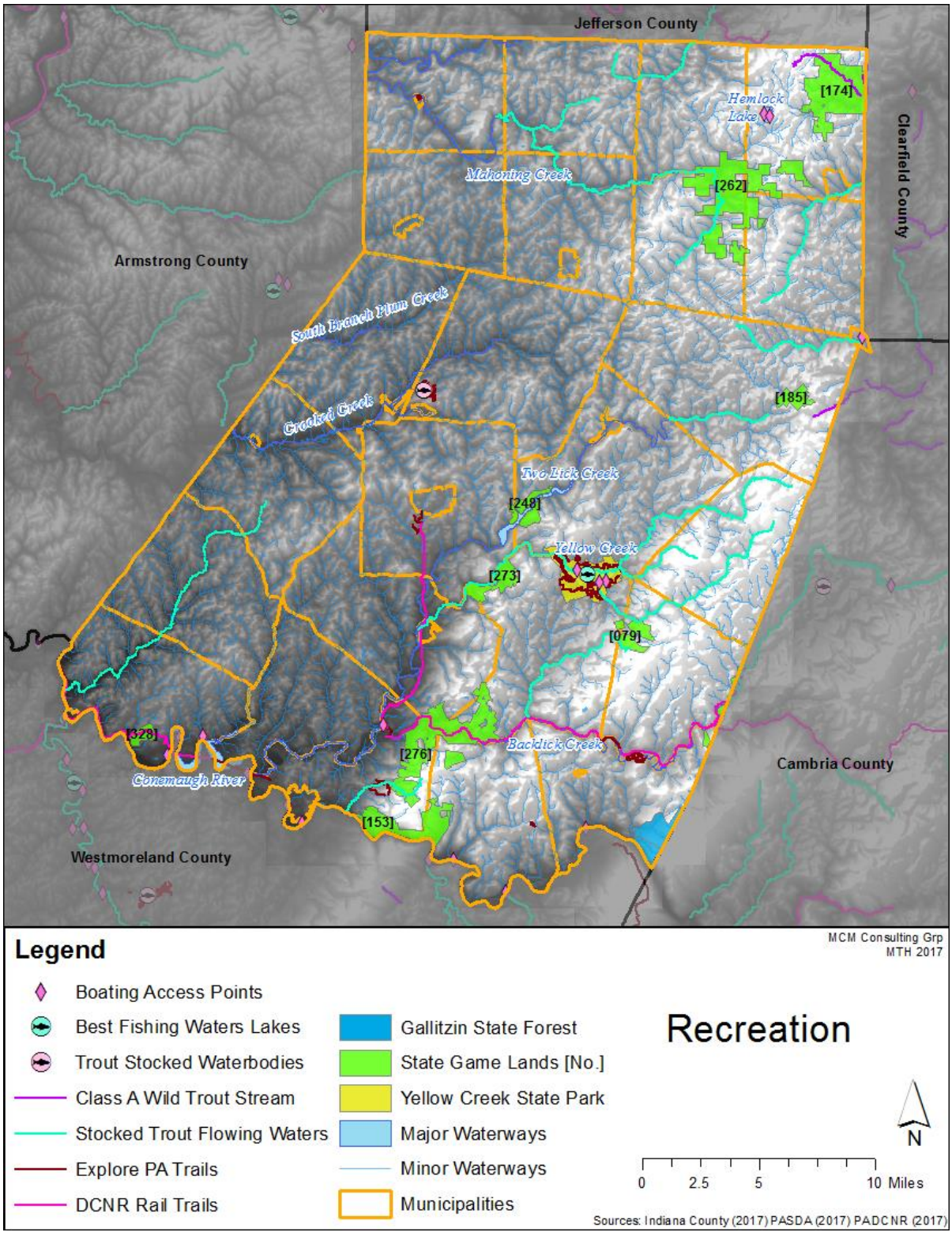
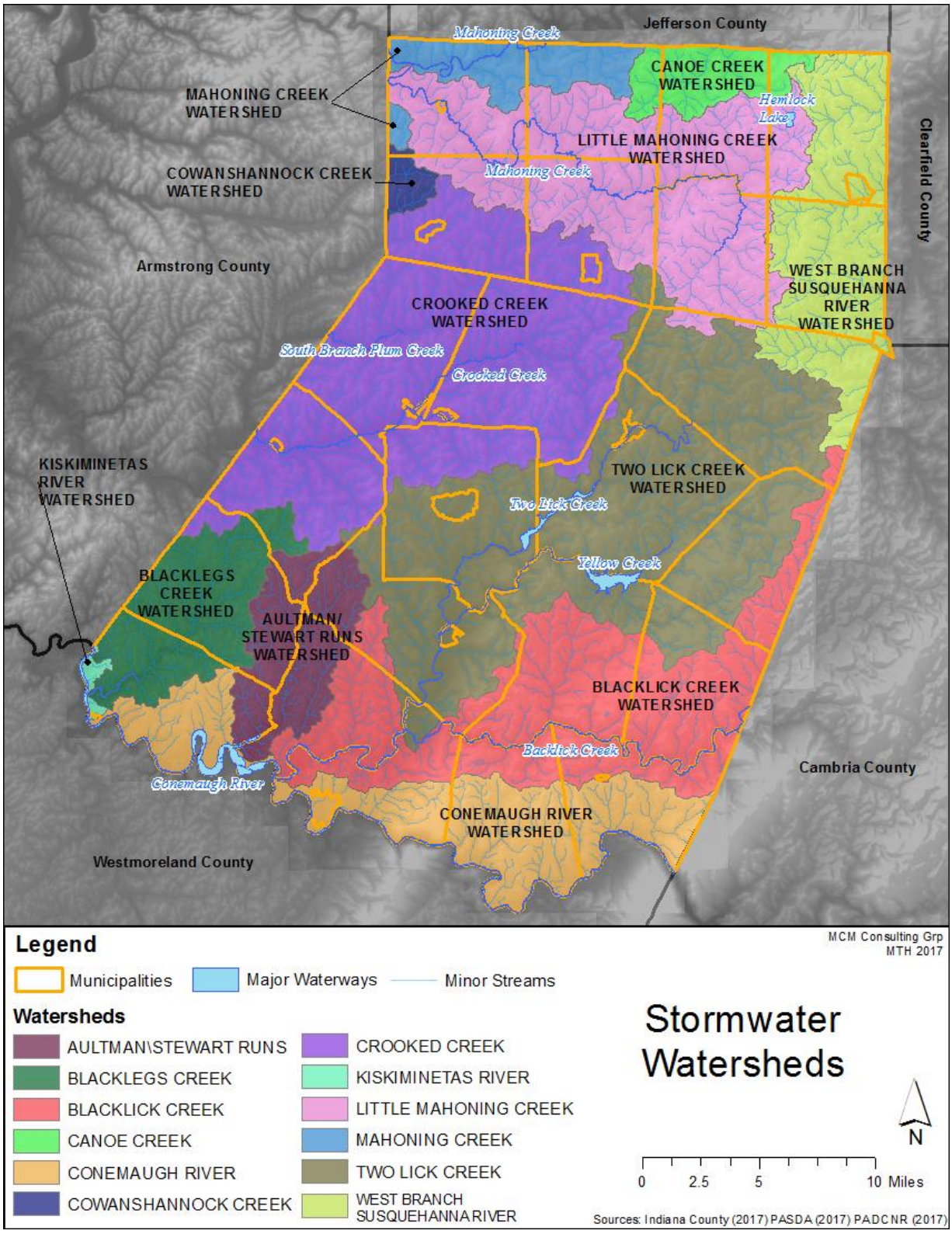


Figure 5 - Hydrologic Features



3. Planning Process

3.1. Update Process and Participation Summary

The Indiana County Hazard Mitigation Plan update began May 9, 2017. The Indiana County Commissioners were able to secure a hazard mitigation grant to start the process. The Indiana County Emergency Management Agency was identified as the lead agency for the Indiana County Hazard Mitigation Plan update. The planning process involved a variety of key decision makers and stakeholders within Indiana County. Indiana County immediately determined that the utilization of a contracted consulting agency would be necessary to assist with the plan update process. MCM Consulting Group, Inc. was selected as the contracted consulting agency to complete the update of the hazard mitigation plan. The core hazard mitigation team, which was referred to as the project team, included officials from the Indiana County Emergency Management Agency, Indiana County Planning Board and MCM Consulting Group, Inc. (MCM).

The process was developed around the requirements laid out in the Federal Emergency Management Agency (FEMA) Local Hazard Mitigation Crosswalk, referenced throughout this plan, as well as numerous other guidance documents including, but not limited to, Pennsylvania's All-Hazard Mitigation Standard Operating Guide, FEMA's State and Local Mitigation Planning How-to Guide series of documents (FEMA 386-series) and the National Fire Protection Association (NFPA) 1600 Standard on Disaster/Emergency Management and Business Continuity Programs.

MCM Consulting Group, Inc. assisted the Indiana County Emergency Management Agency in coordinating and leading public involvement meetings, local planning team meetings, analysis and the writing of the HMP. The Indiana County Local Planning Team worked closely with MCM in the writing and review of the HMP. MCM conducted project meetings and local planning team meetings throughout the process. Meeting agendas, meeting minutes and sign in sheets were developed and maintained for each meeting conducted by MCM. These documents are detailed in Appendix C of this plan.

Public meetings with local elected officials were held, as well as work sessions and in-progress review meetings with the Indiana County Local Planning Team and staff. At each of the public meetings, respecting the importance of local knowledge, municipal officials were strongly encouraged to submit hazard mitigation project opportunity forms, complete their respective portions of the capabilities assessment and review and eventually adopt the county hazard mitigation plan. Indiana County will continue to work with all local municipalities to collect local hazard mitigation project opportunities.

The HMP planning process consisted of:

- Applying for and receiving a hazard mitigation planning grant (HMPG) to fund the planning project.

- Announcing the initiative via press releases and postings on the county website.
- Involving elected and appointed county and municipal officials in a series of meetings, training sessions and workshops.
- Identifying capabilities and reviewed the information with the municipalities.
- Identifying hazards.
- Assessment of risk and analyzing vulnerabilities.
- Identifying mitigation strategies, goals and objectives.
- Developing an implementation plan.
- Announcing completion via press releases and postings on the county website.
- Plan adoption at a public meeting of the Indiana County Board of Commissioners.
- Plan submission to FEMA and PEMA.

The 2018 Indiana County HMP was completed January 11, 2018. The 2018 plan follows an outline developed by PEMA which provides a standardized format for all local HMPs in the Commonwealth of Pennsylvania. The 2018 HMP format is consistent with the PEMA recommended format. The 2018 Indiana County HMP has additional hazard profiles that were added to the HMP and these additional profiles increased the subsections in section 4.3 of the HMP.

3.2. The Planning Team

The 2018 Indiana County Hazard Mitigation Plan update was led by the Indiana County Steering Committee. The Indiana County Steering Committee provided guidance and leadership for the overall project. The committee assisted MCM Consulting Group, Inc. with dissemination of information and administrative tasks. *Table 3 – Steering Committee* outlines the individuals that comprised this team.

Table 3 – Steering Committee

Indiana County Hazard Mitigation Plan Update Steering Committee		
Name	**Organization**	**Position**
Thomas Stutzman	Indiana County EMA	Director
John Pividori	Indiana County EMA	Deputy Director
Byron Stauffer	Indiana County Planning	Director
Michael Shanshala	PennDOT District 10	Maintenance Services Engineer
Adam Marshall	PennDOT District 10	Assistant Traffic Engineer
Tim Evans	Blairsville Boro	Elected or Appointed Official
John Bertolino	Center Twp	Elected or Appointed Official
Dana Turgeon	Indiana Boro	Elected or Appointed Official

Indiana County Hazard Mitigation Plan Update Steering Committee		
Name	**Organization**	**Position**
Dave Fairman	Indiana Boro	Elected or Appointed Official
Bradley Gotshall	Indiana Boro	Elected or Appointed Official
Milton Lady	White Twp	Elected or Appointed Official
Michael Rearick	MCM Consulting Group, Inc.	Project Manager

In order to represent the county, the Indiana County Steering Committee developed a diversified list of potential Local Planning Team (LPT) members. Members that participated in the 2012 hazard mitigation plan were highly encouraged to join the 2018 team. The steering committee then provided invitations to the prospective members and provided a description of duties to serve on the LPT. The following agencies, departments and organizations were invited to participate in the LPT: Indiana County Commissioners, Indiana County Planning Commission, Indiana University of Pennsylvania, DCNR Bureau of Parks, DCNR Bureau of Forestry, Indiana County Historical Society, PennDOT, Pennsylvania State Police, Indiana County Conservation District, Indiana County School Districts, Indiana County Fire Chiefs, Indiana County Ambulance, Indiana County Sheriff and all thirty eight municipalities. Consideration was given to inviting all the surrounding county emergency management agencies to participate but all of these counties interface with Indiana County through the Region 13 Group. The invitations for membership of the LPT were disseminated by the Indiana County Emergency Management Agency utilizing letters, email and telephone calls. The LPT worked throughout the process to plan and hold meetings, collect information and conduct public outreach.

The stakeholders listed in *Table 4 - Local Planning Team* served on the 2018 Indiana County Hazard Mitigation Local Planning Team, actively participated in the planning process by attending meetings, completing assessments, surveys and worksheets and/or submitting comments.

Table 4 - Local Planning Team

Indiana County Hazard Mitigation Plan Update Local Planning Team		
Name	**Organization**	**Position**
Thomas Stutzman	Indiana County EMA	Director
John Pividori	Indiana County EMA	Deputy Director
Margaret Larkin	Armagh Boro	Elected or Appointed Official
Marilyn Mack	Armagh Boro	Elected or Appointed Official
James Brendlinger	Armagh Boro	Elected or Appointed Official
Michael Ault	Armagh Boro	Elected or Appointed Official
Glenn Carnahan	Armstrong Twp	Elected or Appointed Official
Rodger George	Armstrong Twp	Elected or Appointed Official
Patricia George	Armstrong Twp	Elected or Appointed Official
Tracy Pearce	Banks Township	Elected or Appointed Official

Indiana County Hazard Mitigation Plan Update Local Planning Team		
Name	**Organization**	**Position**
Tim Stewart	Blacklick Twp	Elected or Appointed Official
Tim Evans	Blairsville Boro	Elected or Appointed Official
Chuck Westover	Brush Valley Twp	Elected or Appointed Official
David Overdorff	Brush Valley Twp	Elected or Appointed Official
Sam Kerr	Brush Valley Twp	Elected or Appointed Official
Mike Dill	Buffington Twp	Elected or Appointed Official
Dwight Winebark	Canoe Twp	Elected or Appointed Official
Elmer Williard	Canoe Twp	Elected or Appointed Official
Georgia Lou Riddle	Canoe Twp	Elected or Appointed Official
Jim Gatskie	Center Twp	Elected or Appointed Official
John Bertolino	Center Twp	Elected or Appointed Official
Dave Smyers	Center Twp	Elected or Appointed Official
Jim Golden	Cherryhill Twp	Elected or Appointed Official
George Oakes	Clymer Borough	Elected or Appointed Official
Ashley Harmon	Conemaugh Twp	Elected or Appointed Official
Robert Fairman	Creekside Boro	Elected or Appointed Official
Patrick Ackerson	East Mahoning	Elected or Appointed Official
Bertha Ackerson	East Mahoning	Elected or Appointed Official
Douglas Rudnik	East Wheatfield Twp	Elected or Appointed Official
Colleen Rudnik	East Wheatfield Twp	Elected or Appointed Official
Patricia Yamrick	Ernest Boro	Elected or Appointed Official
Amy Aikens	Grant Twp	Elected or Appointed Official
Frank Carrozza	Ernest Boro	Elected or Appointed Official
Jennifer Jennings	Green Twp	Elected or Appointed Official
Will Houck	Green Twp	Elected or Appointed Official
Joseph S Iezzi	Homer City Boro	Elected or Appointed Official
Dana Turgeon	Indiana Boro	Elected or Appointed Official
Dave Fairman	Indiana Boro	Elected or Appointed Official
Bradley Gotshall	Indiana Boro	Elected or Appointed Official
Kevin Thelen	Indiana University	Emergency Planner
Michael Rearick	MCM Consulting Group, Inc.	Project Manager
William Burba	Montgomery Twp	Elected or Appointed Official
Edward M. Freno	Montgomery Twp	Elected or Appointed Official
Joan E. Diem	North Mahoning Twp	Elected or Appointed Official
Robert Martin	North Mahoning Twp	Elected or Appointed Official
Carl Huber	North Mahoning Twp	Elected or Appointed Official
Michael Shanshala	Penndot District 10	Maintenance Services Engineer
Adam Marshall	Penndot District 10	Assistant Traffic Engineer
Linda Lindahl	Pine Twp	Elected or Appointed Official
Christopher Cameron	Pine Twp	Elected or Appointed Official
John R Anthony	Plumville Boro	Elected or Appointed Official

Indiana County Hazard Mitigation Plan Update Local Planning Team		
Name	**Organization**	**Position**
Daniel Hill	Plumville Boro	Elected or Appointed Official
Craig Andrie	Rayne Twp	Elected or Appointed Official
R Michael Keith	Rayne Twp	Elected or Appointed Official
Don Kelly	Saltsburgh Boro	Elected or Appointed Official
Rob Kelly	Saltsburgh Boro	Elected or Appointed Official
Larry H. Marshall	South Mahoning Twp	Elected or Appointed Official
Bob Ofman	West & East Wheatfield Twp	Elected or Appointed Official
Jean Yarnal	West Wheatfield Twp	Elected or Appointed Official
Don Shelter	West Wheatfield Twp	Elected or Appointed Official
Joe Shelter	West Wheatfield Twp	Elected or Appointed Official
Harry Lichtenfels	West Wheatfield Twp	Elected or Appointed Official
Milton Lady	White Twp	Elected or Appointed Official
Chris Anderson	White Twp	Elected or Appointed Official
Matt Genchur	White Twp	Elected or Appointed Official
James Blair	Young Twp	Elected or Appointed Official

3.3. Meetings and Documentation

Public meetings with local elected officials and the local planning team were held. At each of the public meetings, municipal officials were strongly encouraged to submit hazard mitigation project opportunity forms, complete their respective portions of the capability assessment and review and eventually adopt the multi-jurisdictional HMP. *Table 5 - HMP Process Timeline* lists the meetings held during the HMP planning process, which organizations and municipalities attended and the topic that was discussed at each meeting. All meeting agendas, sign-in sheets, presentation slides, any other documentation is located in Appendix C.

A final public meeting was held on January 11, 2018 to present the draft plan and invite public comments. The meeting was advertised in the local newspaper and also made available digitally on the Indiana County web site at: www.IndianaCounty.org The Indiana County website was used to make a digital copy of the draft hazard mitigation plan available.

The public comment period remained open until February 11, 2018. All public comments were to be submitted in writing to the EMA Director at the Indiana County Emergency Management Agency. No public comments were received for the draft plan.

Table 5 - HMP Process Timeline

Indiana County HMP Process - Timeline		
Date	**Meeting**	**Description**
05/09/2017	Indiana County Hazard Mitigation Plan (HMP) Kick-Off Meeting	Identified challenges and opportunities as they relate to fulfilling the DMA 2000 requirements. Identified existing studies and information sources relevant to the Hazard Mitigation Plan. Identified stakeholders, including the need to involve local officials.
06/21/2017	Local Planning Team Initial Meeting	Defined hazard mitigation planning and identified roles and responsibilities. Discussed the 2012 hazard mitigation plan and defined a timeline to complete the update.
11/15/2017 11/21/2017 11/30/2017 12/01/2017	Meeting with Municipal Officials	Educated county and local elected officials on the hazard mitigation planning process. Presented the findings of the hazard vulnerability analysis and risk assessment. Sought input for mitigation projects throughout the county. Distributed Hazard Mitigation Project Opportunity Forms.
12/20/2017	Public Meeting	Conducted a public meeting to review the draft risk assessment section of the Indiana County Hazard Mitigation Plan update.
01/11/2018	Indiana County Hazard Mitigation Plan – Draft Plan Review Public Meeting	An update of the hazard mitigation planning process was delivered. The Draft HMP was reviewed with the municipal representatives and public. Attendees were informed about the timeline and their opportunity to review the entire draft plan and provide written comments for inclusion into the plan.

3.4. Public and Stakeholder Participation

Indiana County engaged numerous stakeholders and encouraged public participation during the HMP update process. Advertisements for public meetings were completed utilizing the local newspaper and the Indiana County website. Copies of those advertisements are located in Appendix C. Municipalities and other county entities were invited to participate in various meetings and encouraged to review and update various worksheets and surveys. Copies of all meeting agendas, meeting minutes and sign-in sheets are located in Appendix C. Worksheets and surveys completed by the municipalities and other stakeholders are located in appendices of this plan update as well. Municipalities were also encouraged to review hazard mitigation related items with other constituents located in the municipality like businesses, academia, private and nonprofit interests.

The tools listed below were distributed with meeting invitations, provided directly to municipalities to complete and return to the Indiana County Emergency Management Agency or at meetings to solicit information, data and comments from both local municipalities and other key stakeholders. Responses to these worksheets and surveys are available for review at the Emergency Management Agency.

1. **Risk Assessment Hazard Identification and Risk Evaluation Worksheet:** Capitalizes on local knowledge to evaluate the change in the frequency of occurrence, magnitude of impact and/or geographic extent of existing hazards and allows communities to evaluate hazards not previously profiled using the Pennsylvania Standard List of Hazards.

2. **Capability Assessment Survey:** Collects information on local planning, regulatory, administrative, technical, fiscal and political capabilities that can be included in the countywide mitigation strategy.
3. **Municipal Project Opportunity Forms and Mitigation Actions:** Copies of the 2012 mitigation opportunity forms that were included in the 2012 HMP were provided to the municipalities for review and amendment. The previous mitigation actions were provided and reviewed at update meetings. New 2018 municipal project opportunity forms are included as well, located in Appendix G**.**

A schedule that provided appropriate opportunities for public comment was utilized during the review and drafting process. Any public comment that was received during public meetings or during the draft review of the plan were documented and included in the plan. Copies of newspaper public meeting notices, website posted public notices and other correspondence are included in Appendix C of this plan.

Indiana County invited all contiguous counties to review the 2018 draft hazard mitigation plan. Letters were sent to the emergency management coordinators in Armstrong, Cambria, Clearfield, Jefferson and Westmoreland Counties. Copies of these letters are included in Appendix C.

3.5. Multi-Jurisdictional Planning

Indiana County used an open, public process to prepare this HMP. Meetings and letters to municipal officials were conducted to inform and educate them about hazard mitigation planning and its local requirements. Municipal officials provided information related to existing codes and ordinances, the risks and impacts of known hazards on local infrastructure and critical facilities and recommendations for related mitigation opportunities. The pinnacle to the municipal involvement process was the adoption of the final plan. *Table 6 - Worksheets, Surveys and Forms Participation* reflects the municipality participation by completing worksheets, surveys and forms.

Table 6 - Worksheets, Surveys and Forms Participation

Municipality Participation in Worksheets, Surveys and Forms			
Municipality	**Capability Assessment Survey**	**Risk Assessment Hazard Identification and Risk Evaluation Worksheet**	**Hazard Mitigation Opportunity Form Review and Updates**
Armagh Borough	**X**	**X**	**None**
Armstrong Township	**X**	**X**	**X**
Banks Township	**X**	**X**	**X**
Black Lick Township	**X**	**X**	**X**
Blairsville Borough	**X**	**X**	**None**
Brush Valley Township	**X**	**X**	**X**
Buffington Township	**X**	**X**	**None**

Municipality Participation in Worksheets, Surveys and Forms			
Municipality	**Capability Assessment Survey**	**Risk Assessment Hazard Identification and Risk Evaluation Worksheet**	**Hazard Mitigation Opportunity Form Review and Updates**
Burrell Township	**X**	**X**	**X**
Canoe Township	**X**	**X**	**X**
Center Township	**X**	**X**	**X**
Cherry Tree Borough			
Cherryhill Township	**X**	**X**	**None**
Clymer Borough	**X**	**X**	**None**
Conemaugh Township	**X**	**X**	**None**
Creekside Borough	**X**	**X**	**None**
East Mahoning Township	**X**	**X**	**None**
East Wheatfield Township	**X**	**X**	**X**
Ernest Borough	**X**	**X**	**X**
Glen Campbell Borough			
Grant Township	**X**	**X**	**None**
Green Township	**X**	**X**	**X**
Homer City Borough	**X**	**X**	**None**
Indiana Borough	**X**	**X**	**X**
IUP	**X**	**X**	**X**
Marion Center Borough			
Montgomery Township	**X**	**X**	**X**
North Mahoning Township	**X**	**X**	**X**
Pine Township	**X**	**X**	**X**
Plumville Borough	**X**	**X**	**None**
Rayne Township	**X**	**X**	**X**
Saltsburgh Borough	**X**	**X**	**None**
Shelocta Borough			
Smicksburg Borough	**X**	**X**	**None**
South Mahoning Township	**X**	**X**	**None**
Washington Township	**X**	**X**	**None**
West Mahoning Township	**X**	**X**	**X**
West Wheatfield Township	**X**	**X**	**X**
White Township	**X**	**X**	**X**
Young Township	**X**	**X**	**None**

Thirty-seven municipalities within Indiana County have adopted the 2012 Indiana County Hazard Mitigation Plan as the municipal hazard mitigation plan. The borough of Cherry Tree did not participate. The Indiana County Local Planning Team goal is 100% participation by municipalities in adopting the 2018 Indiana County Hazard Mitigation Plan. At the time of posting this hazard mitigation plan update for 2018, four municipalities have not participated in the update process. A final letter was sent to all remaining municipalities to acquire participation. Copies of this letter are in Appendix C.

4. Risk Assessment

4.1. Update Process Summary

A key component to reducing future losses is to first have a clear understanding of what the current risks are and what steps may be taken to lessen their threat. The development of the risk assessment is the critical first step in the entire mitigation process, as it is an organized and coordinated way of assessing potential hazards and risks. The risk assessment identifies the effects of both natural and human-caused hazards and describes each hazard in terms of its frequency, severity and county impact. Numerous hazards were identified as part of the process.

A risk assessment evaluates threats associated with a specific hazard and is defined by probability and frequency of occurrence, magnitude, severity, exposure and consequences. The Indiana County risk assessment provides in-depth knowledge of the hazards and vulnerabilities that affect Indiana County and its municipalities. This document uses an all-hazards approach when evaluating the hazards that affect the county and the associated risks and impacts each hazard presents.

This risk assessment provides the basic information necessary to develop effective hazard mitigation/prevention strategies. Moreover, this document provides the foundation for the Indiana County Emergency Operations Plan (EOP), local EOPs and other public and private emergency management plans.

The Indiana County risk assessment is not a static document, but rather, is a biennial review requiring periodic updates. Potential future hazards include changing technology, new facilities and infrastructure, dynamic development patterns and demographic and socioeconomic changes into or out of hazard areas. By contrast, old hazards, such as brownfields and landfills, may pose new threats as county conditions evolve.

Using the best information available and Geographic Information Systems (GIS) technologies, the county can objectively analyze its hazards and vulnerabilities. Assessing past events is limited by the number of occurrences, scope and changing circumstances. For example, ever-changing development patterns in Pennsylvania have a dynamic impact on traffic patterns, population density and distribution, storm water runoff and other related factors. Therefore, limiting the risk assessment to past events is myopic and inadequate.

The Indiana County Local Planning Team reviewed and assessed the change in risk for all natural and human-caused hazards identified in the 2012 hazard mitigation plan. The mitigation planning team then identified hazards that were outlined within the Pennsylvania Hazard Mitigation Plan but not included in the 2012 Indiana County Hazard Mitigation Plan that could impact Indiana County. The team utilized the hazard identification and risk evaluation worksheet that was provided by the Pennsylvania Emergency Management Agency.

The Indiana County Steering Committee met with municipalities and provided guidance on how to complete the municipal hazard identification and risk evaluation worksheet. This information was combined with the county information to develop an overall list of hazards that would need to be profiled.

Once the natural and human-caused hazards were identified and profiled, the local planning team then completed a vulnerability assessment for each hazard. An inventory of vulnerable assets was completed utilizing GIS data and local planning team knowledge. The team used the most recent Indiana County assessment data to estimate loss to particular hazards. Risk factor was then assessed to each profiled hazard utilizing the hazard prioritization matrix. This assessment allows the county and its municipalities to focus on and prioritize local mitigation efforts on areas that are most likely to be damaged or require early response to a hazard event.

4.2. Hazard Identification

4.2.1. Presidential and Gubernatorial Disaster Declarations

Table 7 - Presidential & Gubernatorial Disaster Declarations presents a list of all Presidential and Governor's Disaster Declarations that have affected Indiana County from 1972 through 2017, according to the Pennsylvania Emergency Management Agency.

Table 7 - Presidential & Gubernatorial Disaster Declarations

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
January, 1966	Heavy snow	Gubernatorial Declaration
February, 1972	Heavy snow	Gubernatorial Declaration
June, 1972	Flood (Agnes)	Presidential Disaster Declaration
September, 1972	Flood	Presidential Disaster Declaration
February, 1974	Truckers strike	Gubernatorial Declaration
January, 1977	Gas shortage/severe winter weather	Presidential Emergency Declaration
July, 1977	Flash flood	Presidential Disaster Declaration
January, 1978	Heavy snow	Gubernatorial Declaration
February, 1978	Blizzard	Gubernatorial Declaration
March, 1993	Blizzard	Presidential Emergency Declaration
January, 1994	Severe winter storms	Presidential Disaster Declaration
January, 1996	Severe winter storms	Presidential Disaster Declaration
January, 1996	Flooding	Presidential Disaster Declaration
July, 1999	Drought	Gubernatorial Declaration
September, 1999	Hurricane Floyd	Presidential Disaster Declaration
September, 2003	Hurricane Isabel/Henri	Presidential Disaster Declaration

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
September, 2004	Tropical Depression Ivan	Presidential Disaster Declaration
September, 2005	Hurricane Katrina – to render mutual aid and to receive and house evacuees	Presidential Emergency Declaration
September, 2005	Hurricane Katrina	Gubernatorial Proclamation of Emergency
June, 2006	Flooding	Presidential Proclamation of Emergency
September, 2006	Tropical depression Ernesto	Gubernatorial Proclamation of Emergency
February, 2007	severe winter storm	Gubernatorial Proclamation of Emergency
February, 2007	waive the regulations regarding hours of service limitations for drivers of commercial vehicles	Gubernatorial Proclamation of Emergency
April, 2007	Severe storm	Gubernatorial Declaration
April, 2007	Severe winter storm	Gubernatorial Proclamation of Emergency
February, 2010	severe winter storm	Gubernatorial Proclamation of Emergency
April, 2010	Severe winter storm	Presidential Emergency Declaration
January, 2011	Severe winter storm	Gubernatorial Proclamation of Emergency
September, 2011	Severe storms and flooding (Lee/Irene)	Gubernatorial Proclamation of Emergency
April, 2012	Spring winter storms	Gubernatorial Proclamation of Emergency
October, 2012	Hurricane Sandy	Gubernatorial Proclamation of Emergency
June, 2013	High winds, thunderstorms, heavy rain, tornado, flooding	Gubernatorial Proclamation of Emergency
January, 2014	Extended prolonged cold	Gubernatorial Proclamation of Emergency
January, 2014	Driver hours waived due to prolonged and continued severe winter weather	Gubernatorial Proclamation of Emergency
February, 2014	Severe winter weather	Gubernatorial Proclamation of Emergency
February, 2014	Severe winter storm	Presidential Proclamation of Emergency

4.2.2. Summary of Hazards

The Indiana County Local Planning Team (LPT) was provided the Pennsylvania Standard List of Hazards to be considered for evaluation in the 2018 HMP Update. Following a review of the hazards considered in the 2012 HMP and the standard list of hazards, the local planning team decided that the 2018 plan should identify, profile and analyze seventeen hazards. These seventeen hazards include all of the hazards profiled in the 2012 plan plus three additional hazards that have been identified since the last plan was approved. The list below contains the seventeen hazards that have the potential to impact Indiana County as identified through previous risk assessments, the Indiana County Hazards Vulnerability Analysis and input from those that participated in the 2018 HMP update. Hazard profiles are included in Section 4.3 for each of these hazards.

Identified Natural Hazards

Drought

Drought is a natural climatic condition which occurs in virtually all climates, the consequence of a natural reduction in the amount of precipitation experienced over a long period of time, usually a season or more in length. High temperatures, prolonged winds and low relative humidity can exacerbate the severity of drought. This hazard is of particular concern in Pennsylvania due to the presence of farms as well as water-dependent industries and recreation areas across the Commonwealth. A prolonged drought could severely impact these sectors of the local economy, as well as residents who depend on wells for drinking water and other personal uses. (National Drought Mitigation Center, 2006).

Earthquake

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons and disrupt the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking which is dependent upon amplitude and duration of the earthquake. (FEMA, 1997).

Flood, Flash Flood, Ice Jam

Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically

experienced when precipitation occurs over a given river basin for an extended period of time. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiography, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas. Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. All forms of flooding can damage infrastructure.

Invasive Species

An invasive species is a species that is not indigenous to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. These species can be any type of organism: plant, fish, invertebrate, mammal, bird, disease, or pathogen. Infestations may not necessarily impact human health, but can create a nuisance or agricultural hardships by destroying crops, defoliating populations of native plant and tree species, or interfering with ecological systems (Governor's Invasive Species Council of Pennsylvania, 2009).

Pandemic and Infectious Diseases

A pandemic occurs when infection from of a new strain of a certain disease, to which most humans have no immunity, substantially exceeds the number of expected cases over a given period of time. Such a disease may or may not be transferable between humans and animals. (Martin & Martin-Granel, 2006).

Radon Exposure

Radon is a cancer-causing natural radioactive gas that you can't see, smell, or taste. It is a large component of the natural radiation that humans are exposed to and can pose a serious threat to public health when it accumulates in poorly ventilated residential and occupation settings. According to the USEPA, radon is estimated to cause about 21,000 lung cancer deaths per year, second only to smoking as the leading cause of lung cancer (EPA 402-R-03-003: EPA Assessment…, 2003). An estimated 40% of the homes in Pennsylvania are believed to have elevated radon levels (Pennsylvania Department of Environmental Protection, 2009).

Subsidence & Landslide

Subsidence is a natural geologic process that commonly occurs in areas with underlying limestone bedrock and other rock types that are soluble in water. Water passing through naturally occurring fractures dissolves these materials leaving underground voids. Eventually, overburden on top of the voids causes a collapse which can damage structures with low strain tolerances. This collapse can take place slowly over time or quickly in a single event, but in either case. Karst topography describes a landscape that contains characteristic structures such as sinkholes, linear depressions, and caves. In addition to natural processes, human activity such as water, natural gas, and oil extraction can cause subsidence and sinkhole formations. (FEMA, 1997).

A landslide is the downward and outward movement of slope-forming soil, rock and vegetation reacting to the force of gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes and changes in groundwater levels. Mudflows, mudslides, rock falls, rockslides and rock topples are all forms of a landslide. Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, developed hillsides and areas recently burned by forest and brush fires. (Delano & Wilshusen, 2001).

Tornado and Windstorms

A wind storm can occur during severe thunderstorms, winter storms, coastal storms, or tornados. Straight-line winds such as a downburst have the potential to cause wind gusts that exceed 100 miles per hour. Based on 40 years of tornado history and over 100 years of hurricane history, FEMA identifies western and central Pennsylvania as being more susceptible to higher winds than eastern Pennsylvania. (FEMA, 1997). A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornados are most often generated by thunderstorm activity (but sometimes result from hurricanes or tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and wind-blown debris. According to the National Weather Service, tornado wind speeds can range between 30 to more than 300 miles per hour. They are more likely to occur during the spring and early summer months of March through June and are most likely to form in the late afternoon and early evening. Most tornados are a few dozen yards wide and touch down briefly, but even small, short-lived tornados can inflict tremendous damage. Destruction ranges from minor to catastrophic depending on the intensity, size and duration of the storm. Structures made of light materials such as mobile homes are most susceptible to damage. Waterspouts are weak tornados that form over warm water and are relatively un-

common in Pennsylvania. Each year, an average of over 800 tornados is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries (NOAA, 2002). Based on NOAA Storm Prediction Center Statistics, the number of recorded F3, F4, & F5 tornados between 1950-1998 ranges from <1 to 15 per 3,700 square mile area across Pennsylvania (FEMA, 2009). A water spout is a tornado over a body of water (American Meteorological Society, 2009).

Winter Storm

Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. A winter storm can range from a moderate snowfall or ice event over a period of a few hours to blizzard conditions with wind-driven snow that lasts for several days. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow, which can severely impair visibility and disrupt transportation. The Commonwealth of Pennsylvania has a long history of severe winter weather. (NOAA, 2009).

Identified Manmade Hazards

Civil Disturbance

Civil disturbance hazards encompass a set of hazards emanating from a wide range of possible events that cause civil disorder, confusion, strife and economic hardship. Civil disturbance hazards include the following:

- Famine; involving a widespread scarcity of food leading to malnutrition and increased mortality (Robson, 1981).
- Economic Collapse, Recession; Very slow or negative growth, for example (Economist, 2009).
- Misinformation; erroneous information spread unintentionally (Makkai, 1970).
- Civil Disturbance, Public Unrest, Mass Hysteria, Riot; group acts of violence against property and individuals, for example (18 U.S.C. § 232, 2008).
- Strike, Labor Dispute; controversies related to the terms and conditions of employment, for example (29 U.S.C. § 113, 2008).

Dam Failure

A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Dams provide benefits such as flood protection, power generation, drinking water, irrigation and recreation. Failure of these structures results in an uncontrolled release of impounded water. Failures are relatively rare, but immense damage and loss of life is possible in downstream communities when such events occur. Aging infrastructure, hydrologic, hydraulic and geologic characteristics, population growth and design and maintenance practices should be considered when assessing dam failure hazards. The failure of the South Fork Dam, located in Johnstown, Pennsylvania, was the deadliest

dam failure ever experienced in the United States. It took place in 1889 and resulted in the Johnstown Flood which claimed 2,209 lives (FEMA, 1997). Today there are approximately 3,200 dams and reservoirs throughout Pennsylvania (Pennsylvania Department of Environmental Protection, 2009).

Environmental Hazards

Environmental hazards are hazards that pose threats to the natural environment, the built environment and public safety through the diffusion of harmful substances, materials, or products. Environmental hazards include the following:

- Hazardous material releases; at fixed facilities or as such materials are in transit and including toxic chemicals, infectious substances, biohazardous waste and any materials that are explosive, corrosive, flammable, or radioactive (PL 1990-165, § 207(e)).
- Air or Water Pollution; the release of harmful chemical and waste materials into water bodies or the atmosphere, for example (National Institute of Health Sciences, July 2009; Environmental Protection Agency, Natural Disaster PSAs, 2009).
- Superfund Facilities; hazards originating from abandoned hazardous waste sites listed on the National Priorities List (Environmental Protection Agency, National Priorities List, 2009).
- Manure Spills; involving the release of stored or transported agricultural waste, for example (Environmental Protection Agency, Environmental Impacts of..., 1998).
- Product Defect or Contamination; highly flammable or otherwise unsafe consumer products and dangerous foods (Consumer Product Safety Commission, 2003).

Levee Failure

A levee is a human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding (Interagency Levee Policy Review Committee, 2006). Levee failures or breaches occur when a levee fails to contain the floodwaters for which it is designed to control or floodwaters exceed the height of the constructed levee. 51 of Pennsylvania's 67 counties have been identified as having at least one levee (FEMA Region III, 2013).

Opioid Epidemic

The opioid epidemic is the rapid increase in the use of prescription and non-prescription opioid drugs in the United States beginning in the late 1990s and continuing throughout the first two decades of the 2000s. Opioids are a diverse class of moderately strong painkillers, including oxycodone, hydrocodone, and a very strong painkiller, fentanyl,

which is synthesized to resemble other opiates such as opium-derived morphine and heroin. The potency and availability of these substances, despite their high risk of addiction and overdose, have made them popular both as formal medical treatments and as recreational drugs. Due to their sedative effects on the part of the brain which regulates breathing, opioids in high doses present the potential for respiratory depression, and may cause respiratory failure and death.

The Commonwealth of Pennsylvania, along with other states in the nation has enacted legislation to curb the prescription and distribution of these drugs to try to prevent addiction rising from abuse as a painkiller. This includes, but is not limited to restrictions to prescribing to minors, quantity limits, a prescription database with entry requirements and other limits to its availability.

Terrorism

Terrorism is use of force or violence against persons or property with the intent to intimidate or coerce. Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear and radiological weapons. (FEMA, 2009).

Transportation Accidents

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

Utility Interruption

Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications and public works and information network sectors. Utility interruption hazards include the following:

- Geomagnetic Storms; including temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation and satellite systems (National Research Council et al., 1986).
- Fuel or Resource Shortage; resulting from supply chain breaks or secondary to other hazard events, for example (Mercer County, PA, 2005).

- Electromagnetic Pulse; originating from an explosion or fluctuating magnetic field and causing damaging current surges in electrical and electronic systems (Institute for Telecommunications Sciences, 1996).
- Information Technology Failure; due to software bugs, viruses, or improper use (Rainer Jr., et al, 1991).
- Ancillary Support Equipment; electrical generating, transmission, system-control and distribution-system equipment for the energy industry (Hirst & Kirby, 1996).
- Public Works Failure; damage to or failure of highways, flood control systems, deep-water ports and harbors, public buildings, bridges, dams, for example (United States Senate Committee on Environment and Public Works, 2009).
- Telecommunications System Failure; Damage to data transfer, communications and processing equipment, for example (FEMA, 1997)
- Transmission Facility or Linear Utility Accident; liquefied natural gas leakages, explosions, facility problems, for example (United States Department of Energy, 2005)
- Major Energy, Power, Utility Failure; interruptions of generation and distribution, power outages, for example (United States Department of Energy, 2000).

4.2.3. Climate Change

Impacts of Climate Change on Identified Hazards

Humans have become the dominant species on Earth and our society and influence is globalized. Human activity such as the large scale consumption of fossil fuels and deforestation has caused atmospheric carbon dioxide concentrations to significantly increase and a notable diversity of species to go extinct. The result is rapid climate change unparalleled in Earth's history and an extinction event approaching the level of a mass extinction (Barnosky et al., 2011; Wake & Vredenburg, 2008). The corresponding rise of average atmospheric temperatures is intensifying many natural hazards, and further threatening biodiversity. The effects of climate change on these hazards is expected to intensify over time as temperatures continue to rise, so it is prudent to be aware of how climate change is impacting natural hazards.

The most obvious change is in regard to extreme temperatures. As average atmospheric temperatures rise, extreme high temperatures become more threatening, with record high temperatures outnumbering record low temperatures 2:1 in recent years (Meehl et al., 2009). As climate change intensifies, it is expected that the risk of extreme heat will be amplified whereas the risk of extreme cold will be attenuated. Less immediately apparent, climate change could increase the prevalence of the West Nile Virus (Section 4.3.5). Some studies show increased insect activities during a similar rapid warming event in Earth's history (Curano et al., 2008). Other studies make projections that with the warming temperatures and lower annual precipitation that are expected with climate change, there will be an expansion of the suitable climate for mosquitos and West Nile Virus, potentially increasing the risk that the disease poses (Harrigan et al., 2014).

Increasing temperatures will cause rainfall patterns to change over time – warmer air holds more moisture, so the prospect of climate change means that heavier and more intense precipitation events are expected. Over the last 100 years, average annual precipitation in Pennsylvania has increased between 5 and 10 percent, and the amount of precipitation from extreme storm events have increased 70 percent in the Northeast since 1958 (EPA, 2016). Precipitation is thought to increase mostly in the winter and spring and remain somewhat consistent in the summer and fall. Higher temperatures will cause snow to melt earlier in the spring, and in combination with heightened precipitation conditions, it is expected that the risk of flooding (Section 4.3.3) and dam and levee failures (Section 4.3.11 & 4.3.13) will be heightened in the winter and spring.

Similarly, extreme winter storms (Section 4.3.9) are expected to occur more frequently – there have been about twice as many extreme snow events in the United States in the latter half of the 20th century as occurred in the first half (NOAA, 2018). This uptick is caused in part by higher than normal ocean surface temperatures that result in an increased source of moisture for storms that develop over the Atlantic Ocean. Conditions

for severe winter storms are particularly heightened in the eastern United States due to changes in atmospheric circulation patterns caused by higher temperatures and melting Arctic sea ice (Francis & Vavrus, 2012).

Climate change is also expected to result in more intense hurricanes and tropical storms. With the rise of atmospheric temperatures, ocean surface temperatures are rising, resulting in warmer and moister conditions where tropical storms develop (Stott et al., 2010). A warmer ocean stores more energy, and is capable of fueling stronger storms. It is projected that the Atlantic hurricane season is elongating, and there will be more category 4 and 5 hurricanes than before (Trenberth, 2010).

Warmer temperatures and earlier snow melt in the spring is also expected to increase evaporation and dry out soil, resulting in heightened drought (Section 4.3.1) conditions during summer and fall months (EPA, 2016). Correspondingly this will impact wildfires as drought is accompanied by drier soils and forests, resulting in an elongated wildfire season and more intense and long-burning wildfires (Pechony & Shindell, 2010). However, the Southwest United States is at a greater risk of this increased drought and wildfire activity than Indiana County in the Eastern United States.

Climate change is contributing to the introduction of new invasive species (Section 4.3.4). As maximum and minimum seasonal temperatures change, non-native species are able to establish themselves in previously inhospitable climates where they have a competitive advantage. This may shift the dominance of ecosystems in the favor of non-native species, contributing to species loss and the risk of extinction.

This type of sudden global change is novel to humanity. Despite the myriad of well thought out research, there is still much uncertainty surrounding the future of the Earth. All signs point to the intensification of the hazards mentioned above, especially if human society and individuals do not make swift and significant changes to reduce emissions and species losses.

4.3. Hazard Profiles

4.3.1. Drought

4.3.1.1 Location and Extent

While Pennsylvania is generally more water-rich than many U.S. states, the Commonwealth may be subject to drought conditions. A drought is broadly defined as a time period of prolonged dryness that contributes to the depletion of ground and surface water. Droughts are regional climatic events, so when such an event occurs in Indiana County, impacts are not restricted to the county and are often more widespread. The spatial extent of the impacted area can range from localized areas in Pennsylvania to the entire Mid-Atlantic region.

There are three types of drought:

Meteorological Drought – A deficiency of moisture in the atmosphere compared to average conditions. Meteorological drought is defined by the duration of the deficit and degree of dryness, and is often associated with below average rainfall. Depending on the severity of the drought, it may or may not have a significant impact on agriculture and the water supply.

Agricultural Drought – A drought inhibiting the growth of crops, due to a moisture deficiency in the soil. Agricultural drought is linked to meteorological and hydrologic drought.

Hydrologic Drought – A prolonged period of time without rainfall that has an adverse effect on streams, lakes, and groundwater levels, potentially impacting agriculture.

4.3.1.2 Range of Magnitude

The Commonwealth uses five parameters to assess drought conditions:

- Stream flows (compared to benchmark records).
- Precipitation (measured as the departure from normal, thirty-year average precipitation).
- Reservoir storage levels in a variety of locations.
- Groundwater elevations in a number of counties (comparing to past month, past year and historic record).
- Soil moisture via the Palmer Drought Index (See *Table 8 - Palmer Drought Severity Index*) - a soil moisture algorithm calibrated for relatively homogeneous regions which measures dryness based on recent precipitation and temperature.

Table 8 - Palmer Drought Severity Index

Palmer Drought Severity Index	
Severity Category	**PDSI**
Extremely wet	4.0 or more
Very wet	3.0 to 3.99
Moderately wet	2.0 to 2.99
Slightly wet	1.0 to 1.99
Incipient wet spell	0.5 to 0.99
Near normal	0.49 to -0.49
Incipient dry spell	-0.5 to -0.99
Mild drought	-1.0 to -1.99
Moderate drought	-2.0 to -2.99
Severe drought	-3.0 to -3.99
Extreme drought	-4.0 or less

Table 9 - Drought Preparation Phases

Drought Preparation Phases (PA DEP)				
Phase	**General Activity**	**Actions**	**Request**	**Goal**
Drought Watch	Early stages of planning and alert for drought possibility	Increased water monitoring, awareness and preparation for response among government agencies, public water suppliers, water users and the public	Voluntary water conservation	Reduce water use by 5%
Drought Warning	Coordinate a response to imminent drought conditions and potential water shortages	Reduce shortages - relieve stressed sources, develop new sources if needed	Continue voluntary water conservation, impose mandatory water use restrictions if needed	Reduce water use by 10-15%
Drought Emergency	Management of operations to regulate all available resources and respond to emergency	Support essential and high priority water uses and avoid unnecessary uses	Possible restrictions on all nonessential water uses	Reduce water use by 15%

Local Water Rationing: With the approval of the PA Emergency Management Council, local municipalities may implement local water rationing to share a rapidly dwindling or severely depleted water supply in designated water supply service areas. These individual water rationing plans, authorized through provisions of 4 PA Code Chapter 120,

will require specific limits on individual water consumption to achieve significant reductions in use. Under both mandatory restrictions imposed by the Commonwealth and local water rationing, procedures are provided for granting of variances to consider individual hardships and economic dislocations. [PEMA, 409 Plan]

4.3.1.3 Past Occurrence

Table 10 - Drought Event History for Indiana County shows declared drought status for Indiana County from 1980 to October 2017 as reported by the Pennsylvania Department of Environmental Protection (PA DEP) and the table also includes past disaster declarations impacting Indiana County due to drought events. *Figure 6 - Palmer Drought Severity Index History (NOAA, 2016)* shows that Indiana County has experienced severe drought (PDSI ≤ -3) between five and ten percent of the time from 1895-1995, which gives a good idea of how often the county has been affected by drought events.

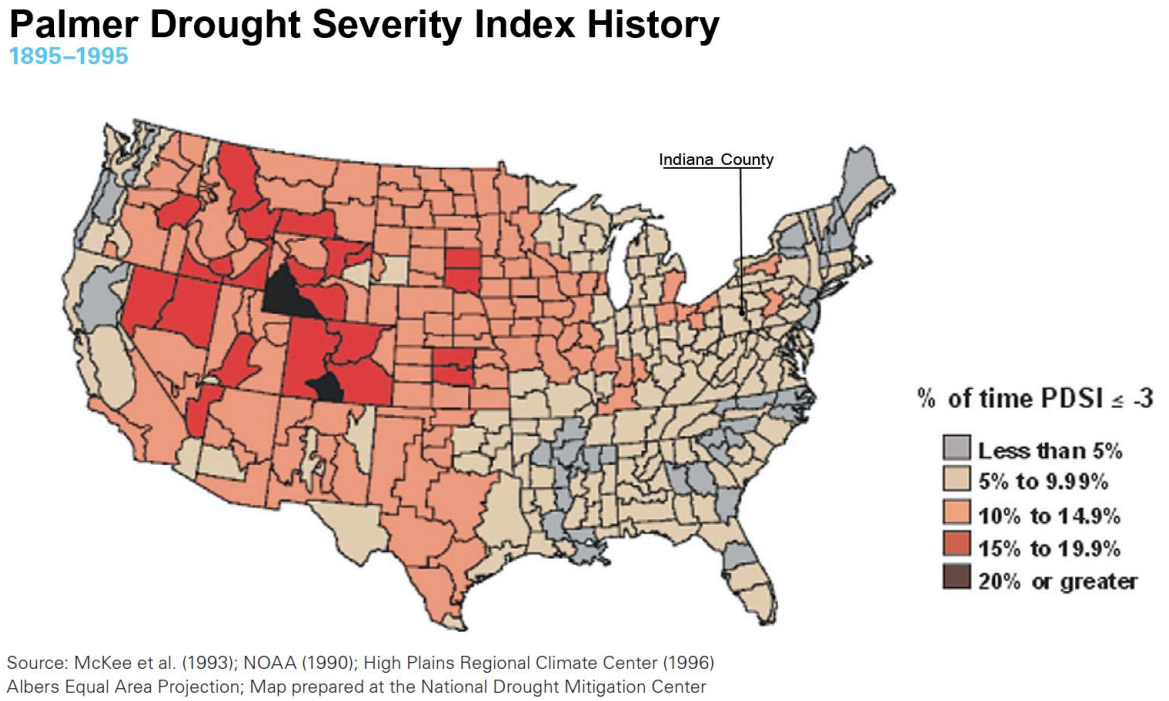
One of the worst drought emergencies that Indiana County experienced on record occurred from August 16, 1991 through April 20, 1992. This drought had its origins in January of 1991, when reduced snowfall over the winter led to reduced spring snow melt, thereby reducing the amount of precipitation and the groundwater from recharging. Drought conditions worsened during April, a normally wet month, and rapidly accelerated during May, when rainfall was unusually low across most of the state. By June, conditions had deteriorated to a point where many stream flows were as low as they would normally be during August, but with the typically dry summer months still ahead. At the height of this event, the regional PDSI value for the Southwest Plateau (including Lawrence, Butler, Armstrong, Beaver, Allegheny, Westmoreland, Somerset, Washington, Fayette, Greene and Indiana Counties) hit its lowest at -4.14 in November 1991 (NOAA, 2010). From August 1991 to April 20, 1992 the county had an emergency drought status as the entire region struggled to outlast the dry spell.

Table 10 - Drought Event History for Indiana County

Drought Event History for Indiana County (PA DEP 2017)			
Start Date	**End Date**	**Drought Status**	**Event Duration**
10/22/1985	12/19/1985	Watch	1 months, 27 days
7/7/1988	8/24/1988	Watch	10 months, 8 days
8/24/1988	12/12/1988	Warning	
12/12/1988	5/15/1989	Watch	
6/28/1991	7/24/1991	Watch	1 year, 6 months, 18 days
7/24/1991	8/16/1991	Warning	
8/16/1991	4/20/1992	Emergency	
4/20/1992	9/11/1992	Warning	
9/11/1992	1/15/1993	Watch	

Drought Event History for Indiana County (PA DEP 2017)			
Start Date	**End Date**	**Drought Status**	**Event Dura-tion**
9/1/1995	12/18/1995	Watch	3 months, 17 days
12/3/1998	12/8/1998	Watch	1 year, 5 months, 2 days
12/8/1998	3/15/1999	Warning	
3/15/1999	6/18/1999	Watch	
6/18/1999	7/20/1999	Warning	
7/20/1999	9/30/1999	Emergency**	
9/30/1999	2/25/2000	Warning	
2/25/2000	5/5/2000	Watch	
8/24/2001	5/13/2002	Watch	8 months, 19 days
4/11/2006	6/30/2006	Watch	2 months, 19 days
8/6/2007	9/5/2007	Watch	30 days
11/7/2008	1/26/2009	Watch	2 months, 19 days
9/16/2010	12/17/2010	Watch	3 months, 1 days
8/5/2011	9/2/2011	Watch	28 days
3/24/2015	7/10/2015	Watch	3 months, 16 days
4/26/2016	6/21/2016	Watch	1 months, 26 days
7/5/2016	9/13/2016	Watch	2 months, 8 days
**Gubernatorial Disaster Declaration			

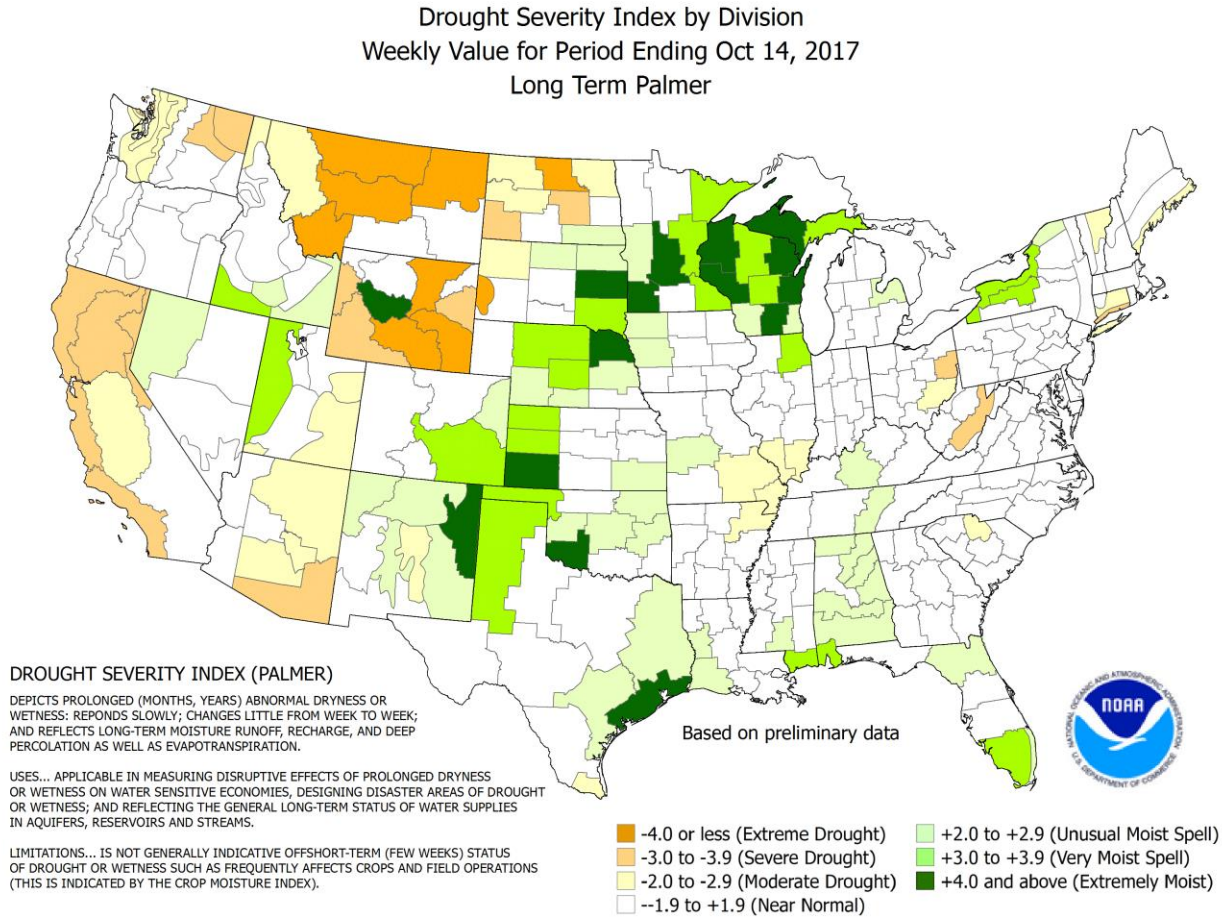
Figure 6 - Palmer Drought Severity Index History (NOAA, 2016)



4.3.1.4 Future Occurrence

It is difficult to forecast the exact severity and frequency of future drought events, and the future of climate change will lead to increased uncertainty and extremity of climate events, suggesting that it is best to be prepared for potentially adverse conditions. Indiana County has experienced severe drought between five and ten percent of the time between 1895 and 1995 (*Figure 6 - Palmer Drought Severity Index History (NOAA, 2016)*), which can be used to make a rough estimate of the future probability of drought in Indiana County, although it does not account for uncertainty introduced by climate change. *Figure 7 - Recent Drought Severity Index (NOAA, 2017)* shows a recent Palmer Drought Severity Index reading for the continental United States and as of October 14, 2017. Indiana County and most of the surrounding region are considered in near normal conditions, with a PDSI between -1.9 and 1.9.

Figure 7 - Recent Drought Severity Index (NOAA, 2017)



4.3.1.5 Vulnerability Assessment

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

While these were statewide impacts, they illustrate the potential for droughts to severely impair the local economy in more agricultural communities. As of the 2012 Census of Agriculture, there were an estimated 1,166 farms in Indiana County, at an average size of 132 acres. Indiana County ranks thirtieth of the sixty-seven counties in the Commonwealth for agricultural production, totaling $67,307,000 dollars (USDA, 2012). The majority of this production comes from crops, including nursery and greenhouse crops ($39.3 million). The remaining agricultural production comes from livestock, poultry and their products ($28 million).

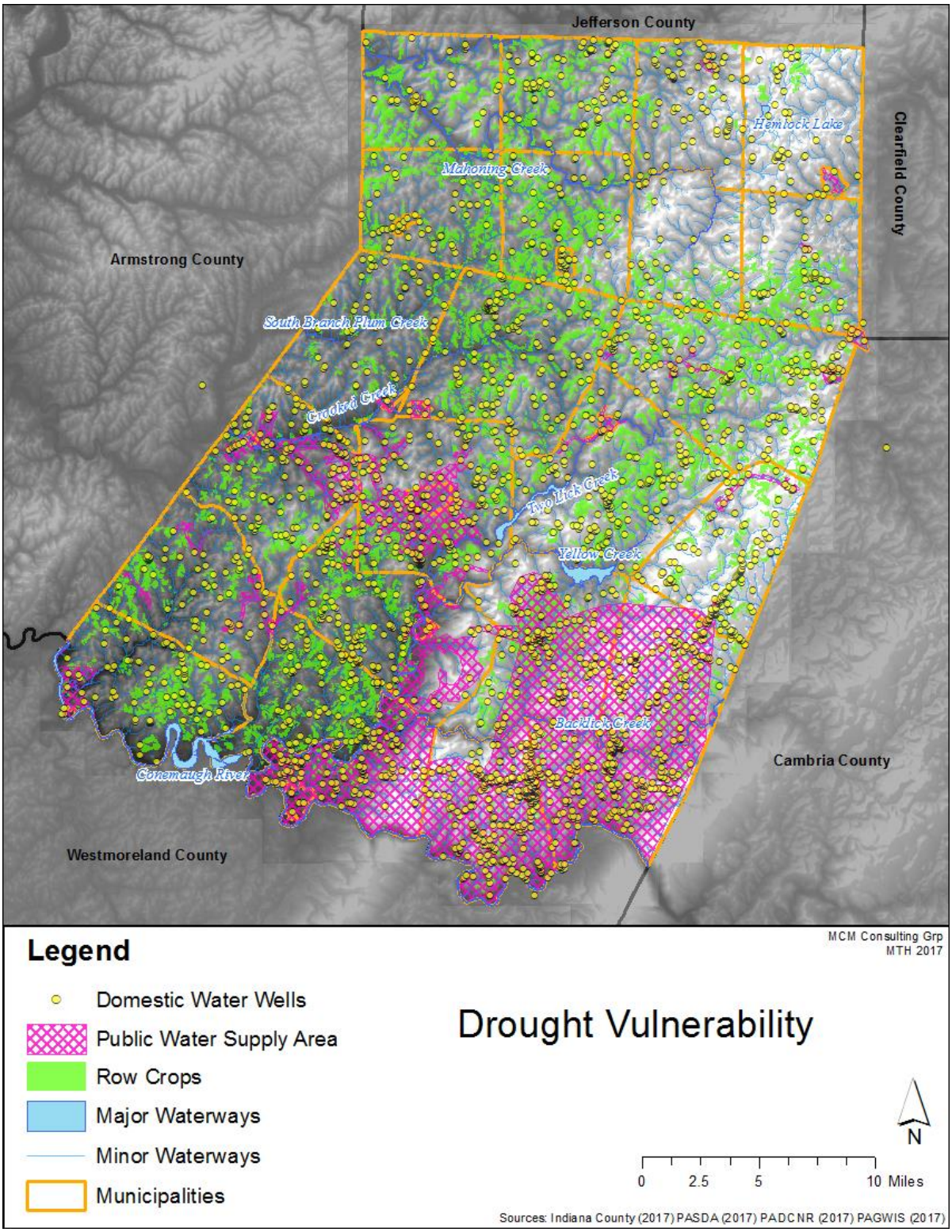
Water supplies are also vulnerable to the effects of drought. Public water service areas cover 20.6% of the county, including all of Armagh, Clymer, Cherry Tree, Creek Side, Ernest, Indiana, Shelocta, Saltsburg, and Blairsville Boroughs, Homer City and East Wheatfield and Burrell Townships, as well as a majority of West Wheatfield, Buffington and Brush Valley Townships. The majority of the county however relies on wells for their fresh drinking water. Droughts will quickly affect systems that rely on surface supplies, whereas systems with wells are more capable of handling short-term droughts without issue. Longer-term droughts inhibit the recharging of groundwater aquifers which has an impact on well owners. Depending on the severity of the drought, this could cause the well to dry up, rendering the well owner at a loss for useable water, meaning Indiana County residents who use private domestic wells are vulnerable to drought events. *Table 11 - Domestic Wells* shows the number of wells in each municipality in Indiana County. Well data was gathered from the Pennsylvania Groundwater Information System (PaGWIS), which relies on voluntary submissions by well drillers. While this is the best dataset of domestic wells available for Indiana County, it is not comprehensive due to the voluntary nature of the data submission. Not all wells were reported including a location designation.

The EPA provides a guide published in October 2017 for water utilities to aid in drought response and recovery. The guide outlines what goes into a good drought response plan, and how to manage water supply and demand during a drought, outlines best practices for communication and partnerships with other local utilities and provides case studies to discuss examples of drought management practices (EPA, 2017).

Table 11 - Domestic Wells

Domestic Wells (PAGWIS, 2017)			
Municipality	**Domestic Wells**	**Municipality**	**Domestic Wells**
Armagh Borough	2	Grant Township	118
Armstrong Township	339	Green Township	504
Banks Township	177	Homer City Borough	12
Black Lick Township	195	Indiana Borough	88
Blairsville Borough	58	Marion Center Borough	26
Brush Valley Township	342	Montgomery Township	213
Buffington Township	379	North Mahoning Township	248
Burrell Township	212	Pine Township	334
Canoe Township	252	Plumville Borough	15
Center Township	263	Rayne Township	356
Cherry Tree Borough	13	Saltsburg Borough	51
Cherryhill Township	412	Shelocta Borough	18
Clymer Borough	24	Smicksburg Borough	2
Conemaugh Township	248	South Mahoning Township	196
Creekside Borough	2	Washington Township	200
East Mahoning Township	166	West Mahoning Township	104
East Wheatfield Township	444	West Wheatfield Township	480
Ernest Borough	0	White Township	427
Glen Campbell Borough	3	Young Township	163

Figure 8 - Drought Vulnerability

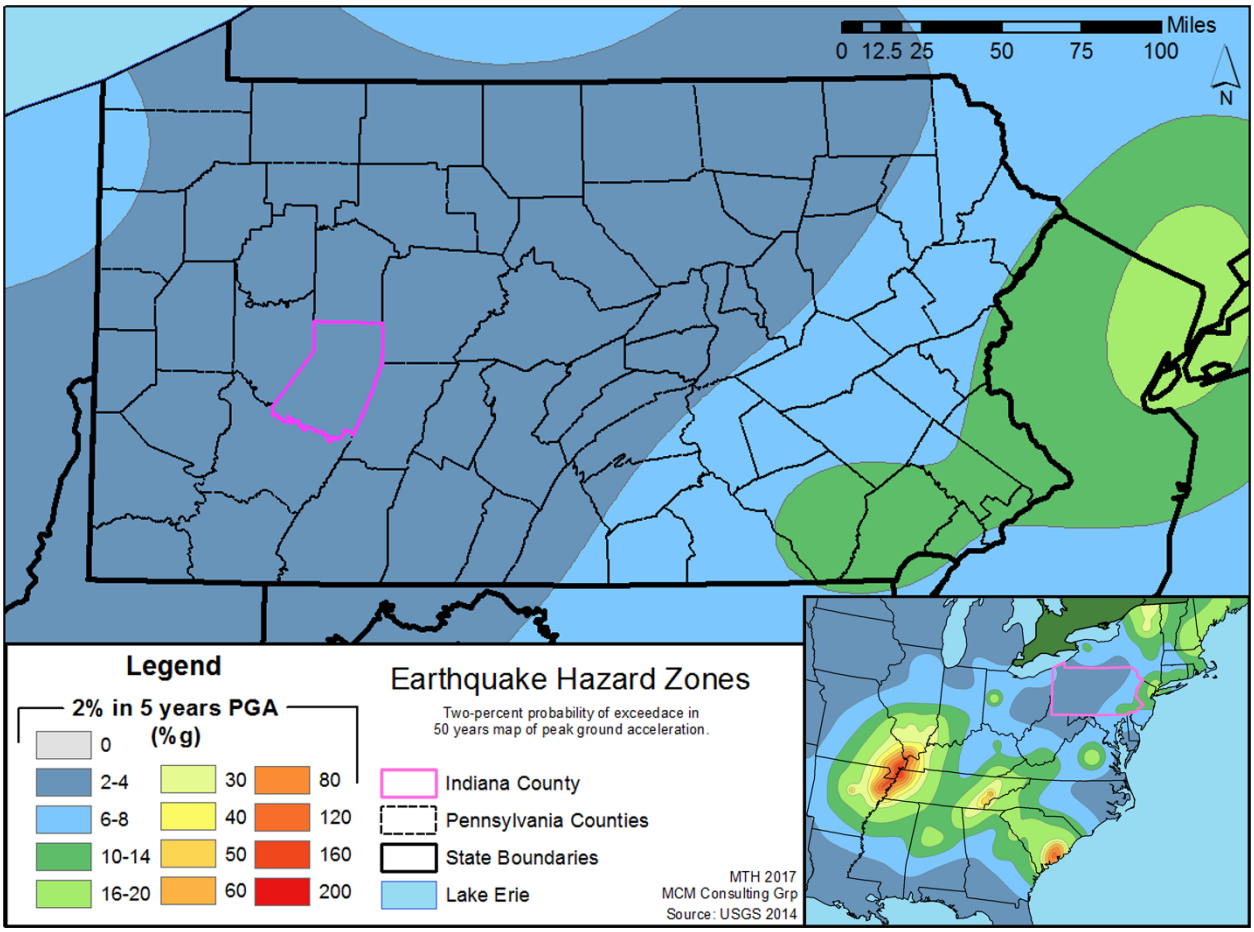


4.3.2. Earthquake

4.3.2.1 Location and Extent

Earthquake events in Pennsylvania do not typically impact areas greater than 100 km from the epicenter of the event and are usually mild events. The United States Geological Survey identified relative earthquake hazard zones across the Commonwealth. As seen in *Figure 9 - Earthquake Hazard Zones* Indiana County falls entirely within the very slight zone. Thus, earthquakes are rare in the county, and no historic records of earthquakes exist for Indiana County.

Figure 9 - Earthquake Hazard Zones



4.3.2.2 Range of Magnitude

Earthquake magnitude is often measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake. *Table 12 - Richter Scale* summarizes magnitudes as they relate to the spatial extent of impacted areas. A historical survey of earthquakes occurring within 100 km of Indiana County with known magnitudes indicates that earthquakes have generally had magnitudes of up to

4.0 with an average moment magnitude of 3.0 (DCNR, 2017). Pennsylvania has not experienced any earthquakes with a magnitude greater than 6.0.

Table 12 - Richter Scale

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

The Richter Scale does not give any indication of the impact or damage of an earthquake, although it can be inferred that higher magnitude events cause more damage. Instead, the impact of an earthquake event is measured in terms of earthquake intensity, usually measured using the Modified Mercalli Intensity Scale, shown in *Table 13 - Mercalli Intensity Scale*. Based on historical data of earthquakes with a recorded Intensity, little damage is expected from earthquake events. However, since the worst earthquake recorded in Pennsylvania was a magnitude 5.2, a worse-case scenario for this hazard would be if an earthquake of similar magnitude occurred in Indiana County or near the border in an adjacent county, causing mild damage in populated areas.

Table 13 - Mercalli Intensity Scale

Modified Mercalli Intensity Scale with Associated Impacts.			
SCALE	**INTENSITY**	**DESCRIPTION OF EFFECTS**	**CORRESPONDING RICHTER SCALE MAGNITUDE**
I	**Instrumental**	Detected only on seismographs	<4.2
II	**Feeble**	Some people feel it	<4.2
III	**Slight**	Felt by people resting; like a truck rumbling by	<4.2
IV	**Moderate**	Felt by people walking	<4.2
V	**Slightly Strong**	Sleepers awake; church bells ring	<4.8

Modified Mercalli Intensity Scale with Associated Impacts.			
SCALE	**INTENSITY**	**DESCRIPTION OF EFFECTS**	**CORRESPONDING RICHTER SCALE MAGNITUDE**
VI	**Strong**	Trees sway; suspended objects swing; objects fall off shelves	<5.4
VII	**Very Strong**	Mild alarm, walls crack, plaster falls	<6.1
VIII	**Destructive**	Moving cars uncontrollable, masonry fractures, poorly constructed buildings damaged	<6.9
IX	**Ruinous**	Some houses collapse, ground cracks, pipes break open	<6.9
X	**Disastrous**	Ground cracks profusely, many buildings destroyed, liquefaction and landslides widespread	<7.3
XI	**Very Disastrous**	Most buildings and bridges collapse, roads, railways, pipes and cables destroyed, general triggering of other hazards	<8.1
XII	**Catastrophic**	Total destruction, trees fall, ground rises and falls in waves	>8.1

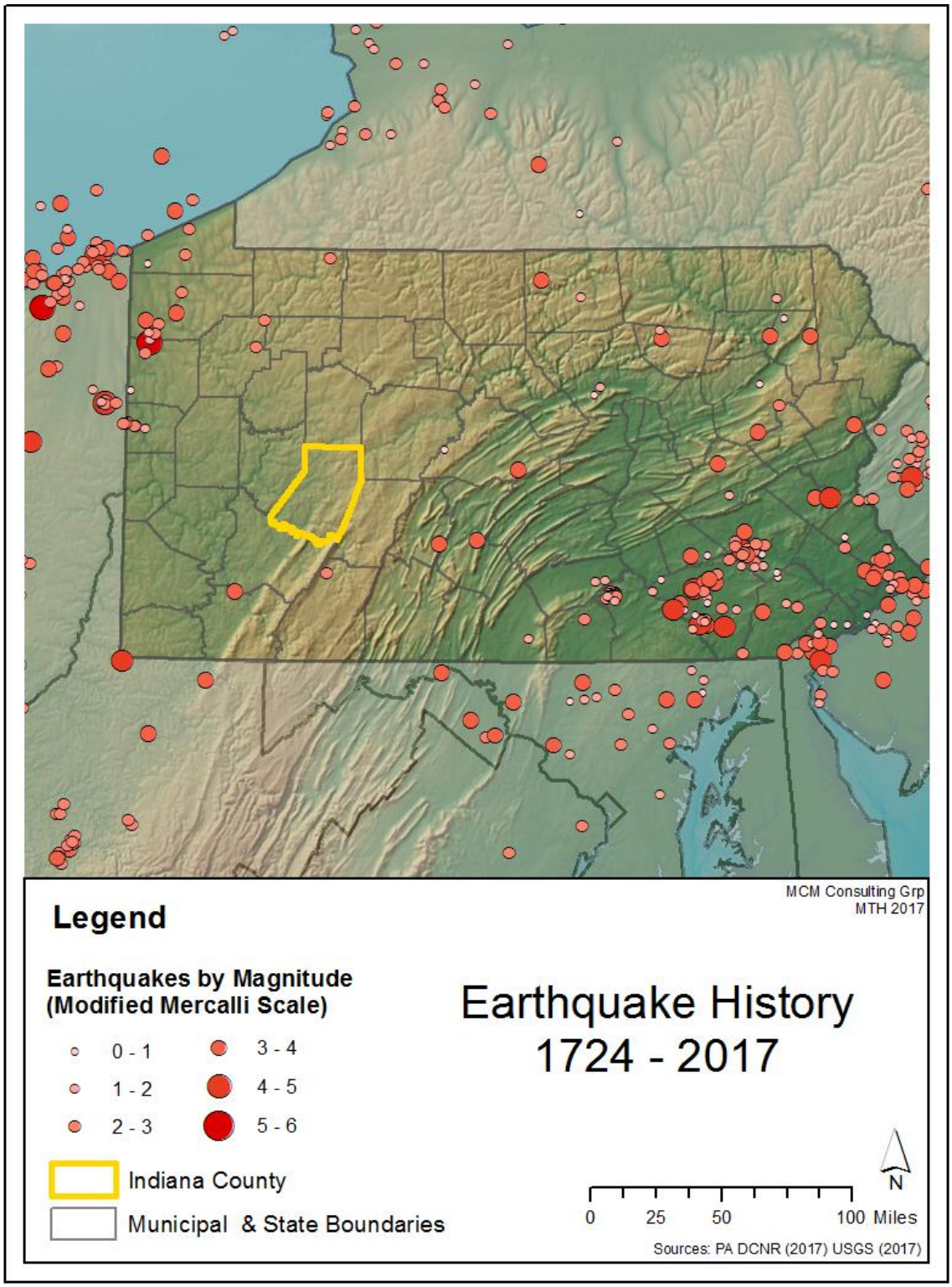
Environmental impacts of earthquakes can be numerous, widespread, and devastating, particularly if indirect impacts like economic impacts are considered. Some examples of these impacts are listed below, but these impacts are unlikely to occur in Indiana County:

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

4.3.2.3 Past Occurrence

According to records maintained by the Pennsylvania Department of Conservation and Natural Resources (DCNR, 2017), there are no recorded earthquakes with epicenters in Indiana County. However, as shown in *Figure 10 - Earthquake History*, there have been events located within 100 km of Indiana County. It is important to note that some of these events may not have been true earthquakes but instead may have been the result of mine or quarry blasts. These have largely been minor events with magnitudes of less than four.

Figure 10 - Earthquake History



4.3.2.4 Future Occurrence

One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak ground acceleration (PGA) measures the strength of ground movements in this manner. PGA is the percent of *g* (acceleration due to gravity) experienced during the earthquake or the rate in change of motion of the earth's surface during an earthquake as a percent of the established rate of acceleration due to gravity. In general, an acceleration of ten- to fifteen- percent of gravity is associated with structural damage to ordinary buildings not designed to withstand earthquakes, although soil conditions at individual sites will impact the amount of damage. The US Geological Surveys Earthquake Hazards Program places the PGA value for Indiana County at 2. (USGS, 2008 [USGS Publications, Series: Earthquake Spectra, Title: Ground-motion prediction equations for the average horizontal component of PGA, PGV, and 5%-damped PSA at spectral periods between 0.01 s and 10. 0 s]).

4.3.2.5 Vulnerability Assessment

Southwestern Pennsylvania's vulnerability to earthquakes is minimal. Recorded history does not document any earthquake epicenter within Indiana County. The effects of earthquakes (if the hazard exists) could potentially be anything from:

- detected only on seismographs, to
- ground water wells collapsing, to
- total destruction.

Based on the past history of earthquake events near Indiana County, the county's vulnerability to this hazard is expected to be low. In the event of an earthquake, unanchored objects may be upset, but few damages are to be expected. As defined by the Risk Factor Methodology probability criteria (see *Table 48 - Risk Factor Assessment*), the future occurrence of an Earthquake in Indiana County can be considered *unlikely* as defined by the Vulnerability Assessment.

4.3.3. Flood, Flash Flood and Ice Jams

4.3.3.1 Location and Extent

Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period of time. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. Flash floods are the most common type of flooding in Indiana County. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiography, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas.

Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often then breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. All forms of flooding can damage infrastructure.

Floodplains are lowlands adjacent to rivers, streams and creeks that are subject to recurring floods. The size of the floodplain is described by the recurrence interval of a given flood. Flood recurrence intervals are explained in more detail in Section 4.3.3.4. However, in assessing the potential spatial extent of flooding, it is important to know that a floodplain associated with a flood that has a 10% chance of occurring in a given year is smaller than the floodplain associated with a flood that has a 0.2% annual chance of occurring. The National Flood Insurance Program (NFIP) publishes digital flood insurance rate maps (DFIRMs). These maps identify the 1% annual chance of flood area. Special Flood Hazard Area (SFHA) and Base Flood Elevations (BFE) are developed from the 1% annual chance flood event, as seen in *Figure 11 - Flooding and Floodplain* Diagram. Structures located in the SFHA have a 26% chance of flooding in a 30-year period. The SFHA serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania and Indiana County local governments. Federal floodplain management regulations and mandatory flood insurance purchase requirements apply to the following high risk special flood hazard areas in *Table 14 - Flood Hazard High Risk Zones*. Appendix D of this hazard mitigation plan includes a flooding vulnerability map for each municipality in Indiana County with vulnerable structures and critical facilities identified.

Past flooding events have been primarily caused by heavy rains which cause small creeks and streams to overflow their banks, often leading to road closures. Flooding poses a threat to critical facilities, agricultural areas, and those who reside or conduct business in the floodplain. The most significant hazard exists for facilities in the floodplain that process, use and/or store hazardous materials. A flood could potentially release and transport hazardous materials out of these areas. As the water recedes it would spread the hazardous materials throughout the area. Most flood damage to property and structures located in the floodplain is caused by water exposure to the interior, high velocity water and debris flow.

Indiana County is located northeast of the Conemaugh River and west of the west branch of the Susquehanna River. The major creeks within the county include the Two Lick, Black Legs, Crooked, Yellow, Mahoning and South Branch Plum Creeks. The IUP Campus in Indiana is crossed by four small streams: Marsh Run flows from the northeast, and Whites Run flows from the north, which join to form Stoney Run, which flows southward towards Two Lick Creek. A small portion of the Indiana Campus (the southern section and wester edge) is located within the 1% annual chance flood zone, specifically part of Miller Stadium, and the Kovalchick Convention and Athletic Complex.

Figure 11 - Flooding and Floodplain Diagram

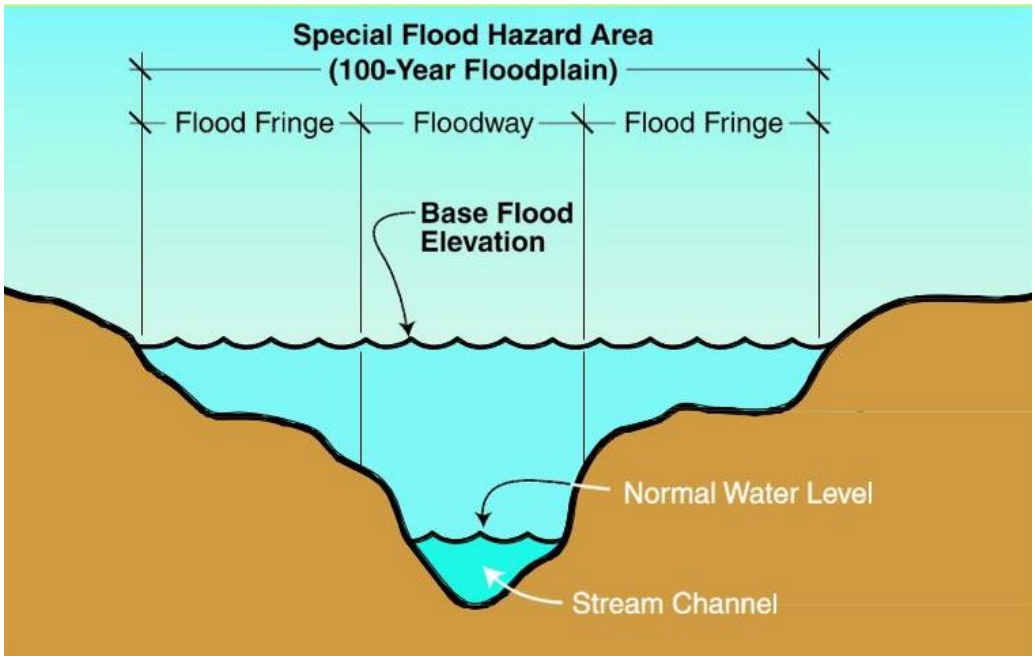


Table 14 - Flood Hazard High Risk Zones

Flood Hazard High Risk Zones (FEMA, 2017)	
Zone	**Description**
A	Areas subject to inundation by the 1% annual chance flood event. Because detailed hydraulic analysis have not been performed, no base flood elevations or flood depths are shown
AE	Areas subject to inundation by the 1% annual chance flood event determined by detailed methods. BFEs are shown within these zones.
AH	Areas subject to inundation by the 1% annual chance shallow flooding (usually areas of ponding) where average depths are 1-3 feet. BFEs derived from detailed hydraulic analysis are shown in this zone.
AO	Areas subject to inundation by the 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are 1-3 feet. Average flood depths derived from detailed hydraulic analysis are shown within this zone.
AR	Areas that result from the decertification of a previously accredited flood protection system that is determined to be in the process of being restored to provide base flood protection.

4.3.3.2 Range of Magnitude

Several factors determine the severity of floods, including rainfall intensity and duration, topography, ground cover and rate of snowmelt. Water runoff is greater in areas with steep slopes and little to no vegetative ground cover. The mountainous terrain of Indiana County can cause more severe floods as runoff reaches receiving water bodies more rapidly over steep terrain. Urbanization typically results in the replacement of vegetative ground cover with impermeable surfaces like asphalt and concrete, increasing the volume of surface runoff and stormwater, particularly in areas with poorly planned stormwater drainage systems. A large amount of rainfall over a short time span can cause flash floods. Additionally, small amounts of rain can cause floods in locations where the soil is frozen, saturated from a previous wet period, or if the area is rife with impermeable surfaces such as large parking lots, paved roadways and other developed areas. The county occasionally experiences intense rainfall from tropical storms in late summer and early fall which can potentially cause flooding as well.

In winter months, local flooding could be exacerbated by ice jams in rivers. Ice jam floods occur on rivers that are totally or partially frozen. A rise in stream level will break up a totally frozen river and create ice flows that can pile up on channel obstructions such as shallow riffles, log jams, or bridge piers. The jammed ice creates a dam across the channel over which the water and ice mixture continues to flow, allowing for more jamming to occur.

Severe flooding can cause injuries and deaths, and can have long-term impacts on the health and safety of the citizens. Severe flooding can also result in significant property damage, potentially disrupting the regular function of critical facilities and have long-

term negative impacts on local economies. Industrial, commercial and public infrastructure facilities can become inundated with flood waters, threatening the continuity of government and business. The special needs population must be identified and located in flooding situations, as they are often home-bound. Mobile homes are especially vulnerable to high water levels. Flooding can have significant environmental impacts when flood waters release and/or transport hazardous materials, and can also result in spreading diseases.

Severe flooding also comes with many secondary effects that could have long lasting impacts on the population, economy and infrastructure of Indiana County. Power failures are the most common secondary effect associated with flooding. Coupled with a shortage of critical services and supplies, power failures could cause a public health emergency. Critical infrastructure, such as sewage and water treatment facilities, can be severely damaged, having a significant effect on public health. High flood waters can cause sewage systems to fail and overflow, contaminating groundwater and drinking water. Flooding also has the potential to trigger other hazards, such as landslides, hazardous material spills and dam failures.

The maximum threat of flooding in Indiana County is estimated by looking at potential loss data and repetitive loss data, both analyzed in the risk assessment portion of the hazard mitigation plan. In these cases, the severity and frequency of damage can result in permanent population displacement, and businesses may close if they are unable to recover from the disaster.

Although floods can cause deaths, injuries and damage to property, they are naturally occurring events that benefit riparian systems which have not been disrupted by human actions. Such benefits include groundwater recharge and the introduction of nutrient rich sediment which improves soil fertility. However, human development often disrupts natural riparian buffers by changing land use and land cover, and the introduction of chemical or biological contaminants that often accompany human presence can contaminate habitats after flood events.

4.3.3.3 Past Occurrence

Indiana County has experienced numerous flooding, flash flooding and ice jam flooding events in the past. The flooding and flash flooding was caused by a variety of heavy storms, tropical storms and other issues. A summary of flood event history for Indiana County is found in *Table 15 - Flood Event History*– property damage that is reported as "-" was not reported.

It is important to note that the IUP campus in Indiana Borough is self-insured and does not have flood insurance through the NFIP. Therefore, the University has not made any flood insurance claims. However, the Borough of Indiana does participate in the NFIP.

The only flooding on campus occurred after Hurricane Andrew in 1992 when Miller Stadium experienced less than minor flooding. The stadium has not flooded since due to efforts to improve drainage systems.

In 1936, flooding in Clymer Borough damaged 200 homes. A significant flood event occurred in July 1977. As a result of severe thunderstorms, parts of Indiana County received eight to twelve inches of rainfall over an eight to nine-hour period from early evening on July 19th until early in the morning on July 20th. The storm's intensity varied on a relatively small geographic scale, with some locations receiving over two inches of rain in a single forty-minute period, and other locations only twenty miles away receiving no recorded precipitation. Flash flooding was reported in Clymer, Homer City, Indiana and Cherry Tree. The event resulted in the highest recorded maximum flood record along the Conemaugh River in the Townships of East and West Wheatfield, with the river rising to a gage height of 27.06 feet at Seward, located downstream in Westmoreland County. The Conemaugh River experienced a maximum flow of 115,000 cubic feet per second. The event also resulted in the flood of record for the Crooked Creek within the Borough of Creekside as well as the Township of Washington. Dixon Run in Green Township flooded during the event as well.

Yellow Creek has historically created flood problems for the Borough of Homer City, with two significant events in 1936 and 1972. Lower elevation areas within the borough tend to flood and experience property damage from heavy rainfall that raises stream levels. Flooding here has the potential to cause sewer backups, which is a significant sanitation problem. Flooding from Two Lick Creek also may cause sewer back-up within the borough.

One of the most destructive flooding events in Indiana County in recent history was due to Hurricane Ivan in September of 2004. Numerous roads were closed, the Mahoning Dam overflowed, and much of the Borough of Clymer flooded causing many people to be evacuated. Approximately 150 people were evacuated countywide and 339 structures were damaged or destroyed. The event caused approximately $1.5 million dollars in damages.

On June 22nd 2017, Indiana County experienced the impacts of Tropical Storm Cindy, resulting in extensive flooding. Several individuals were trapped in their vehicles on Route 56 in Brush Valley and some rail cars were swept off of their tracks near Shelocta. Tragically, the event resulted in one death when a man became trapped in an overflow pipe as waters were rising. Flooding continued into the following day June 23rd.

In 1924 and 1926, ice jams occurred in Clymer Borough at the iron bridge at Sherman Street, and the subsequent flooding resulted in the loss of one resident's life. A winter time flood, which included ice jams and rapid snow melting caused a worst case scenario flash flood on January 19 1996. With an estimated snowpack over most watersheds holding the equivalent of 3.5 to over 5 inches of water, temperatures rose from below freezing to above 50˚F in 12 to 24 hours, staying above freezing for about 48 hours.

During this flood, roads, bridges, and water treatment plants were damaged in Homer City Borough and Center Township. Basement flooding inundated about 300 homes with 10 homes experiencing flooding on their first floor. Property damage from this flood was estimated at $2 million dollars.

Table 15 - Flood Event History

Flood Event History (NCEI, 2017; Knowledge Center, 2017; 2012 HMP)				
Location	**Date**	**Type**	**Property Damage**	**Description**
Indiana County	Oct 1954	Flood	$ -	Flood caused by heavy rains from Hurricane Hazel
Indiana County	May 1956	Flood	$ -	Flood impacting all western Pennsylvania counties
Indiana County	June 1972	Flood	$ -	Flood caused by long term heavy rains from Hurricane Agnes.
Indiana County	Sept 1972	Flood	$ -	Flood caused by long term heavy rains.
Indiana County	Sept 1974	Flood	$ -	Flood caused by long term heavy rains.
Indiana County	July 1977	Flash Flood	$ -	Flash flood caused by thunderstorm rains.
Indiana County	11/27/93	Flash Flood	$ -	Crooked Creek flooded; one home damaged
Indiana County	03/21/94	Flash Flood	$ -	Heavy rains flooded creeks and caused mudslides closing roads; basements flooded in Indiana Borough.
Indiana County	03/28/94	Flood	$ -	Backwater flooding occurred from the Conemaugh Flood Control Dam; flood waters covered areas upstream from the Dam.
Indiana County	07/06/94	Flash Flood	$ -	Heavy rains produced 2.3 inches in 30 minutes; trees downed in Marion Center and flood waters covered local roads.
Indiana County	06/05/95	Flash Flood	$ -	Streets and streams flooded in New Florence.
Indiana County	06/25/95	Flash Flood	$ -	Debris Covered roads resulted in flood waters in Hillsdale.
Homer City	01/19/96	Flash Flood	$ 2,000,000	Major damage occurred along Crook Creek and Two Lick Creek in Homer City, Clymer, and Creekside. Approximately 300 homes sustained substantial basement flooding. Ten homes had water into the first floor. A few businesses were damaged. Roads, bridges, and a water treatment plant were also damaged.
Clymer	02/28/96	Flash Flood	$3,000	A few basements were flooded in Clymer.
Indiana	06/18/96	Flash Flood	$ -	Two to three feet of water covered some streets in Indiana. Up to three feet of water made Route 119 3 miles north of Indiana impassable. Marsh Run in Indiana went over its banks and flooded nearby roads.
Cherry Tree	07/19/96	Flash Flood	$40,000	Fifteen feet of flood waters inundated an ambulance garage in Cherry Tree. A house along the Little Mahoning Creek was under water north of Marion Center.

Flood Event History (NCEI, 2017; Knowledge Center, 2017; 2012 HMP)				
Location	**Date**	**Type**	**Property Damage**	**Description**
Blairsville	08/20/96	Flash Flood	$ -	Extensive road flooding was reported along Route 22 near Blairsville.
Indiana	08/21/96	Flash Flood	$8,000	Marsh Run went out of its banks and flooded nearby roads in Indiana. Some roads were closed. A few basements were also flooded in Indiana.
Hooverhurst	08/23/96	Flash Flood	$ -	Route 286 was flooded after Cush Creek overflowed its banks.
Jacksonville	09/09/96	Flash Flood	$ -	Route 286 near Jacksonville was flooded. Flooding also occurred along Route 119 in Home and Homer City.
Homer City	05/25/97	Flash Flood	$3,000	Widespread heavy thunderstorm rains led to Two Lick Creek overflowing its banks. Widespread heavy thunderstorm rains led to a rapid rise on the Conemaugh River at Seward. Rainfall amounts in the vicinity were between 3 and 4 inches. The river crested at 14.6 feet at 11 pm EST, 2.6 feet above the 12 foot flood stage. Nearby homes were flooded along the River. The river fell below flood stage early on the morning of the 26th.
Countywide	11/07/97	Flash Flood	$10,000	A storm system moving up the Atlantic Coast pushed heavy rainfall into parts of western Pennsylvania. The rain was intensified by strong east upslope winds into the Allegheny Plateau, producing widespread 2 day rainfall storm totals of 2.5 to 3.5 inches. The first report of flooding was on Route 403 along Dixon Run near Cramer. Later, Tearing Run near Homer City went out of its banks. Near Robinson, Richards Run flooded at the intersections of Rt. 259 and Rt. 2201 at Pinkerton Crossing. Extensive street flooding was reported in Clymer and Homer City. Two Lick Creek and Marsh Run also flooded. In Homer City, a basement of a business was flooded. Basement flooding was scattered throughout the county.
Indiana County	11/08/97	Flood	$ -	Three to four inches of rain fell in the headwaters of the Conemaugh River causing moderate flooding at Seward. The Conemaugh River went above flood stage early November 8 and crested at 10 am at 15.1 feet, 3.1 feet above flood stage. The water level quickly receded and went below flood stage between 6 and 7 pm November 8.
Countywide	05/05/98	Flash Flood	$10,000	Route 286 between Indiana and Clymer was flooded. Airport Road by Indiana Airport was flooded. Numerous basements in the area were also flooded.
Blairsville	07/14/00	Flash Flood	$ -	Thunderstorms producing torrential rains moved across western Pennsylvania, dropping between 2 and 3 inches of rain across portions of Indiana, Armstrong and Westmoreland Counties. Minor road flooding was reported in the Blairsville area.
Blairsville	07/28/00	Flash Flood	$10,000	Heavy thunderstorms passing over western Pennsylvania produced rainfall of up to 2 inches in an hour over several counties, producing numerous instances of flash flooding. Up to 3 feet of water was reported on some roadways in North Blairsville as Black Lick Creek overflowed its banks.

Flood Event History (NCEI, 2017; Knowledge Center, 2017; 2012 HMP)				
Location	**Date**	**Type**	**Property Damage**	**Description**
Penn Run	07/31/00	Flash Flood	$ -	Strong thunderstorms passed over areas of western Pennsylvania that had already received several inches of rain over the past few days. These thunderstorms produced torrential rainfall of up to 3 inches in 90 minutes as they moved across the area, creating flash flooding problems across several counties. Minor roadway flooding was reported on SR 553 in the Penn Run area.
Blairsville	03/26/02	Flood	$5,000	Another 1.0 to 1.5 inches of rain over relatively saturated ground produced widespread small stream flooding across western Pennsylvania on the 26th. Flooding closed portions of State Highway 217 between Breinizer to just north of Blairsville.
Clymer	04/15/02	Flash Flood	$ -	Heavy thunderstorm rains produced minor road flooding in the Clymer and Marion Center areas.
Blairsville	06/13/02	Flash Flood	$ -	Heavy thunderstorm rains produced roadway flooding in the Blairsville and Clymer areas.
Homer City	06/14/02	Flash Flood	$50,000	Heavy thunderstorm rains falling on already-soaked ground produced street and basement flooding in Homer City and across Center Township. Area fire departments received a total of 17 calls to pump out basements. Roadway flooding was reported along Route 553 near Penn Run and U.S. Route 119 in Burrell Township.
Marion Center	07/06/03	Flash Flood	$3,000	Basements flooded.
Penn Run	08/09/03	Flash Flood	$ -	Earthen dam overflowed near Yellow Creek camp ground. Several roads were flooded. 150 campers were told to evacuate the camp ground.
Clymer, Homer City & Indiana	11/19/03	Flash Flood	$ -	Flash flooding on streets in Dixonville. Stoney Run flooded nearby field. Basements flooded in Homer City. Old State Route 56 flooded. 2.25 inches of rain was reported.
Indiana County	01/04/04	Flood	$70,000	Route 1008 flooded in Indiana. By 915 PM, Routes 22 and 119 were flooded east of Blairsville, after 3 inches of rain. Business and cars were inundated by floods from Two Lick, Yellow, Black Leggs, and Crooked creeks.
Indiana County	04/13/04	Flood	$ -	Flooding reported on Rte 588 in Cherry Tree, along Rte 286 between Indiana and Clymer, and in Indiana Borough.
Indiana County	07/12/04	Flood	$ -	Rte 210 flooded south of Punxsutawney.
Indiana	07/18/04	Flash Flood	$18,000	Between 525 and 530 PM EDT, basements were flooded in White Twp, 1 miles south of Indiana; and US Routes 119 and 422 were flooded between Indiana and Blairsville. By 6 PM EDT, a few cars were covered to their rooftops by water. Radar estimated 3 to 4 inches of rain fell.

Flood Event History (NCEI, 2017; Knowledge Center, 2017; 2012 HMP)				
Location	**Date**	**Type**	**Property Damage**	**Description**
Indiana County	09/17/04	Flood	$1,500,000	At 630 PM EDT on 17th, Curry Run overflowed and closed Rte 422 near Shelocta (newspaper). By 720 PM, there was widespread road and stream flooding. Flood waters swept away 8 empty campers at a camp ground between Shelocta and Elderton. 845 PM, numerous roads closed by flood. At one house in Centre Twp, basement wall caved in. Rte 954 near Beyer was washed out. Rte 4018 near Smicksburg closed when Mahoning Dam overflowed. Indiana had 3.5 inches of rain. By 1050 PM, Clymer flooded and people were evacuated. 150 people had to be evacuated countywide. Shelocta hit hard. Total of 339 structures damaged or destroyed, 40 of them were businesses. (IVAN)
Indiana County	01/05/05	Flood	$30,000	By 1035 AM on 5th, basements flooded along Rte 286 near Clarksburg. By 1 AM on 6th, Old Rte 56 flooded in Center Twp; numerous basements flooded. By 9 AM on 6th, rainfall was 3.2 inches.
Clarksburg	06/06/05	Flash Flood	$15,000	Basements flooded when streams overflowed.
Homer City	08/08/05	Flash Flood	$30,000	About 10 AM EDT, Rte 286 flooded near Clarksburg. And Rte 217 flooded 5 miles west of Homer City, which also caused some basement flooding. By 1019 AM EDT, numerous streams were flooding roads near Homer City.
Brush Vly	11/29/05	Flash Flood	$ -	Little Brush Creek flooded Whitetail Lane.
Marion Center	06/25/06	Flash Flood	$200,000	Widespread flooding of roads and of at least 16 basements, in Marion Center, East Mahoning Twp, and northern Indiana County. Skywarn spotter in Marion Center reported 2.5 inches of rain from 10 AM EDT to 1230 PM EDT; 4 inches by 130 PM; 4.5 inches by 3 PM; and finally 4.6 inches at 7 PM EDT. By 3 PM EDT, numerous roads were reported flooded in East Mahoning Twp. By 7 PM, Little Mahoning Creek overflowed and flooded Route 119 between Marion Center and the northern border of Indiana County, and several vehicles in a parking lot were submerged. By 720 PM EDT, Canoe Creek flooded Juneau. By 815 PM EDT, near Mottarns Mill in North Mahoning Twp, East Creek Rd was washed out; it paralleled Little Mahoning Creek. Route 210 was damaged by flooding.
Clarksburg	07/05/07	Flash Flood	$5,000	A mesoscale convective vortex ahead of a cold front over Lake Erie produced an area of thunderstorms with very heavy rainfall. Rainfall amounts across Beaver county reached more than 4 inches in 2 hours with reports of 2 to 3 inches in 2 hours common in other counties. Emergency management reported roads closed in Saltsburg and Conemaugh Township due to flash flooding.
Indiana Borough	07/29/07	Flood	-	Flooding

Flood Event History (NCEI, 2017; Knowledge Center, 2017; 2012 HMP)				
Location	**Date**	**Type**	**Property Damage**	**Description**
Blairsville	08/09/07	Flash Flood	$20,000	Three separate mesoscale convective systems moved across Southeast Ohio, Western Pennsylvania, Northern West Virginia, and Garrett county Maryland. Widespread wind damage, flash flooding, and an EF0 tornado occurred during the event. The tornado touched down in the West End of Pittsburgh. Significant flash flooding occurred in Millvale in Allegheny county. Emergency management reported flash flooding on RT 22 closing the highway.
Penn Run	08/23/07	Flash Flood	$5,000	Scattered severe thunderstorms developed along a slow moving cold front across Western Pennsylvania. Emergency management reported Penn Run flooding over Spalding Road.
Grafton	12/19/08	Flood	$10,000	A combination of heavy rain and snow melt brought numerous streams and creeks out of there banks across Fayette, Westmoreland, and Indiana counties. Law enforcement reported Two Lick Creek flooding near Josephine and Grafton along route 119. Roadways were flooded in Burrell Township and East Wheatfield Township.
Indiana County	12/24/08	Flood	-	Flooded Roadways in Cherry Tree Borough, Cherryhill Township and East Wheatfield Township.
Cherry Tree Borough	07/31/09	Flood	-	Flooding - Road Closure
Pine Flats	03/13/10	Flood	$5,000	Low pressure moving east across the Ohio Valley brought moderate rainfall and isolated flooding across parts of Western Pennsylvania. Emergency management reported Wandin Road at Pine Flats closed due to flooding.
Brush Valley Township, West Mahoning Township	12/01/10	Flood	-	Flooded Roadway in Brush Valley Township and road closure in West Mahoning Township
Marion Center	09/10/11	Flood	$5,000	Slow moving showers and isolated thunderstorms moved over portions of northwestern Pennsylvania during the day on the 10th. Locally heavy rainfall caused flooding in Jefferson and Indiana counties. Trained spotter reported small streams and creeks out of their banks near Marion Center.
Chevy Chase Hgts	07/26/12	Flood	$150,000	Multiple lines of severe thunderstorms developed and moved east across the Ohio valley ahead of a strong cold front. Law enforcement reported roads flooded and some water in businesses in Indiana Borough.

Flood Event History (NCEI, 2017; Knowledge Center, 2017; 2012 HMP)				
Location	**Date**	**Type**	**Property Damage**	**Description**
Rochester Mills & Loop	06/28/13	Flash Flood	$ -	A series of shortwaves diving through a broad upper level trough brought rounds of showers and thunderstorms through the last several days of June. With a weakly capped atmosphere, a cold pool associated with two such upper level waves helped to spark two areas of convection in the afternoon on June 28th. There were numerous reports of wind damage across eastern Ohio, northern West Virginia, and western Pennsylvania. In addition, training thunderstorms produced several areas of flooding, including some flash flooding across several counties in western Pennsylvania and northern West Virginia. Emergency manager reported roadway flooded, and flooding in Grant Township
Indiana	08/08/13	Flood	-	Flooded Roadway and Basements
White	08/28/13	Flood	$ -	A shortwave crossing the region helped support for the development of showers and thunderstorms a few of which became severe. However, the bigger threat was heavy rain, as there was plenty of low level moisture to support one to two inch an hour rain rates. Once cell in particular produced 3+ inches of rain as it slowly moved southward across Venango, Indiana, Westmoreland, and Armstrong counties in Pennsylvania and Garrett county in Maryland. The towns along the Kiskiminetas River; Apollo, Vandergrift, and Gilpin were hit particularly hard by flash flooding. The Department of Highways reported ponding of water on Route 286 in Saltsburg Boro. Trained spotter reported several inches of water on Route 22 in Blairsville.
Strangford	06/14/15	Flash Flood	$10,000	Thunderstorms developed along a wavy frontal boundary across parts of eastern Ohio and much of southwest Pennsylvania the afternoon of the 14th into the early morning of the 15th. Some of these storms were severe, but most produced very heavy rainfall, with local reports of near 4 inches of rain for the event. This brought flash flooding to portions of southwest Pennsylvania. The 911 Call Center reported flash flooding with numerous roads closed.
Indiana	05/23/16	Flood	-	Roadway Flooded
Strangford	05/28/16	Flood	$15,000	Showers and thunderstorms developed along the Laurel Highlands in Pennsylvania in the evening of the 28th. Lift for convective development was provided by the higher terrain, and with little steering flow, heavy rain fell over the aforementioned region. Local law enforcement and county EMA reported some roadway and basement flooding, due to poor drainage.

Flood Event History (NCEI, 2017; Knowledge Center, 2017; 2012 HMP)				
Location	**Date**	**Type**	**Property Damage**	**Description**
Strangford	08/28/16	Flood	$10,000	A weak cold front moved southeast across eastern Ohio and western Pennsylvania the afternoon and evening of the 28th. While some wind damage was reported, more significant flash flooding occurred over portions of Allegheny and Fayette counties in Pennsylvania, with the widespread flash flooding across Bullskin Township in Fayette county, including the town of Connellsville. Between 75 to 100 homes sustained damage from flood waters in Bullskin Township, including 29 single family homes with major damage, 8 mobile homes destroyed, a bridge destroyed, and 3 to 4 bridges suffering major structural damage. 50 people were evacuated, with damage estimates in the millions of dollars. The 911 Call Center reported basement flooding in some homes.
Coral	12/18/16	Flood	$2,000	A period of heavy rain ahead of a cold front, combined with snow melt produced flooding of streams and some roadways across eastern Ohio, Western Pennsylvania, and the northern Panhandle of West Virginia. The Two Lick Creek Creek was above flood stage of 9 Feet. A roadway was reported flooded to the Knowledge Center
Cherry Tree	05/29/17	Flood	$10,000	Showers and thunderstorms, some of which where severe, developed in a rather unstable environment with modest shear, in the afternoon and evening of the 28th. Focus for storms was along a warm front, where slow moving/training cells produced heavy rain approaching 3 inches in several areas in the vicinity of Interstate 80. Flash Flooding was reported in Venango and Clarion counties in Pennsylvania, with additional flooding reported overnight in Indiana county as another round of storms approached with the nearing cold front. State official reported flooding of several roads in Cherry Tree including Front Stree, State Route 580, and US 219. State official reported that Wandin Road and State Route 286 were flooding in Green Township. State official reported roads around and including US 199 flooded. Also, a vehicle was stranded on West Creek Road in North Mahoning Township.
Green Township	06/01/17	Flood	$ -	Flood Damage Roadways
Indiana	06/16/17	Flood	$ -	Minor Roadway and Basement Flooding

Flood Event History (NCEI, 2017; Knowledge Center, 2017; 2012 HMP)				
Location	**Date**	**Type**	**Property Damage**	**Description**
Parkwood	06/22/17	Flash Flood	$ -	Showers and thunderstorms developed along a warm front across northern Pennsylvania in the afternoon and evening of the 22nd. With a tropical air mass in place, rainfall became very efficient especially over southern Armstrong and central Indiana counties in Pennsylvania. A nearly stationary set of storms produced 4-6 inches of rain across the area, with focus over Shelocta, in Indiana county. Several feet of rushing water over 422 lead to several water rescues as individuals were trapped in their vehicles. In addition, rail cars were swept off the tracks. Roadways remained closed through the morning of the 23rd, before yet another round of rain would fall. This event was estimated to be a 200-year flood, though this is unofficial at this time. Emergency management reported multiple water rescues ongoing on Route 422 in Armstrong Township. Rail cars were pushed off of tracks near Shelocta with parts of the tracks washed away. State official reported multiple vehicles trapped on Route 56 in Brush Valley. Little Brush Creek was out of it's banks. Emergency management reported that a man drowned as he attempting to clean debris from an overflow pipe in a pond near his home on Sportsman Club Road when the kayak he was in flipped and his legs were pulled into the pipe. Water then continued to rise, submerging the individual. Local 911 reported a water rescue on Haggerty Lane. Emergency management reported that US 119 was closed due to water over the roadway and that Brookside Dairy Farm on Old Route 56 was under water. Also, Two Lick Creek was reported out of it's banks.
Shelocta & Shado Wood Vlg	06/23/17	Flood	$ -	Remnants of tropical storm Cindy interacted with a southward moving cold front in the afternoon of June 23rd. In addition to heavy rain and flooding concerns, especially with saturated antecedent conditions in several locations in southwest PA, severe thunderstorms were also possible. There were numerous reports of trees down across much of northern West Virginia, southwestern Pennsylvania, and even Garrett county, Maryland with reports of flooding in some of the same locations, as 2-4 inches of rain were reported through the evening. There also was enough low level shear to support a non-zero tornado threat, which did materialize across southwest PA and northern WV. One EF-1 tornado was confirmed in Washington county, PA, and two tornadoes, an EF-0 and EF-1, were confirmed in Monongalia county, WV. Fayette County, PA also declared a state of emergency. Several roads remain closed per the local broadcast media around Shelocta due to flooding. These include 422 between route 56 and Five Points Road, Rearick Road, Anthony Run Road, and Old Route 56. Emergency manager reported that flooding from Crooked Creek, continued in to Friday afternoon, June 23rd. The public reported several roads closed due to heavy rain in Indiana.

Flood Event History (NCEI, 2017; Knowledge Center, 2017; 2012 HMP)				
Location	**Date**	**Type**	**Property Damage**	**Description**
Claypoole Hgts & Indiana Borough	07/14/17	Flash Flood	$ -	Showers and thunderstorms, some of which produced heavy rain, developed along an advancing shortwave in zonal flow aloft early on the 14th. Training of these storms over Fayette and Indiana counties in Pennsylvania resulted in some reports of flash flooding, as local creeks and streams rose rapidly. Emergency manager and social media reported flooding in several areas around Indiana including Philadelphia Street and Wayne Ave south of IUP campus. Emergency manager reported a swift water rescue at the intersection of Old Route 119 and Wayne Ave.

The National Flood Insurance Program identifies properties that frequently experience flooding. *Repetitive loss properties* are structures insured under the NFIP which have had at least two paid flood losses of more than $1,000 over any ten-year period since 1978. The hazard mitigation assistance (HMA) definition of a repetitive loss property is a structure covered by a contract for flood insurance made available under the NFIP that has incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded twenty five percent of the market value of the structure at the time of each such flood event; and at the time of the second incidence of flood-related damage, the contract for flood insurance contains in-creased cost of compliance coverage.

A property is considered a *severe repetitive loss property* either when there are at least four losses each exceeding $5,000 or when there are two or more losses where the building payments exceed the property value. As of October 31st, 2017, there are thirty repetitive loss properties and no severe repetitive loss property in Indiana County. This is an increase from 2012 when there were only thirteen repetitive loss properties and no severe repetitive loss properties.

Most municipalities in Indiana County participate in the NFIP except for Armagh Borough, Banks Township, Ernest Borough, Glen Campbell Borough, Smicksburg Borough and West Mahoning Township. Information on each participating municipality is located in *Table 17 - Municipal NFIP Policies*, where data for non-participating municipalities appears as "-".

Table 16 - Repetitive Loss Properties

Repetitive Loss Properties						
Comm. Name	**Comm. Number**	**Building Payments**	**Contents Payments**	**Total Payments**	**Losses**	**Properties**
Blairsville Borough	420495	$ 8,078	$ 7,284	$15,362	4	2 Residential
Clymer Borough	420498	$ 16,646	$ 5,717	$22,363	4	2 Residential
Creekside Borough	420499	$ 22,576	$ -	$22,576	5	2 Residential
East Wheatfield Township	421716	$ 7,141	$ -	$7,141	2	1 Residential
Indiana Borough	420501	$ 187,223	$ -	$187,223	35	14 Residential
South Mahoning Township	422439	$ 16,713	$ -	$16,713	3	1 Residential
White Township	421725	Not Reported	Not Reported	Not Reported	20	7 Residential 1 Commercial
Total	-	**$258,377**	**$ 13,001**	**$ 271,378**	**73**	**29 Residential 1 Commercial**

Table 17 - Municipal NFIP Policies

Municipal NFIP Policies			
Municipality	**Structures in SFHA**	**Losses**	**Active Contracts**
Armagh Borough	0	-	-
Armstrong Township	77	4	9
Banks Township	5	-	-
Black Lick Township	32	2	1
Blairsville Borough	15	10	1
Brush Valley Township	18	5	3
Buffington Township	21	1	5
Burrell Township	28	1	1
Canoe Township	40	7	7
Center Township	63	13	17
Cherry Tree Borough	6	17	2
Cherryhill Township	29	5	7
Clymer Borough	115	19	20
Conemaugh Township	89	2	8
Creekside Borough	84	6	14

Municipal NFIP Policies			
Municipality	**Structures in SFHA**	**Losses**	**Active Contracts**
East Mahoning Township	22	2	1
East Wheatfield Township	39	2	3
Ernest Borough	0	-	-
Glen Campbell Borough	0	-	-
Grant Township	12	0	0
Green Township	98	10	14
Homer City Borough	74	29	24
Indiana Borough	221	102	107
Marion Center Borough	5	6	1
Montgomery Township	5	0	1
North Mahoning Township	9	0	0
Pine Township	7	1	1
Plumville Borough	8	0	4
Rayne Township	30	1	5
Saltsburgh Borough	42	0	10
Shelocta Borough	76	19	14
Smicksburg Borough	0	-	-
South Mahoning Township	15	6	3
Washington Township	36	2	9
West Mahoning Township	22	-	-
West Wheatfield Township	35	1	7
White Township	35	28	47
Young Township	22	1	3
Total	**1435**	**302**	**349**

4.3.3.4 Future Occurrence

Table 18 - Flood Probability Summary

Flood Probability Summary (FEMA)	
Flood Recurrence Intervals	**Annual Chance of Occurrence**
10-year	10.00%
50-year	2.00%
100-year	1.00%
500-year	0.20%

Flooding is a frequent problem throughout Pennsylvania. Indiana County will certainly be impacted by flooding events in the future - Indiana experiences some degree of flooding annually. The threat of flooding is compounded in the late winter and

early spring months, as melting snow can overflow streams, creeks and tributaries, increasing the amount of groundwater, clogging stormwater culverts and bridge openings. The NFIP recognizes the 1%-annual-chance flood, also known as the base flood or one-hundred-year flood, as the standard for identifying properties subject to federal flood insurance purchase requirements. A 1%-annual-chance flood is a flood which has a 1% chance of occurring over a given year, or is likely once every one hundred years. The digital flood insurance rate maps (DFIRMs) are used to identify areas subject to the 1% annual-chance flooding. A property's vulnerability to a flood is dependent upon its location in the floodplain. Properties along the banks of a waterway are the most vulnerable. The property within the floodplain is broken into sections depending on its distance from the waterway. The ten-year flood zone is the area that has a ten percent chance of being flooded every year. However, this label does not mean that this area can-not flood more than once every ten years. It just designates the probability of a flood of this magnitude every year. Further away from this area is the fifty-year flood-plain. This area includes all of the ten-year floodplain plus additional property. The probability of a flood of this magnitude occurring during a one-year period is two percent. A summary of flood probability is shown in *Table 18 - Flood Probability Summary*.

4.3.3.5 Vulnerability Assessment

Indiana County is vulnerable to flooding events. Flooding puts the entire population at some level of risk, whether through the flooding of homes, businesses, places of employment, or the road, sewer and water infrastructure. *Table 20 - Structures Vulnerable to Flooding* identifies how many structures located in the special flood hazard area by municipality using county GIS data. Critical facilities are facilities that if damaged would present an immediate threat to life, public health and safety. Critical Facilities that are located in the special flood hazard area are identified in *Table 19 - Critical Facilities Vulnerable to Flooding*. Appendix D of this hazard mitigation plan includes a flooding vulnerability map for each municipality in Indiana County with vulnerable structures and critical facilities identified. A list of critical facilities located in the special flood hazard area is located in Appendix D as well.

Table 19 - Critical Facilities Vulnerable to Flooding

Critical Facilities Vulnerable to Flooding (Indiana County, 2017)			
Municipality	**Type**	**Name**	**Address**
Clymer Borough	Fire Station	Clymer Fire Station	550 Sherman St
Creekside Borough	Fire Station	Creekside Fire Station	440 Indiana Rd
Plumville Borough	Fire Station	Plumville Fire Station	109 Indiana St
White Township	SARA Facility	Paw Two Lick Creek Plant	1034 Waterworks Rd

Table 20 - Structures Vulnerable to Flooding

Structures Vulnerable to Flooding (Indiana County, 2017)			
Municipality	**Structures in SFHA**	**Municipality**	**Struc-tures in SFHA**
Armagh Borough	0	Grant Township	12
Armstrong Township	77	Green Township	98
Banks Township	5	Homer City Borough	74
Black Lick Township	32	Indiana Borough	221
Blairsville Borough	15	Marion Center Borough	5
Brush Valley Township	18	Montgomery Township	5
Buffington Township	21	North Mahoning Township	9
Burrell Township	28	Pine Township	7
Canoe Township	40	Plumville Borough	8
Center Township	63	Rayne Township	30
Cherry Tree Borough	6	Saltsburgh Borough	42
Cherryhill Township	29	Shelocta Borough	76
Clymer Borough	115	Smicksburg Borough	0
Conemaugh Township	89	South Mahoning Township	15
Creekside Borough	84	Washington Township	36
East Mahoning Township	22	West Mahoning Township	22
East Wheatfield Township	39	West Wheatfield Township	35
Ernest Borough	0	White Township	35
Glen Campbell Borough	0	Young Township	22
		Total	**1435**

Figure 12 - IUP Flood Hazard Areas

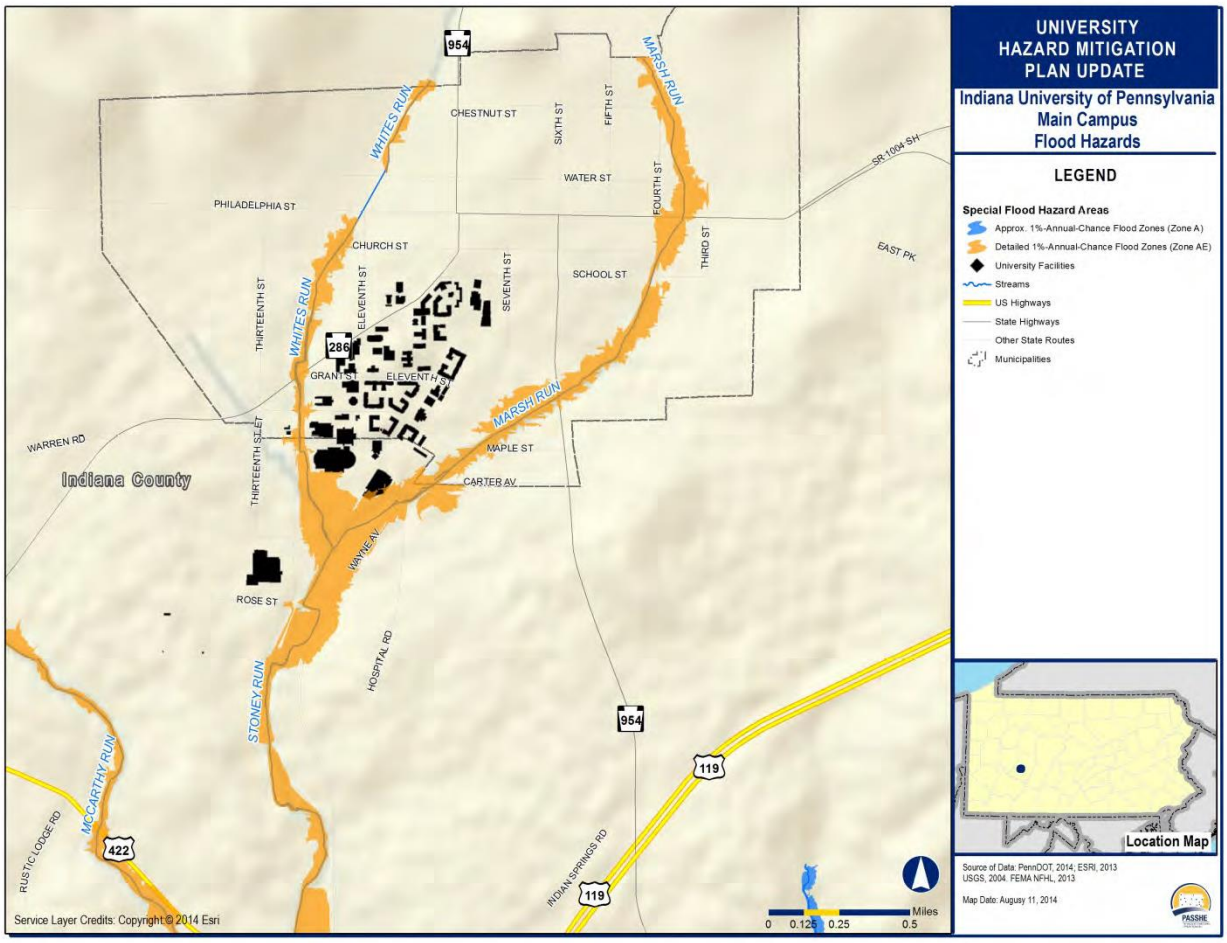
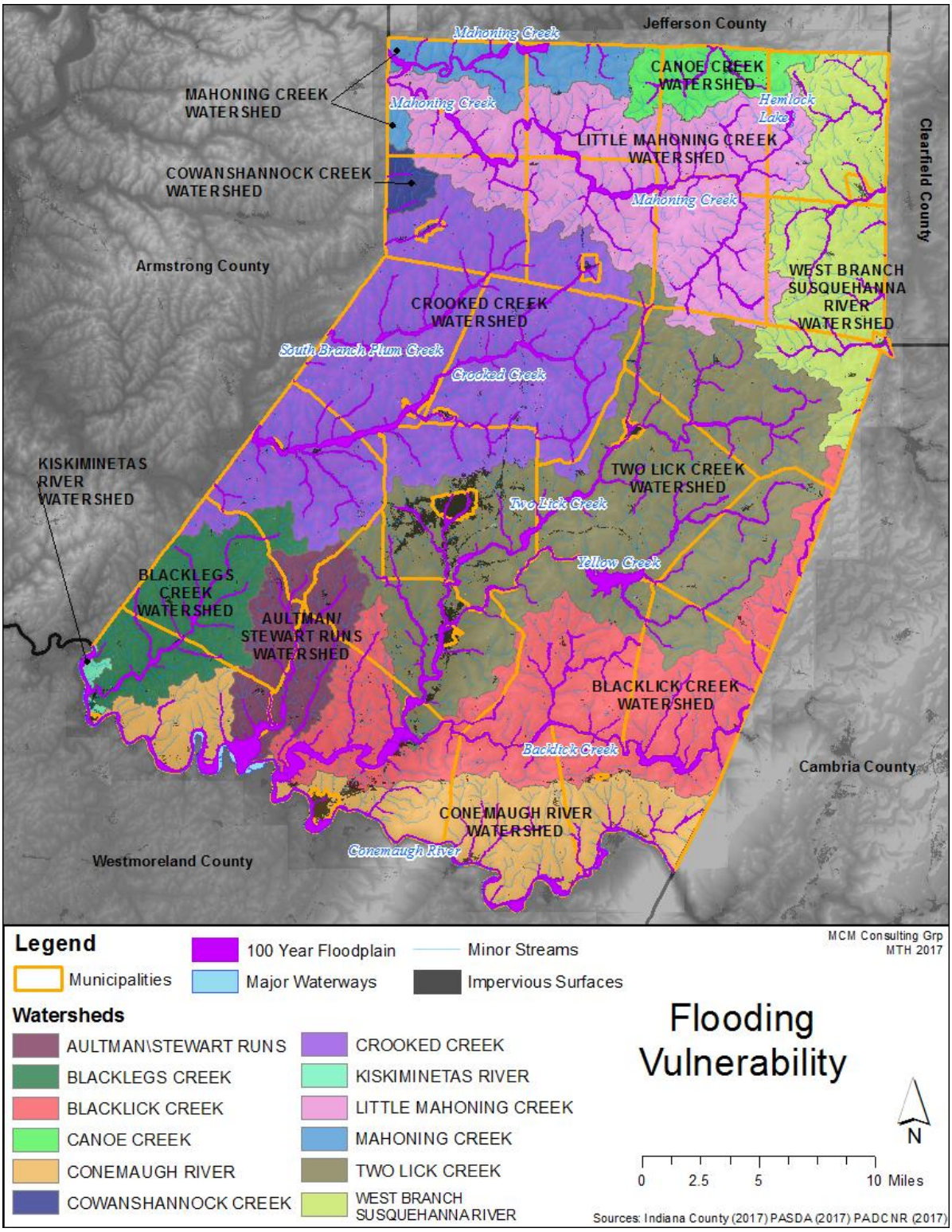


Figure 13 - Flooding Vulnerability



4.3.4. Invasive Species

4.3.4.1 Location and Extent

An invasive species is a species that is not indigenous to a given ecosystem and that, when introduced to a non-native environment, tends to thrive. The spread of an invasive species often alters ecosystems, which can cause environmental and economic harm and pose a threat to human health. The phenomena of invasive species is due to human activity. Human society is globalized, and people have the capability to traverse the globe at rates unparalleled in the history of the Earth. Either intentionally or unintentionally, other species may accompany people when they travel, introducing the stowaway species to a novel ecosystem. In a foreign ecosystem, a transported species may thrive, potentially restructuring the ecosystem and threatening its health. Common pathways for invasive species introduction to Pennsylvania include (PA DOA, 2010):

- Contamination of internationally traded products
- Hull fouling
- Ship ballast water release
- Discarded live fish bait
- Intentional release
- Escape from cultivation
- Movement of soil, compost, wood, vehicles or other materials and equipment
- Unregulated sale of organisms
- Smuggling activities
- Hobby trading or specimen trading

Invasive species threats are typically divided into two main subsets:

Aquatic Invasive Species (AIS) are nonnative, invertebrates, fishes, aquatic plants, and microbes that threaten the diversity or abundance of native species, the ecological stability of the infested waters, human health and safety, or commercial, agriculture, or recreational activities dependent on such waters.

Terrestrial Invasive Species (TIS) are nonnative plants, vertebrates, arthropods, or pathogens that complete their lifecycle on land whose introduction does or is likely to cause economic or environmental harm or harm to human health.

The location and extent of invasive threats is dependent on the preferred habitat of the species, as well as the species' ease of movement and establishment. *Table 21 - Indiana Invasive Species* lists invasive species that have been found in Indiana County.

4.3.4.2 Range of Magnitude

Some invasive species are not considered agricultural pests, do not harm humans and do not cause significant ecological problems. Other invasive species can have many negative impacts and cause significant changes in the composition of ecosystems. For example, the Emerald Ash Borer has a ninety-nine percent mortality rate for any ash tree it infects. Didymo, an aggressive form of algae not yet found in Indiana County, can clog waterways and smother native aquatic plants and animals.

The aggressive nature of many invasive species can cause significant reductions in biodiversity by crowding out native species. This can affect the health of individual host organisms as well as the overall well-being of the affected ecosystem. An example of a worst-case scenario for invasive species is the success of the Emerald Ash Borer in Indiana County and the surrounding region. The Emerald Ash Borer has already become established in Indiana County and the surrounding region, and there is a high mortality rate for trees associated with this pest. Hardwood forests in the county have been negatively impacted due to this invasive species and there have been many ash tree fatalities. Degradation of forest health which cascades into other problems. Among other benefits, forests prevent soil degradation and erosion, protect watersheds, and sequester carbon from the atmosphere. Forests have a key role in hydrologic systems, so losing a forest amplifies the effects of erosion and flooding. Forest degradation also has adverse economic effects, impacting such activities as logging, tourism, foraging and other production activities dependent on lumber.

The magnitude of an invasive species threat is generally amplified when the ecosystem or host species is already stressed, such as in times of drought. The already weakened state of the native ecosystem causes it to more easily succumb to an infestation.

4.3.4.3 Past Occurrence

Invasive species have been entering Pennsylvania since the arrival of European settlers. There are several invasive pests that have moved through Indiana County and the surrounding region which have resulted in the deaths of many trees. PENNDOT summarizes these invasive species:

> *Western Pennsylvania has been inhabited by an invasive beetle known as the Emerald Ash Borer. This green-colored insect has infested many ash trees, which has resulted in a pandemic level of dead ash trees. In addition, the Gypsy Moth Caterpillar defoliated Western Pennsylvania at least twice within the last twenty years. This insect infested the oak tree species and many of those trees have died as well. The Wooly Adelgid and needle blight fungi are also currently affecting the white pine and hemlock trees, resulting in their premature deaths. (PENNDOT, 2017)*

These occurrences represent lost battles to invasive species, and these species are widespread in Indiana County and the surrounding region. Once a species is established in an area and it causes a change in the ecology, it is quite difficult if somewhat futile to

turn back the clock on the prevalence of the species, however Indiana County can work towards mitigating the negative impacts of such widespread invasive species. In the case of the Emerald Ash Borer and other tree killing invasive species, PENNDOT has identified one way that the threat needs to be mitigated:

> *[The Emerald Ash Borer, Gypsy Moth and Wooly Adelgid] have left Indiana County and many other western Pennsylvania Counties with tens of thousands of dead trees either within the State Department of Transportation's (PENNDOT) right-of-way or on private property, but within close proximity to falling on our highways. Although random in nature, several fatalities have been associated with trees falling on motorists or motorists running into downed trees across the highway.*
>
> *In 2015, the local PENNDOT Engineering District performed a comprehensive field view of roads within Indiana County under their jurisdiction. They identified 2,074 dead trees that existed to the right and left of centerline that could conceivable fall onto the roadway. They then developed a Risk Assessment Tool to prioritize the order of tree removal based upon Average Daily Traffic, number of dead trees, priority network, etc. An estimate of approximately $2 Million for complete removal was derived. This does not include the number of additional trees that die each year compounding to the total. One can easily see the growing magnitude of this pandemic. PENNDOT has been incorporating select tree removal into roadway construction projects using both federal and state funding. Since July 1, 2016, PENNDOT Department Force Crews have also increased their efforts in select manual tree removal. This work is often done during the winter when crews are not engaged in snow removal operations. Dead tree removal is quickly becoming a major focus of PENNDOT, however a sustained funding source to remove all of these potential hazards is simply not available. The PA Department of Agriculture has established strict firewood and lumber quarantine areas in some of these districts so additional costs may be incurred.*

Table 21 - Indiana Invasive Species lists all non-native species that are established in Indiana County. While all species listed here are not native to Indiana County, those species highlighted in yellow pose a larger ecological threat than others (see 4.3.5.5. Vulnerability Assessment for additional discussion). For some species such as the Asian Long-horned Beetle or the Spotted Lanternfly, Indiana County is on the edge of the species range, meaning control efforts taken in the county can help limit the propagation of the threat even beyond the county (*Table 22 - Vulnerable Species*).

Table 21 - Indiana Invasive Species

Non-Native Species Established in Indiana County		
Scientific Name	**Common Name**	**Type**
Corbicula fluminea	Asiatic Clam	Aquatic Animal
Potamogeton crispus	Curly-leaf Pondweed	Aquatic Plant
Myriophyllum spicatum	Eurasian Water-milfoil	Aquatic Plant
Persicaria hydropiper	Marshpepper Knotweed, Smartweed	Aquatic Plant

Non-Native Species Established in Indiana County		
Scientific Name	**Common Name**	**Type**
Typha angustifolia	narrow-leaved cattail	Aquatic Plant
Mentha aquatica	water mint	Aquatic Plant
Nasturtium officinale	Watercress	Aquatic Plant
Cryptococcus fagisuga & Neonectria (N.)	Beech Bark Disease Complex	Disease
Sirococcus clavigignenti-juglandacearum	Butternut Canker	Disease
Diaporthales: Cryphonectriaceae	Chestnut Blight	Disease
Hemiptera: Diaspididae	Elongate Hemlock Scale	Disease
Neonectria faginata	Neonectria canker	Disease
Ceratocystis fagacearum	Oak Wilt	Disease
Cronartium ribicola	White Pine Blister Rust	Disease
Halyomorpha halys	brown marmorated stink bug	Insect
Coleoptera: Buprestidae	Emerald Ash Borer	Insect
Hymenoptera: Diprionidae	European Pine Sawfly	Insect
Lepidoptera: Lymantriidae	Gypsy Moth	Insect
Adelges tsugae	Hemlock Woolly Adelgid	Insect
Popillia japonica	Japanese Beetle	Insect
Hymenoptera: Tentredinadae	Larch Sawfly	Insect
Hymenoptera: Pamphilidae	Pine False Webworm	Insect
Coleptera: Cuculionidae	Pine Shoot Beetle	Insect
Sirex noctilio	Sirex Woodwasp	Insect
Trifolium hybridum	alsike clover	Plant
Glyceria grandis var. grandis	American mannagrass	Plant
Poa annua	annual bluegrass	Plant
Elaeagnus umbellata	Autumn Olive	Plant
Bromus racemosus	bald brome	Plant
Echinochloa crus-galli	barnyardgrass	Plant
Lotus corniculatus	birdsfoot trefoil	Plant
Solanum dulcamara	bittersweet nightshade	Plant
Medicago lupulina	black medic	Plant
Plantago lanceolata	buckhorn plantain	Plant
Fagopyrum esculentum	buckwheat	Plant
Ranunculus bulbosus	bulbous buttercup	Plant
Cirsium vulgare	Bull Thistle	Plant
Lonicera spp.	bush honeysuckles (exotic)	Plant
Poa compressa	Canada bluegrass	Plant
Cirsium arvense	Canada thistle	Plant
Linum usitatissimum	common flax	Plant

Non-Native Species Established in Indiana County		
Scientific Name	**Common Name**	**Type**
Aesculus hippocastanum	common horse chestnut	Plant
Vinca minor	common periwinkle	Plant
Veronica officinalis	common speedwell	Plant
Holcus lanatus	common velvetgrass	Plant
Echium vulgare	common viper's bugloss	Plant
Anthemis arvensis	corn chamomile	Plant
Agrostemma githago	corn cockle	Plant
Ribes rubrum	cultivated currant	Plant
Rumex crispus ssp. crispus	curly dock	Plant
Euphorbia cyparissias	cypress spurge	Plant
Chaenorhinum minus	dwarf snapdragon	Plant
Alnus glutinosa	European Alder	Plant
Betula pendula	European birch	Plant
Prunus padus	European bird cherry	Plant
Lepidium campestre	field pepperweed	Plant
Setaria italica	foxtail millet	Plant
Silene armeria	garden catchfly	Plant
Alliaria petiolata	garlic mustard	Plant
Setaria faberi	giant foxtail	Plant
Polygonum sachalinense; Fallopia sacha-linensis	Giant Knotweed	Plant
Setaria viridis var. viridis	green bristlegrass	Plant
Glechoma hederacea	ground ivy	Plant
Hypochaeris radicata	hairy cat's ear	Plant
Galinsoga quadriradiata	hairy galinsoga	Plant
Vicia villosa	hairy vetch	Plant
Calystegia sepium	hedge bindweed	Plant
Sisymbrium officinale	hedge mustard	Plant
Brassica juncea	Indian mustard	Plant
Berberis thunbergii	Japanese barberry	Plant
Lonicera japonica	Japanese honeysuckle	Plant
Reynoutria japonica	Japanese knotweed	Plant
Microstegium vimineum	Japanese Stiltgrass, Nepalese Browntop	Plant
Persicaria maculosa	ladysthumb	Plant
Digitaria sanguinalis	large crabgrass	Plant
Stellaria graminea	little starwort	Plant
Gnaphalium uliginosum	low cudweed	Plant

Non-Native Species Established in Indiana County		
Scientific Name	**Common Name**	**Type**
Festuca pratensis	meadow fescue	Plant
Hieracium caespitosum	meadow hawkweed	Plant
Persicaria perfoliata	mile-a-minute vine	Plant
Lonicera morrowii	Morrow's Honeysuckle	Plant
Rosa multiflora	multiflora rose	Plant
Malva moschata	musk mallow	Plant
Silene noctiflora	nightflowering catchfly	Plant
Hieracium aurantiacum	orange hawkweed	Plant
Dactylis glomerata	orchardgrass	Plant
Celastrus orbiculata; Celastrus orbicula-tus	Oriental Bittersweet	Plant
Polygonum posumbu	Oriental lady's thumb	Plant
Leucanthemum vulgare	oxeye daisy	Plant
Malus pumila	paradise apple	Plant
Vinca spp.	periwinkle	Plant
Lactuca serriola	prickly lettuce	Plant
Securigera varia	purple crown-vetch	Plant
Lythrum salicaria	Purple Loosestrife	Plant
Elymus repens	quackgrass	Plant
Daucus carota	Queen Anne's lace, wild carrot	Plant
Trifolium pratense	red clover	Plant
Rumex acetosella	red sorrel	Plant
Amaranthus retroflexus	redroot pigweed	Plant
Agrostis gigantea	redtop	Plant
Phalaris arundinacea	Reed Canary Grass	Plant
Taraxacum erythrospermum	rock dandelion	Plant
Poa trivialis	roughstalk bluegrass	Plant
Elaeagnus angustifolia	Russian olive	Plant
Capsella bursa-pastoris	shepherd's-purse	Plant
Centaurea stoebe ssp. micranthos	spotted knapweed	Plant
Draba verna	spring whitlowgrass	Plant
Urtica dioica	stinging nettle	Plant
Anthemis cotula	stinking chamomile	Plant
Potentilla recta	sulfur cinquefoil	Plant
Anthoxanthum odoratum	sweet vernalgrass	Plant
Rosa rubiginosa	sweetbriar	Plant
Acorus calamus	Sweetflag, Calamus	Plant

Non-Native Species Established in Indiana County		
Scientific Name	**Common Name**	**Type**
Arrhenatherum elatius	tall oatgrass	Plant
Hemerocallis fulva	tawny daylily	Plant
Arenaria serpyllifolia	thymeleaf sandwort	Plant
Phleum pratense	timothy	Plant
Ailanthus altissima	tree-of-heaven	Plant
Myosotis scorpioides	true forget-me-not	Plant
Abutilon theophrasti	velvetleaf	Plant
Silene latifolia	white campion	Plant
Trifolium repens	white clover	Plant
Galium verum	yellow bedstraw	Plant
Setaria pumila	yellow foxtail	Plant
Iris pseudacorus	Yellow Iris	Plant
Barbarea vulgaris	yellow rocket	Plant
Melilotus officinalis	yellow sweet-clover	Plant
Linaria vulgaris	yellow toadflax	Plant
EDDMaps, 2017; PA DCNR, 2017; USDA FS, 2017; iMapInvasives, 2017		

4.3.4.4 Future Occurrence

According to PISC (the Pennsylvania Invasive Species Council), the probability of future occurrence for invasive species threats is growing due to the increasing volume of transported goods, increasing efficiency and speed of transportation, and expanding international trade agreements. Expanded global trade has created opportunities for many organisms to be transported to and establish themselves in new counties and regions. Climate change is contributing to the introduction of new invasive species. As maximum and minimum seasonal temperatures change, pests are able to establish themselves in previously inhospitable climates. This also gives introduced species an earlier start and increases the magnitude of their growth, possibly shifting the dominance of ecosystems in the favor of nonnative species.

In order to combat the increase in future occurrences, the PISC (a collaboration of state agencies, public organizations and federal agencies) released the Invasive Species Management Plan in April of 2010. The plan outlines the Commonwealth's goals for managing the spread of nonnative invasive species and creates a framework for responding to threats through research, action, and public outreach and communication. More information can be found at invasivespeciescouncil.com.

There are several invasive species that are found near Indiana County but have not yet been detected inside the county (see Table *22 - Vulnerable Species*). Especially in cases like this, control efforts, heightened awareness, and public outreach and education can

help prevent an invasive species from becoming established. Once a species is established, it is much more difficult to eradicate it from an ecosystem meaning prevention is very important. For a more inclusive list of invasive plants found in Pennsylvania and a list of invasive plants on the Pennsylvania watch list, see the referenced PA DCNR publication "DCNR Invasive Plants" (PA DCNR, 2016). Species highlighted in yellow were identified as priority species for prevention (see 4.3.4.5. Vulnerability Assessment for more additional discussion).

Table 22 - Vulnerable Species

Species Found Near Indiana County		
Scientific Name	**Common Name**	**Type**
Nelumbo lutea	American Water Lotus	Aquatic Plant
Veronica anagallis-aquatica	Water Speedwell	Aquatic Plant
Discula destructiva	Dogwood Anthracnose	Disease
Anoplophora glabripennis	Asian long-horned beetle	Insect
Fenusa pusilla	Birch Leafminer	Insect
Hymenoptera: Cynipidae	Chestnut Gall Wasp	Insect
Coleoptera: Curculionidae	European Bark Beetle (H. Opacus)	Insect
Lepidoptera: Coleophoridae	Larch Casebearer	Insect
lepidoptera: Galacticidae	Mimosa Webworm	Insect
Hemiptera: Asterolecaniidae	Oak Pit Scale A. Minus	Insect
Hymenoptera: Tenthredinidae	Pear Sawfly	Insect
Lycroma delicatula	Spotted Lanternfly (lycorma)	Insect
Hemiptera: Coccidae	Spruce Bud Scale	Insect
Lonicera maackii	Amur honeysuckle	Plant
Lonicera spp. (species unknown)	Bush Honeysuckle (species unknown)	Plant
Persicaria lapathifolia	Dockweed Smartweed; Curlytop Knotweed	Plant
Phragmites australis ssp. australis	European common reed	Plant
Heracleum mantegazzianum	Giant Hogweed	Plant
Conium maculatum	poison hemlock	Plant
Cardamine impatiens	Touch-me-not Bittercress	Plant
EDDMaps, 2017; PA DCNR, 2017; USDA FS, 2017; iMapInvasives, 2017		

4.3.4.5 Vulnerability Assessment

Indiana County's vulnerability to invasion depends on the species in question. Human activity and mobility are ever increasing, and combined with the prospects of climate change, invasive species are becoming increasingly threatening. Invasive species can have adverse economic effects by impacting agriculture and logging activities. Natural

forest ecosystems provide clean water, recreational opportunities, habitat for native wildlife, and places to enjoy the tranquility and transcendence of nature. The balance of forest ecosystems and forest health are vulnerable to invasive species threats.

An interesting facet of the invasive species problem in Pennsylvania is that deer do not eat many invasive plants, giving invasive species a competitive advantage over the native species that fall prey to deer. As such, the management of deer populations in Indiana County has a significant impact on the vulnerability of an ecosystem to invasive species, where overpopulation of deer favors invasive species.

There are five primary components to managing invasive plants:

Prioritize: Public use areas such as state parks and other healthy forest ecosystems should be prioritized over developed and private areas. Locations with lower densities of invasive plants are often easier to control and should be given quick attention. Locations where humans are disturbing the landscape opens up niche space, and often times the aggressive invasive species move in faster than native species. Such locations include: road work, ditch/ culvert work, logging activities, stream improvement/stabilization and bridge work. Some species pose a higher risk than others - members of the Indiana County Conservation District, Indiana County Parks & Trails, Yellow Creek State Park, and Evergreen Conservancy identified priority species for management in Indiana County. Those priority species as well as other priority species are highlighted in yellow in *Table 21 - Indiana Invasive Species* and *Table 22 - Vulnerable Species*. The most notable species that are established in Indiana County that are a priority to manage include:

Autumn Olive: Often appears in cleared areas such as mine land and is highly aggressive. Present in Yellow Creek State Park and has been treated with herbicide and mechanical removal.

Bush Honeysuckle: Also present in Yellow Creek State Park and has been treated with herbicide and mechanical removal.

Multiflora Rose: A widespread problem throughout the county.

Japanese Knotweed: Found along rail trails, also widespread along river valleys in the county. Army Corps lands for the Conemaugh Dam are overrun with Knotweed.

Oriental Bittersweet: Highly aggressive and difficult to eradicate and when it fully invades an area, it kills trees by wrapping around the trunk and strangling them to death.

Japanese Stiltgrass: Aggressive and fast moving, forms a thick mat that nothing else can grow through. It is also quite shade tolerant, so it can take over the understory of forests.

Purple Loosestrife: found along Route 119 corridor, Indiana, PA to south in ditches and wet waste areas.

Invasive species are easiest to control before they become widespread and established in an area, and for that reason, management should prioritize management of species that are listed as priorities in *Table 22 - Vulnerable Species*. Public outreach and education is important for these species in order to improve identification and prevention of invasion. The Asian Long-horned Beetle first attacks red maple trees, followed by many other hardwoods by boring half inch holes through the trees, weakening them structurally and causing limbs to break off, ultimately killing trees. Indiana County has many red and sugar maple trees, so if the Asian Long-horned Beetle ever became established in the county, it could spread quickly and have a devastating impact.

Locate: Detailed locations should be recorded for invasive plants so sites can be easily relocated, treated and monitored.

Delineate: The scale and extent of the infestation should be recorded and mapped so that the progress of the infestation can be monitored.

Control: Methods of control depend on the specific infestation, but the most common approaches are mechanical (cutting and hand-pulling) and chemical (herbicide treatments).

Monitor: Identified sites should be monitored and revisited as often as several times in a growing season (depending on the location/species). Monitoring can allow for early detection of spreading infestations. Most importantly, it prevents a relapse towards full-blown infestation.

4.3.5. Pandemic and Infectious Disease

4.3.5.1 Location and Extent

Pandemic & Epidemic

Pandemic is a widespread outbreak of infectious disease that impacts an extensive region, potentially spanning continents and having global impacts. An epidemic also refers to an outbreak of a rapidly spreading infectious disease, but is more regional and less widespread than a pandemic. The spread of a disease depends on the mode of transmission of the disease, how contagious it is, and the amount of contact between infected and non-infected persons. In the event of a pandemic occurring in the eastern United States, the entirety of Indiana County would likely be affected. Strains of influenza, or the flu have caused epidemics and pandemics, and they commonly attack the respiratory tract in humans. Influenza pandemic planning began in response to the H5N1 (avian) flu outbreak in Asia, Africa, Europe, the Pacific, and the Near East in the late 1990s and early 2000s. Avian flu did not reach pandemic proportions in the United States, but the county began planning for flu outbreaks. The PA Department of Health Influenza Pandemic Response Plan states that "an influenza pandemic is inevitable and will probably give little warning" (PA Department of Health, 2005). For this reason, influenza is a primary concern regarding pandemic and infectious disease in Indiana County.

Studies after the 2009 H1N1 influenza pandemic disproportionately impacted people younger than twenty-four (CIDRAP, 2010). Universities have potential to become outbreak centers due to their large young adult population, high levels of close social contact, and permeable boundaries. During a pandemic or disease outbreak, the population affected may exceed the seasonal norm of one-third of the student population. Because universities can be sites of transmission, they may cause a virus to spread among the surrounding community as well.

Infectious Disease

West Nile Virus has been detected in all sixty-seven counties in the Commonwealth at least once in the past ten years, making it a hazard to Indiana County. The disease is commonly spread by ticks or insects such as the mosquito. West Nile causes headaches, high fever, neck stiffness, disorientation, tremors, convulsions, muscle weakness, paralysis, and death in its most serious form. Blacklegged ticks in Indiana County can also spread Lyme disease, a bacterial disease with symptoms including fever, headaches and a characteristic skin rash (erythema migrans). Untreated, Lyme disease can spread to joints, the heart and the nervous system (CDC, 2016).

4.3.5.2 Range of Magnitude

Pandemic

Advancements in medical technologies have greatly reduced the number of deaths caused by influenza over time. In the early 1900s, flu pandemics could cause tens of millions of deaths, while the 2009 Swine Flu caused fewer than 20,000 deaths worldwide, and many people infected with Swine Flu in 2009 have recovered without needing medical treatment. However, the modern flu viruses are still quite dangerous. About seventy percent of those who were hospitalized with the 2009 H1N1 flu virus in the United States belonged to a high-risk group (CDC, 2009). High risk populations for influenza include children, the elderly, pregnant women, and patients with reduced immune system capability. Such high-risk populations are discussed in more detail in Section 4.3.5.5.

In 2007, Indiana County estimated potential impacts of an influenza pandemic as an annex to the county emergency operations plan. These estimates were reported in the Indiana County Pandemic Response Plan in 2007 and appear in *Table 23 - Pandemic Flu Impact Projections*.

Table 23 - Pandemic Flu Impact Projections

Projections of Pandemic Flu Impact	
Community Estimates	
Indiana County 2006 Estimated Population	88,234
Pandemic Influenza Impact/Attack Rate	25%
Estimated Total Hospital Admissions	
Most Likely Scenario	304
Minimum Scenario	125
Maximum Scenario	397
Estimated Total Estimated Deaths	
Most Likely Scenario	62
Minimum Scenario	37
Maximum Scenario	100

Infectious Disease

West Nile Virus originated in regions of East Africa around 1937 but spread globally. In 2012, West Nile Virus caused 286 deaths in the United States. Most West Nile infections in humans are subclinical, causing no symptoms. Approximately twenty percent of infections cause symptoms and less than one percent of cases result in severe neurological disease or death. Symptoms typically appear between two and fifteen days after infection and there is currently no vaccine for West Nile Virus. Person to person transmission of West Nile is less prevalent than person to person transmission of influenza.

Each year since 2005, there are consistently well over 3,000 cases of Lyme disease in Pennsylvania, with 6,470 confirmed cases in 2014 (CDC, 2016). While most cases of Lyme disease can be treated with a few weeks of antibiotic use, undetected Lyme disease

can seriously damage a body's musculoskeletal and nervous system, sometimes resulting in death.

4.3.5.3 Past Occurrence

Pandemic & Epidemic

Table 24 - Past Influenza Outbreaks and Pandemics

Past Influenza Outbreaks and Pandemics			
Year/Time Frame	**Common Name**	**Virus Type**	**Geographic Origin**
1889	Russian flu	H2N2 or H3N8	Russia
1918-1920	Spanish flu	H1N1	Germany, Britain, France and the United States
1957-1958	Asian flu	H2N2	China
1968-1969	Hong Kong flu	H3N2	Hong Kong
1976	Swine flu	H1N1	Fort Dix, United States
2006-2008	Avian (Bird) Flu	H5N1	India
2007	Equine flu	H3N8	Australia
2009	Swine Flu	H1N1	Mexico

Influenza outbreaks of Spanish Flu, Asian flu, Hong Kong Flu and Swine Flu caused deaths in the United States and are considered pandemics. The 1918-1920 Spanish Flu claimed fifty million lives worldwide and 500,000 in the United States with 350,000 cases in Pennsylvania. The Asian flu caused about 1.5-2 million deaths worldwide with 70,000 deaths in the United States, peaking between September 1957 and March 1958. Approximately fifteen percent of the population of Pennsylvania was affected by Asian flu. The first cases of the Hong Kong Flu in the U.S. were detected in September of 1968 with deaths peaking between December, 1968 and January, 1969 (Global Security, 2009). The most recent flu outbreak to impact Indiana County was the 2009 outbreak of Swine flu. There were 10,940 cases reported in Pennsylvania resulting in seventy-eight deaths. Indiana County had twenty-five confirmed cases and no reported deaths (PA DOH, 2010).

Infectious Disease

West Nile Virus was first detected in Pennsylvania in the year 2000. The most annual reported cases of West Nile occurred in 2003, with 237 infected Pennsylvanians resulting in nine deaths. Since then, a comprehensive network has been developed in Pennsylvania to detect West Nile Virus, including trapping mosquitoes, collecting dead birds and monitoring horses, people, and in past years, sentinel chickens. West Nile Virus was detected in forty-one of sixty-seven counties in the Commonwealth in 2016, with sixteen human cases (PA West Nile Virus Control Program, 2017). West Nile Virus has been detected in Indiana County in eleven out of the last seventeen years with one hu-

man case (See *Table 25 - West Nile Reported Cases*). Cases of Lyme disease are consistently reported in Indiana County with a recent spike in cases throughout the Commonwealth – reported cases are summarized in *Table 26 - Lyme Disease Reported Cases*.

Table 25 - West Nile Reported Cases

West Nile Disease Reported Cases			
Year	**Positive Detection**	**Human Cases**	**Deaths**
2001			
2002	✓		
2003	✓		
2004	✓		
2005	✓		
2006	✓		
2007			
2008			
2009			
2010	✓		
2011	✓		
2012	✓		
2013			
2014			
2015	✓		
2016	✓	1	0
2017	✓		
Totals	**11**	**1**	**0**

Table 26 - Lyme Disease Reported Cases

Lyme Disease Reported Cases			
Year	**Number of Cases**	**Year**	**Number of Cases**
1980	0	1999	<4
1981	0	2000	1
1982	0	2001	3
1983	0	2002	3
1984	0	2003	5
1985	0	2004	2
1986	0	2005	1
1987	<4	2006	0
1988	<4	2007	4
1989	<4	2008	8
1990	<4	2009	18
1991	<4	2010	32
1992	<4	2011	82
1993	0	2012	99
1994	5	2013	210
1995	<4	2014	160
1996	8	2015	192
1997	<4	2016	227
1998	4	**Total**	**1064**

4.3.5.4 Future Occurrence

Pandemic & Epidemic

The precise timing of pandemic influenza is uncertain, but occurrences are most likely when the Influenza Type A virus makes a dramatic change, or antigenic shift, that results in a new or "novel" virus to which the population has no immunity. The emergence of a novel virus is the first step towards pandemic, and based on historical events, is expected to occur every eleven to forty-one years. In the event of an influenza pandemic, colleges and universities can plan an integral role in protecting the health and safety of university members as well as the greater community.

Infectious Disease

Instances of West Nile Virus have been decreasing due to extensive planning and eradication efforts, however the prospect of climate change could increase the prevalence of the virus. Some studies show increased insect activities during a similar rapid warming event in Earth's history (Curano et al., 2008). Other studies make projections that with the warming temperatures and lower annual precipitation that are expected with climate change, there will be an expansion of the suitable climate for mosquitos and West Nile Virus, increasing the risk that the disease poses (Harrigan et al., 2014).

Lyme disease has become increasingly prevalent in recent years and is expected to continue this trend. Researchers point to climate change among other factors that bolster tick populations (Templeton, 2017). Ticks often use mice as hosts, and warmer winters have allowed small rodents such as mice to flourish, and in turn tick populations flourish. Human activity has also eliminated natural predators (like coyote) of small rodents, compounding the problem. Humans suppressing natural fires may also increase the prevalence of ticks because fires in natural areas kills many insects including ticks, so fewer fires yields more ticks (Templeton, 2017).

4.3.5.5 Vulnerability Assessment

Pandemic & Epidemic

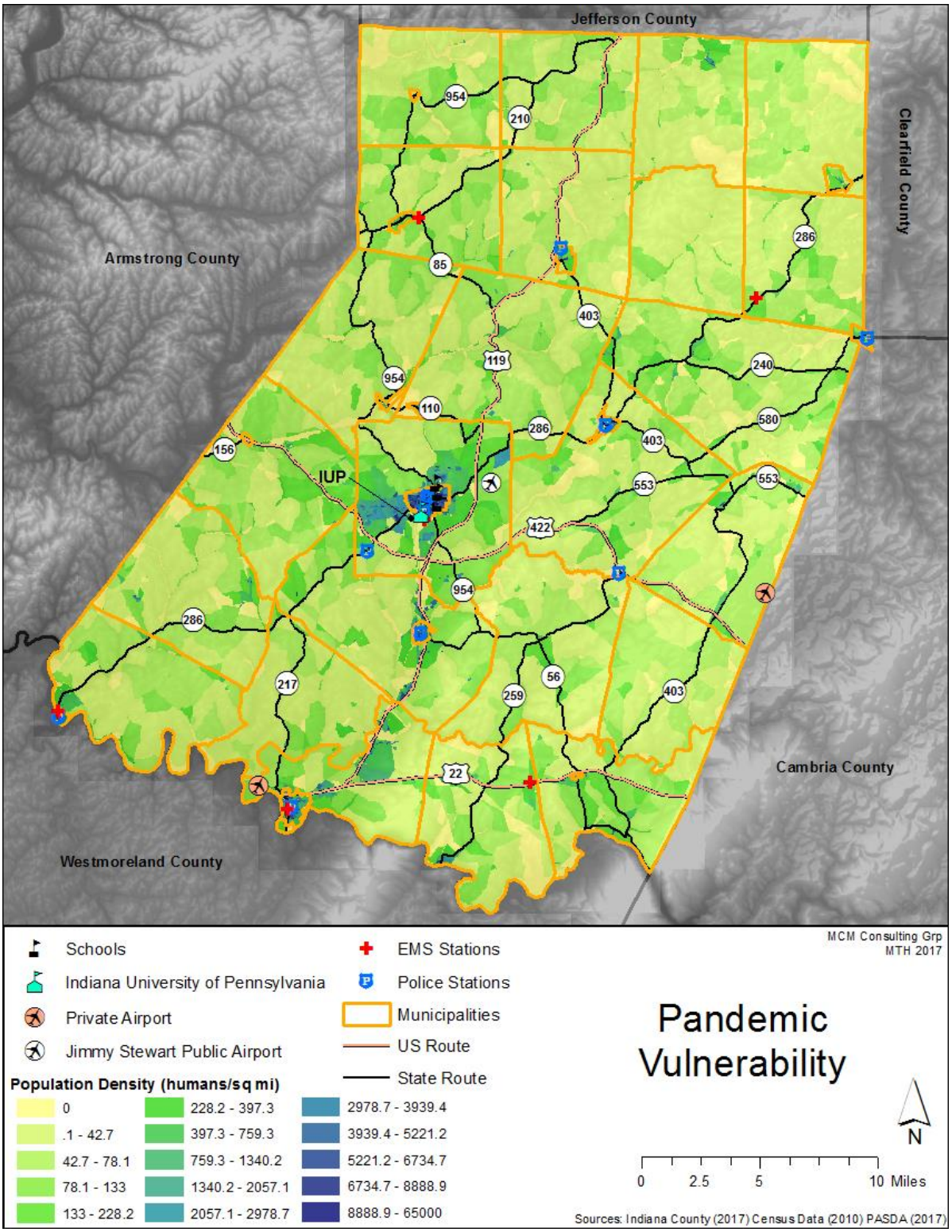
Certain groups are at higher risk of infectious disease infection, including people sixty-five years and older, children younger than five years, pregnant women, and people with certain chronic medical conditions. Such conditions include but are not limited to diabetes, heart disease, asthma, and kidney disease. Schools, convalescent centers, and other institutions serving those younger than five years old and older than sixty-five are locations that are conducive to faster transmission of influenza. More generally, areas with higher population densities and places where people gather can be hotspots where influenza can spread more rapidly. *Figure 14 - Pandemic & Infectious Disease Vulnerability* shows the population density according to 2010 census data and locations of schools, daycares and health care facilities, shedding light on areas where the disease may more readily spread. The highest concentration of elevated-transmission risk locations in the county (schools, retirement homes and senior centers) is found in the Indiana Borough area.

IUP has prepared a Pandemic Response Business Continuity Plan (2009) which addresses how the University will respond to an influenza pandemic event. The plan attempts to outline actions and responses that could help mitigate negative impacts of a pandemic, however there are many uncertainties and variables in influenza planning, so the plan is also robust and flexible and provides guidelines to control infections. The IUP Influenza Manager chairs the Pandemic Influenza Planning Group and assumes a major advisory and guidance role in coordinating and supporting campus planning and response activities before, during, and after a pandemic event.

During a public health emergency, the Pennsylvania Department of Health (PA DOH) opens emergency medicine centers called "Points of Dispensing (PODs)" to ensure that medicine, supplies, vaccines, and information reach Pennsylvania residents during a public health emergency. An Open POD is where the general public goes to receive free emergency medicine and supplies from public health officials. Dispensing of medications/vaccines is a core function of the Strategic National Stockpile plan, and preparedness of an Open POD. IUP is a PA DOH approved Open POD location. While Open PODs play an important role in epidemic response, the students, staff and faculty at IUP could be more vulnerable to pandemics as Open PODs attract a high density of infected peoples.

Persons who spend time in wooded areas are most at risk for contracting Lyme disease via tick bite. The application of tick repellent with DEET or permethrin is highly recommended. Residents should conduct thorough tick checks after spending time in woodland areas and keep on the lookout for the characteristic "bulls-eye" rash indicative of a tick bite infected with Lyme disease.

Figure 14 - Pandemic & Infectious Disease Vulnerability



4.3.6. Radon Exposure

4.3.6.1 Location and Extent

Airborne radon gas is radioactive, and is a step in the radioactive decay of uranium to radium. Radon is a noble gas, cannot be seen, and has no odor. Like other noble gasses, radon gas is very stable, so it does not easily combine with other chemicals. Two isotopes of radon are commonly found: 222Rn and 220Rn. The 220Rn isotope has a very short half-life, so it often only exists for 55 seconds, not long enough to pose a hazard to humans. The 222Rn isotope has a half-life of 3.8 days which is long enough to pose a threat to humans. Still, due to the relatively short half-life of 222Rn, it only exists in relatively close proximity to its radioactive parent, usually within tens of feet away. Radon is a carcinogen and when inhaled, it causes humans to develop lung cancer.

Radon was discovered as a significant source of natural radiation for humans in 1984 in the Reading Prong geologic province in Eastern Pennsylvania, when routine monitoring of employees leaving the, not yet active, Limerick nuclear power plant showed readings that a construction worker working on the plant frequently exceeded expected radiation levels despite the fact that the plant was not active. The Environmental Protection Agency (EPA) guidelines state that mitigation actions should be taken if levels exceed 4pCi/L in a home, and most uranium miners have a maximum exposure of 67 pCi/L. Subsequent testing of the Limerick power plant worker's home showed high radon levels of 2,500 pCi/L (pico Curies per Liter), triggering the Reading Prong to become the focus of the first large-scale radon scare.

Radon gas is considered ubiquitous and can be found in indoor and outdoor environments, however there is no known safe level of exposure to radon. For most people in Pennsylvania, the greatest risk of radon exposure is from within their home in rooms that are below, directly in contact with, or immediately above the ground. Sources of radon include: radon in the air from soil and rock beneath homes, radon dissolved in water from private wells and exsolved during water use (rare in Pennsylvania), and radon emanating from uranium-rich building materials such as concrete blocks or gypsum wallboard (also rare in Pennsylvania). Key factors in radon concentration in homes are the rates of air flow into and out of the house, the location of air inflow, and the radon content of air in the surrounding soil. Because of the flow dynamics of air inside of most houses, even a small rate of soil radon gas inflow can lead to elevated radon concentrations.

There are several factors that contribute to higher radon levels in soil gas:

- Proximity to elevated uranium rich deposits (>50ppm). Areas within a few hundred feet of such deposits are most at risk. Such deposits are rare in Pennsylvania.
- Some more common rocks have higher than average uranium content (5 to 50 ppm), and proximity to such rocks also increases the risk of radon exposure.

These rock types include black shales as well as granitic and felsic alkali igneous rocks. This is the most common source of high radon levels in Pennsylvania. The Reading Prong elevated radon levels come from Precambrian granitic gneisses. This is the most likely cause of high radon levels in Indiana County.

- Other soil and bedrock properties that facilitate radon mobility. The amount of pore space in the soil and its permeability – more porous soils will allow radon to travel more easily. Limestone-dolomite soils can also be predisposed to collect radon from radium resultant from weathering of iron oxide or clay surfaces. In some cases (like in State College, Centre County PA) even with underlying bedrock having normal uranium concentrations (.5 to 5 ppm), the vast majority of locations built on limestone-dolomite soils exceed radon concentrations of 4pCi/L, and many exceeded 20 pCi/L.

4.3.6.2 Range of Magnitude

According to EPA, about 21,000 lung cancer deaths each year in the U.S. are related to radon - it is the second leading cause of lung cancer after smoking and the number one cause of lung cancer among nonsmokers. There is no evidence that children are at a greater risk than adults. Radon causes lung cancer by continuing to radioactively decay after being inhaled, and turning into a daughter product (218Po, 214Pb, 214Bi) which may become attached to lung tissue and induce lung cancer due to their continued radioactive decay. *Table 27 - Radon Risk* (EPA, 2017) describes the relative risk to lung cancer that people experience depending on the radon level and their experience with smoking.

The EPA reports that the national average radon concentration of indoor air of homes is about 1.3 pCi/L, and they recommend that homes be fixed if the radon level is 4pCi/L or more. There is however no safe level of radon exposure, so the EPA also recommends to consider fixing a home if the radon level is between 2 pCi/L and 4 pCi/L.

Table 27 - Radon Risk

Radon Risk (EPA 2017)			
RADON LEVEL (pCi/L)	**IF 1,000 PEOPLE WERE EXPOSED TO THIS LEVEL OVER A LIFETIME…***	**RISK OF CANCER FROM RADON EXPOSURE COMPARES TO…*** **	**ACTION THRESHOLD**
SMOKERS			
20	About 260 people could get lung cancer	250 times the risk of drowning	Fix Structure
10	About 150 people could get lung cancer	200 times the risk of dying in a home fire	
8	About 120 people could get lung cancer	30 times the risk of dying in a fall	
4	About 62 people could get lung cancer	5 times the risk of dying in a car crash	

Radon Risk (EPA 2017)			
RADON LEVEL (pCi/L)	**IF 1,000 PEOPLE WERE EXPOSED TO THIS LEVEL OVER A LIFETIME…***	**RISK OF CANCER FROM RADON EXPOSURE COMPARES TO…*** **	**ACTION THRESHOLD**
2	About 32 people could get lung cancer	6 times the risk of dying from poison	Consider fixing structure between 2 and 4 pCi/L
1.3	About 20 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2pCi/L is difficult
0.4	About 3 people could get lung cancer	(Average outdoor radon level)	
NON-SMOKERS			
20	About 36 people could get lung cancer	35 times the risk of drowning	Fix Structure
10	About 18 people could get lung cancer	20 times the risk of dying in a home fire	
8	About 15 people could get lung cancer	4 times the risk of dying in a fall	
4	About 7 people could get lung cancer	The risk of dying in a car crash	
2	About 4 people could get lung cancer	The risk of dying from poison	Consider fixing structure between 2 and 4 pCi/L
1.3	About 2 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2pCi/L is difficult
0.4	-	(Average outdoor radon level)	
*Note: Risk may be lower for former smokers * Lifetime risk of lung cancer deaths from EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003). ** Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.*			

4.3.6.3 Past Occurrence

The EPA estimates that the average indoor radon concentration in Pennsylvania basements is about 7.1 pCi/L (3.6 pCi/L on the first floor), well above their estimated national average of 1.3 pCi/L. Data on abundance and distribution of radon as it impacts individual houses in Indiana County and Pennsylvania at large is incomplete and biased towards higher radon concentrations – most data is based on test results submitted by concerned homeowners who suspect they might be at risk for high radon levels. Results are skewed to over-represent homes that have high radon levels, and under-represent homes with low radon levels. That being said, any homes with high radon levels are problematic, and there are many reported homes in Indiana County with elevated radon concentrations.

The Pennsylvania Department of Environmental Protection (PA DEP) provides information for homeowners about how to test for radon in their homes, and when they receive a test result over 4 pCi/L, the PA DEP Bureau of Radiation Protection works to

help homeowners repair the home and mitigate the hazard. The PA DEP records all the tests they receive and categorize them in a searchable database by zip code. *Table 28 - Basement Radon Level Test Results* shows there are three zip codes in Indiana County where sufficient tests were reported for the PA DEP to report their findings. All reported zip codes in Indiana County have average basement Radon levels above the suggested EPA action level of 4 pCi/L.

Table 28 - Basement Radon Level Test Results

Basement Radon Level Test Results					
Zip Code	**Municipalities**	**Location**	**Number of Tests**	**Max Result pCi/L**	**Avg Result pCi/L**
15681	Saltsburg Borough, Parts of Conemaugh Township, Young Township	Basement	101	87.2	10.8
15701	Indiana Borough (IUP Indiana Campus), White Township, Creekside Borough, Parts of Rayne Township, Cherryhill Township, Brush Valley Township, Center Township, Armstrong Township, Washington Township	Basement	1851	102.4	6.8
		First Floor	130	24.8	3.3
15714	Parts of Pine Township, Green Township	Basement	115	348.3	7.1
15717	Blairsville Borough, Blacklick Township, Burrell Township, Parts of West Wheatfield Township, Brush Valley Township, Center Township	Basement	220	74.1	6.2
15747	Parts of South Mahoning Township, Rayne Township, Washington Township	Basement	59	79.2	9.6
15748	Homer City Borough, Parts of Young Township, Center Township, Brush Valley Township, Buffington Township	Basement	132	76	7.2
15759	Marion Center Borough, Parts of East Mahoning Township, Grant Township, Rayne Township, South Mahoning Township, Montgomery Township	Basement	44	113	16.1
15765	Parts of Cherry Hill Township, Pine Township	Basement	45	187	12.6
15767	Parts of North Mahoning Township, Canoe Township, Banks Township	Basement	195	121.3	11.9
		First Floor	39	33.2	4
15774	Shelocta Borough, Parts of Armstrong Township, Young Township	Basement	40	90.1	10.4

Basement Radon Level Test Results					
Zip Code	**Municipalities**	**Location**	**Number of Tests**	**Max Result pCi/L**	**Avg Result pCi/L**
15906	Part of East Wheatfield Township	Basement	246	29.9	4.5
15944	Parts of Wheatfield Township, East Wheatfield Township	Basement	47	37.9	4.7
15954	Part of East Wheatfield Township	Basement	33	143.1	13.3

4.3.6.4 Future Occurrence

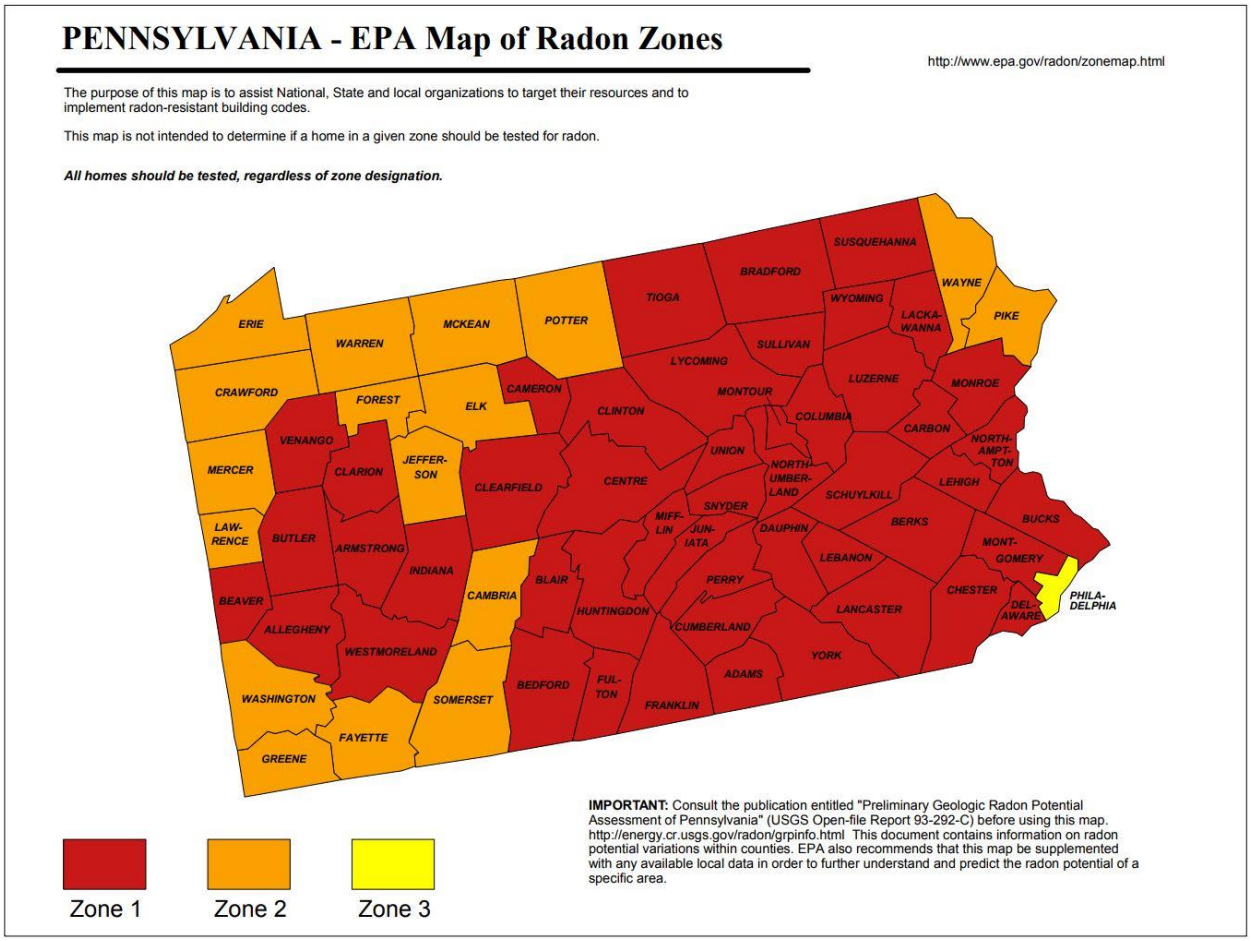
Radon exposure is inevitable given the geologic and geomorphic conditions in Indiana County. The EPA and USGS have mapped radon potential in the US to help target resources and assist local governments in determining if radon-resistant features are applicable for new construction. The designations are broken down in three (3) zones and are assigned by county, as shown in *Table 27 - Radon Risk*. Each zone reflects the average short-term measurement of radon that can be expected in a building without radon controls. Indiana County is located within Zone 1, with a high potential for radon.

1. Zone 1 has the highest potential and readings can be expected to exceed the 4 pCi/L recommended limit.
2. Zone 2 has a moderate potential for radon with levels expected to be between 2 and 4 pCi/L and
3. Zone 3 has a low potential with levels expected to be less than 2 pCi/L.

4.3.6.5 Vulnerability Assessment

Indiana County is in the EPA radon hazard zone 1, meaning there is a high risk of radon exposure. Older homes that have crawl spaces or unfinished basements are more vulnerable to having high radon levels. Average basement radon levels for homes who reported their results to the PA DEP are consistently above the EPA action level of 4 piC/L. Homeowners across Indiana County should test radon levels in their homes in order to determine their level of radon exposure. The EPA estimates that an average radon mitigation system costs approximately $1,200. The PA DEP Bureau of Radiation Protection provide short and long-term tests to determine radon levels, as well as information on how to mitigate high levels of radon in a building.

Figure 15 - Radon Zones



4.3.7. Subsidence & Landslide

4.3.7.1 Location and Extent

Landslides

Landslides are described as downward and outward movement of slope-forming soil, rock and vegetation reactive to the force of gravity. Rockfalls, rockslides, rock topples, block glides, debris flows, mudflows and mudslides are all forms of landslides. Natural causes of landslides include heavy rain, rapid snow melt, erosion, earthquakes and changes in groundwater levels. Landslides occur most frequently in areas with moderate to steep slopes and high precipitation, and most often slope failures happen during or after periods of sustained above average precipitation or snowmelt events. Human activity can increase the likelihood of landslides by reducing vegetation cover, altering the natural slope gradient or increasing the soil water content. One location where this type of human activity is common are areas that were excavated along highways and other roadways.

For the most part, Indiana County falls into a high susceptibility and moderate incidence risk area for landslides. A small sliver in the southwest corner of the county falls into the zone for high incidence of landslides, which is the highest hazard zone for landslides (see *No two subsidence areas or* sinkholes are exactly alike. Variations in size and shape, time period under which they occur (i.e. gradually or abruptly), and their proximity to development ultimately determines the magnitude of damage incurred. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs.

Problems related to subsidence include the disruption of utility services and damages to private and public property including buildings, roads, and underground infrastructure. Incidents of subsidence throughout the coal regions over the years have affected houses, garages, and trees that have been swallowed up by subsidence holes. Lengths of local streets and highways, and countless building foundations have been damaged.

The worst-case scenario in Indiana County would result from long-term subsidence or sinkhole formation from abandoned coal mines that were not recognized and mitigation measures were not implemented. In this case fractures or complete collapse of building foundations and roadways may result.

Figure 16 - Landslide Susceptibility). Most landslides in Indiana County are slow moving and more often cause property damage rather than human injury. These landslides are due to geologic properties of the area that make it easily prone to erosion. In Western Pennsylvania, these conditions include many bedrocks that consist of softer shale and clay stones which can easily erode, and the many hills and valleys which increase the gravitational potential for erosion.

Subsidence

Subsidence refers to gradual caving in, sinking or collapse of an area of land. Many areas of Pennsylvania have bedrock conditions that lend themselves to subsidence events. Carbonate rock like limestone and dolomite is easily eroded and dissolved by water. If an area has carbonate bedrock, it can be susceptible to subsidence because groundwater may erode and dissolve the carbonate rock, leading to the creation of caves, swales, sinkholes and other forms of subsidence. These types of features are generally referred to as karst topography. Indiana County does not have a significant amount of naturally occurring karst topography – the main threat of subsidence in the County comes from abandoned coal mines and other mined areas (e.g. natural gas, water, oil). Poor engineering practices used at the time of withdrawal or progressive degradation in geological stability can increase the risk of subsidence. Approximately 10 to 15 miles outside of IUP's Indiana Campus are three active mines and pockets of underground abandoned mines.

4.3.7.2 Range and Magnitude

Landslides

Landslides can cause damage to utilities as well as transportation routes, resulting in road closure or travel delays. Fortunately, deaths and injuries due to landslides are rare in Pennsylvania and Indiana County. Most reported deaths due to landslides have occurred when rockfalls or other slides along highways have involved vehicles. Storm-induced debris flows can also sometimes cause death and injury. As residential and recreational development increases on and near steep mountain slopes, the hazard from these rapid events will also increase. Most Pennsylvania landslides are moderate to slow moving and damage property rather than people.

The Pennsylvania Department of Transportation and large municipalities incur substantial costs due to landslide damage and to extra construction costs for new roads in known landslide-prone areas. A 1991 estimate showed an average of $10 million per year is spent on landslide repair contracts across the Commonwealth and a similar amount is spent on mitigation costs for grading projects. A number of highway sites in Pennsylvania are in need of permanent repair at estimated costs of $300,000 to $2 million each (DCNR, 2010). The USGS identifies the vast majority of Indiana County as falling into a highly susceptibility and moderate incidence zone for landslides as 1.5 – 15% of the county is involved in land sliding, but it is highly susceptible to sliding (*No two subsidence areas or* sinkholes are exactly alike. Variations in size and shape, time period under which they occur (i.e. gradually or abruptly), and their proximity to development ultimately determines the magnitude of damage incurred. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and

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The worst-case scenario in Indiana County would result from long-term subsidence or sinkhole formation from abandoned coal mines that were not recognized and mitigation measures were not implemented. In this case fractures or complete collapse of building foundations and roadways may result.

Figure 16 - Landslide Susceptibility. These areas are geologically prone to giving way after significant precipitation events.

Subsidence

No two subsidence areas or sinkholes are exactly alike. Variations in size and shape, time period under which they occur (i.e. gradually or abruptly), and their proximity to development ultimately determines the magnitude of damage incurred. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs.

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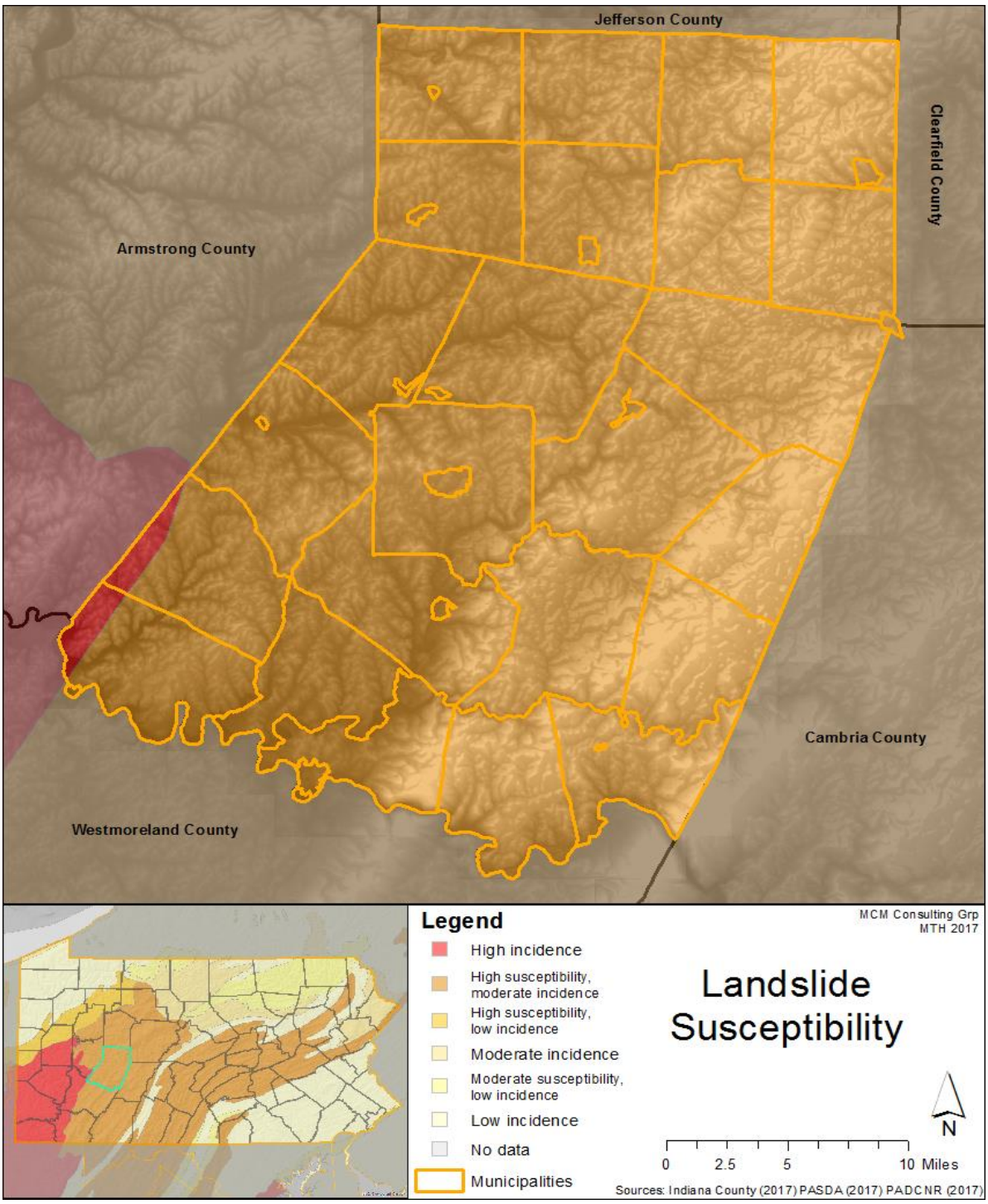
Figure 16 - Landslide Susceptibility



4.3.7.3 Past Occurrence

Landslides

No comprehensive list of landslide incidents in Indiana County is available, as there is no formal reporting system in place. PennDOT and municipal maintenance departments are responsible for slides that inhibit the flow of traffic or damage to roads and bridges, but they can generally only repair the road itself and right-of-way areas. Debris avalanches occurred during heavy rainfall events such as hurricane Diane in 1955 and tropical storm Agnes in 1972 (DCNR, 2001).

Subsidence

The DCNR provides an online Sinkhole Inventory Database, which lists a total of 2,665 identified natural karst topographic features in Pennsylvania as of 2009. None of these reported features are located in Indiana County or the surrounding counties (DCNR, 2009). Indiana County contains 275 active coal mines and the Abandoned Mined Land Inventory has a recorded 806 problem locations in Indiana County from previous mining activity. A sinkhole in Blairsville Borough was reported to the Knowledge Center on March 8th, 2016.

4.3.7.4 Future Occurrence

Landslides

It is likely that Indiana County will experience landslides and their impacts in the future. Mismanaged development in steeply sloped areas would increase the frequency of occurrence of landslides. Road cuts are the most common development that puts an area at a heightened probability of a slide. The PA Department of Environmental Protection has an Erosion and Sediment (E&S) program that sets requirements for development projects of a certain scale that are intended to mitigate erosion, which are similar practices to prevent causing landslides.

Subsidence

Based on the number of abandoned mined sites in Indiana County, the annual occurrence of subsidence and sinkhole events in the county where mining occurred is considered likely. A substantial amount of Indiana County has been undermined for coal, and the Indiana University of Pennsylvania campus is in an area where undermining is present. Existing University assets are at a fairly low risk from subsidence, but future expansion and development locations near active or abandoned mines should be evaluated.

Figure 18 - Subsidence & AML Locations shows data as of October 2017 from the PA DEP and the Abandoned Mine Land Inventory System and helps shed light on areas in the County that have undergone past mining, as well as where reclamation action has been taken. It's important to note that most reclamation actions do not necessarily pertain

directly to the threat of subsidence, but can involve actions such as reclaiming land where old mining buildings were, dealing with acid mine drainage, or closing off openings to old mine shafts. As abandoned mines age, they are more likely to fail and result in subsidence due to the aging timber supports in the mine shafts, and increasing weight and pressure placed upon them from newly constructed buildings and traffic movement. All AML locations can be seen in *Figure 18 - Subsidence & AML Locations*.

4.3.7.5 Vulnerability Assessment

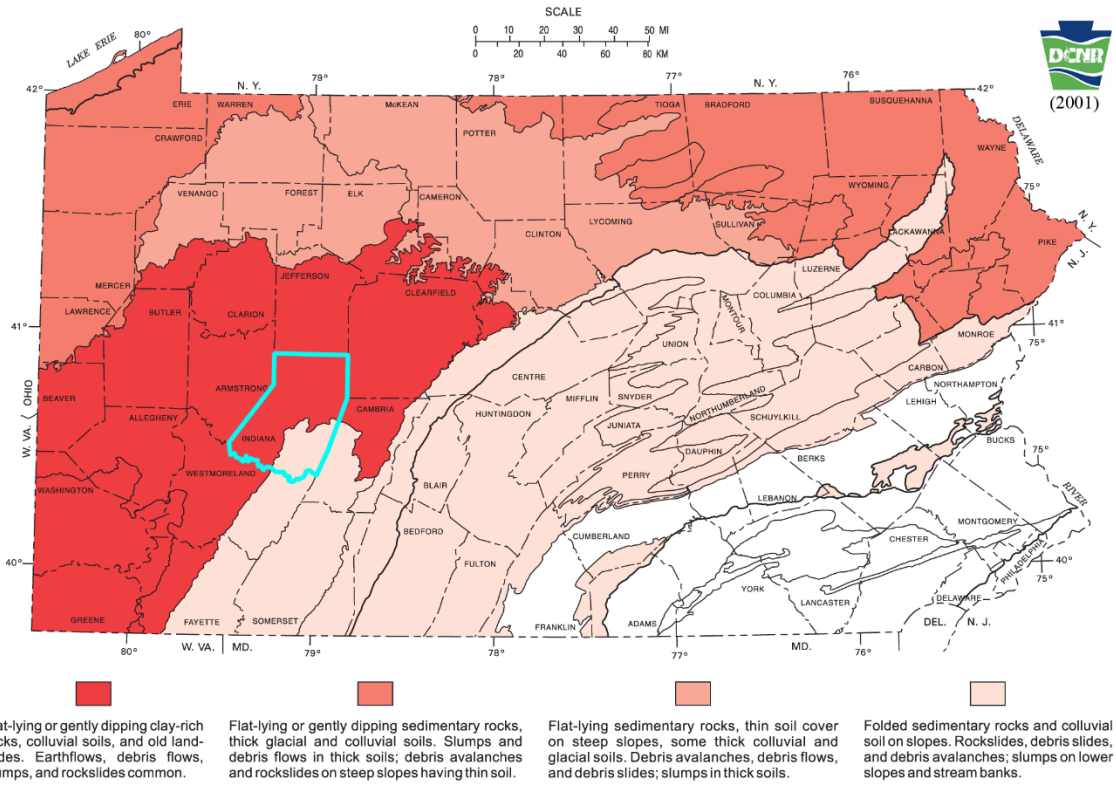
Landslides

Landslides are often precipitated by other natural hazards such as earthquakes or floods, and a serious landslide can cause millions of dollars in damages. Continued enforcement of floodplain management and proper road and building construction helps to mitigate the threat of landslides. Floodplain management is important where mining has occurred within close proximity to watercourses and associated flat-lying areas. Surface water may permeate into areas that still have open fractures and the build-up of surface water in fractures could lead to unexpected flood events.

Indiana County has 1.5 – 15 % land area that is highly prone to landslides. Unfortunately, a comprehensive database of land highly prone to erosion and landslides is not presently available for Indiana County. Construction projects in Indiana County should be wary of erosion and the potential for landslides. An example of a mismanaged construction project that resulted in a landslide comes from an incident in Allegheny County in 1951: excavation of a small section of soil at the base of a slope caused a large, 500 foot wide, several hundred food long landslide (Pittsburgh Geological Society, 2010). There are several general factors that can be indicators of a landslide prone area:

- On or close to steep hills
- Areas of steep road cuts or excavations
- Steep areas where surface run-off is channeled
- Fan shaped areas of sediment and rock accumulations
- Evidence of past sliding such as tilted utility lines, tilted trees, cracks in the ground and irregularly surfaced ground.

Figure 17 - Pennsylvania Distribution Types



The distribution of types of landslides most likely to occur in different geologic settings in Pennsylvania. Stream-bank slumps, soil creep, and rockfall/rockslide combinations on cut slopes can occur throughout Pennsylvania.

Subsidence

Abandoned mine sites are susceptible to subsidence events, and most mining activity which is now abandoned in Indiana County has occurred around bedrock from the Allegheny Formation and the Monongahela Group, though mining activity is not strictly limited to those locations (see *Figure 18 - Subsidence & AML Locations*). Mine Subsidence Insurance is available through the Pennsylvania Department of Environmental Protection (PA DEP). If citizens are aware of areas of Indiana County which have been mined, the PA DEP Mine Subsidence Insurance department can be contacted at 1-800-922-1678 to have a site specific request conducted. The Abandoned Mine Land Inventory System describes vulnerable areas with two different levels of vulnerability: AML Problem Areas encompass the entire area where past mining occurred as well as the adjoining areas, and AML High Hazard Areas are the specific locations most impacted by past mining efforts (High Hazard Areas are a subset of the AML Problem Areas). There are three critical facilities within an AML Problem Area in Indiana County which are summarized in *Table 29 - AML Subsidence Vulnerable Critical Facilities*. *Table 29 - AML Subsidence Vulnerable Critical Facilities* summarizes all addressable structures found within the AML impacted regions within Indiana County. Municipalities that are not listed did

not contain any vulnerable addressable structures. *Figure 18 - Subsidence & AML Locations* shows the locations of the AML sites and abandoned mines, as well as current coal mining operations.

Table 29 - AML Subsidence Vulnerable Critical Facilities

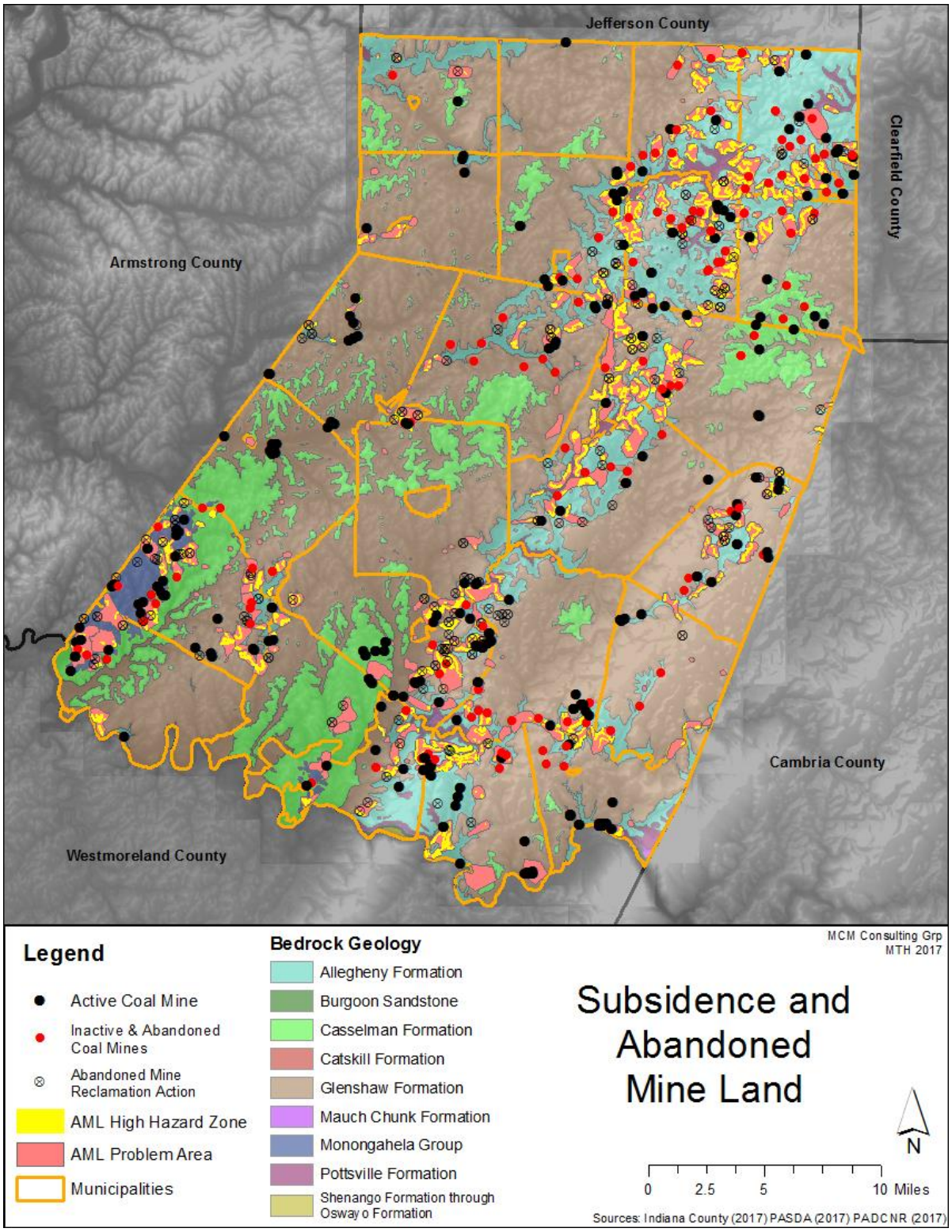
AML Subsidence Vulnerable Critical Facilities				
AML Site Type	**Type**	**Name**	**Municipality**	**Address**
AML Problem Area	Fire Station	Commodore Fire Station	Green Township	410 Musser St
AML Problem Area	Fire Station	Coal/McIntyre Fire Station	Young Township	2049 Coal Run Rd
AML Problem Area	Fire Station	Plumville Fire station	Plumville Borough	109 Indiana St
AML Problem Area	SARA Title III Facility	Conemaugh Power Plant	West Wheatfield Township	1442 Power Plant Rd
AML Problem Area	SARA Title III Facility	Homer City Power Plant	Center Township	1750 Power Plant Rd
AML Problem Area	SARA Title III Facility	Paw Two Lick Creek Plant	White Township	1034 Waterworks Rd
AML Problem Area	SARA Title III Facility	Central Ind County Water Authority	Center Township	15 Tide Rd

Table 30 - AML Subsidence Vulnerable Addressable Structures

AML Subsidence Vulnerable Addressable Structures		
Municipality	**AML Problem Area**	**AML High Hazard Area**
Armagh Borough	0	0
Armstrong Township	3	0
Banks Township	113	11
Black Lick Township	48	0
Blairsville Borough	99	5
Brush Valley Township	19	2
Buffington Township	27	0
Burrell Township	302	10
Canoe Township	277	9
Center Township	546	9
Cherry Tree Borough	0	0
Cherryhill Township	144	10
Clymer Borough	34	0
Conemaugh Township	151	4
Creekside Borough	52	0
East Mahoning Township	47	0
East Wheatfield Township	41	0
Ernest Borough	51	0

AML Subsidence Vulnerable Addressable Structures		
Municipality	**AML Problem Area**	**AML High Hazard Area**
Glen Campbell Borough	7	0
Grant Township	103	7
Green Township	609	20
Homer City Borough	68	0
Indiana Borough	0	0
Marion Center Borough	20	1
Montgomery Township	41	2
North Mahoning Township		4
Pine Township	138	5
Plumville Borough	139	8
Rayne Township	129	0
Saltsburgh Borough	0	0
Shelocta Borough	102	0
Smicksburg Borough	0	0
South Mahoning Township	59	0
Washington Township	13	0
West Mahoning Township	8	0
West Wheatfield Township	268	50
White Township	25	0
Young Township	360	4
Total	**4043**	**161**

Figure 18 - Subsidence & AML Locations



4.3.8. Tornados and Windstorms

4.3.8.1 Location and Extent

Tornado

A tornado, a violently rotating funnel-like vortex, is an extraordinary feature of severe thunderstorms. Tornadoes can also result from hurricanes or tropical storms. When cool, dry air intersects and overrides a layer of warm, moist air, forcing the warm air to rise rapidly generate tornadoes. While the extent of tornado damage is usually localized, the extreme winds of this vortex can be among the most destructive on earth when they move through populated, developed areas.

According to the National Weather Service, tornado wind speeds can range between 30 to more than 300 miles per hour. Tornadoes can occur at any time during the day or night but are most frequent during late afternoon into early evening, the warmest hours of the day. May to August is the most likely time for tornadoes to occur in Pennsylvania.

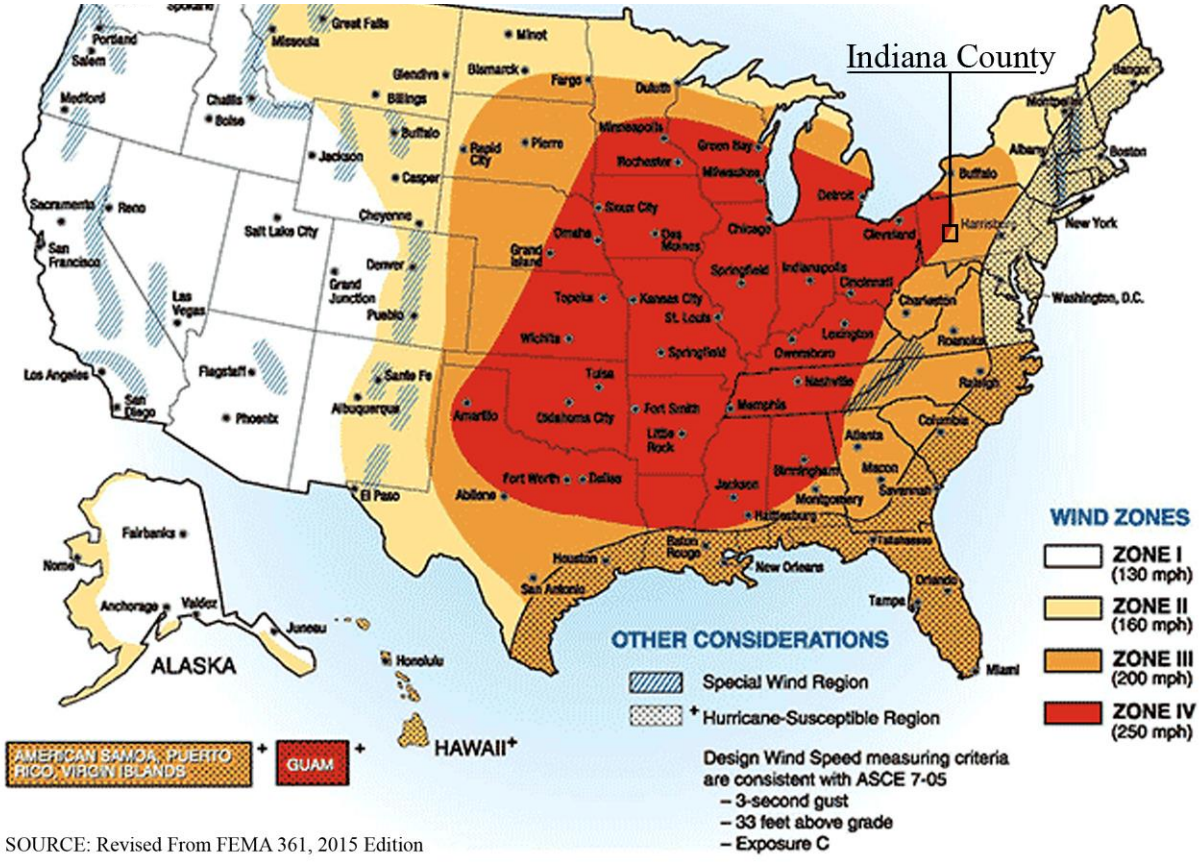
Destruction ranges from minor to catastrophic depending on the intensity, size, and duration of the storm. Structures made of light materials such as mobile homes are most susceptible to damage. Each year an average of approximately 1,300 tornadoes are reported nationwide with Pennsylvania averaging sixteen tornadoes per year.

Tornadoes are considered a county-wide hazard because their path is unpredictable and can affect everyone within the county.

Windstorm

Severe wind can occur during severe thunderstorms, winter storms, coastal storms, or tornadoes. Wind storms are generally defined as sustained wind speeds of forty mph or greater lasting for one hour or longer, or winds of fifty-eight mph or greater for any duration. Straight-line winds, such as a downburst, have the potential to cause wind gusts that exceed one hundred miles per hour. Downburst are subdivided into micro-bursts and macrobursts. A microburst is a very-localized column of sinking air, capable of producing damaging opposing and straight-line winds at the surface. A microburst is larger than a microburst, and isn't as strong; although it can produce winds as high as 130 miles per hour. A wind shear is usually found when a violent weather front is moving through. *Figure 19 - US Wind Zones* shows that most of Indiana County is located in the Zone III wind zone, with a portion of the western side of the county in Zone IV.

Figure 19 - US Wind Zones



4.3.8.2 Range of Magnitude

Tornadoes

Tornadoes are measured using the Enhanced Fujita Scale, also known as the "EF-Scale". The EF-Scale is the definitive metric for estimating wind speeds within tornadoes based upon the damage done to buildings and structures. *Table 31 - Enhanced Fujita Scale* provides a summary of the EF-Scale and associated damage(s).

Table 31 - Enhanced Fujita Scale

Enhanced Fujita Scale		
Tornado EF Number	**Wind Speed- 3 second gusts (MPH)**	**Expected Damage**
EF0	**65-85**	**Minor damage:** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with

Enhanced Fujita Scale		
Tornado EF Number	**Wind Speed- 3 second gusts (MPH)**	**Expected Damage**
		no reported damage (i.e., those that remain in open fields) are always rated EF0).
EF1	**86-110**	**Moderate damage:** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken; moving autos pushed off roads.
EF2	**111-135**	**Considerable damage:** Roofs torn off well-constructed houses; foundations or frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	**136-165**	**Severe damage:** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	**166-200**	**Devastating damage:** Well-constructed houses and whole frame houses completely leveled; cars thrown and large missiles generated.
EF5	**Over 200**	**Extreme damage:** Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100 yards; trees debarked; steel reinforced concrete structures are badly damaged; high-rise buildings have significant structural deformation.

Widespread environmental impacts are rare, since tornado events are typically localized. However, where these events occur, severe damage to plant species is likely. This includes loss of trees and an increased threat of wildfire in areas where dead trees are not removed. Hazardous materials facilities should meet design requirements for the wind zones, identified in *Figure 19 - US Wind Zones,* in order to prevent release of hazardous materials into the environment.

A worst-case scenario for tornadoes occurred in July of 1996, when an F2 tornado (prior to the EF scale ratings – wind speeds between an EF 2 and an EF 3) touched down in Jefferson County, then grew to be as wide as 200 feet as it traveled into Indiana County. One mobile home was destroyed and its occupants injured, and another mobile home damaged. The roof was lifted off a barn and severely damaged a thick forested region.

Overall, the storm caused about $200,000 in property damage and $10,000 in crop damage (NCDC, 2011).

4.3.8.3 Past Occurrence

Tornadoes

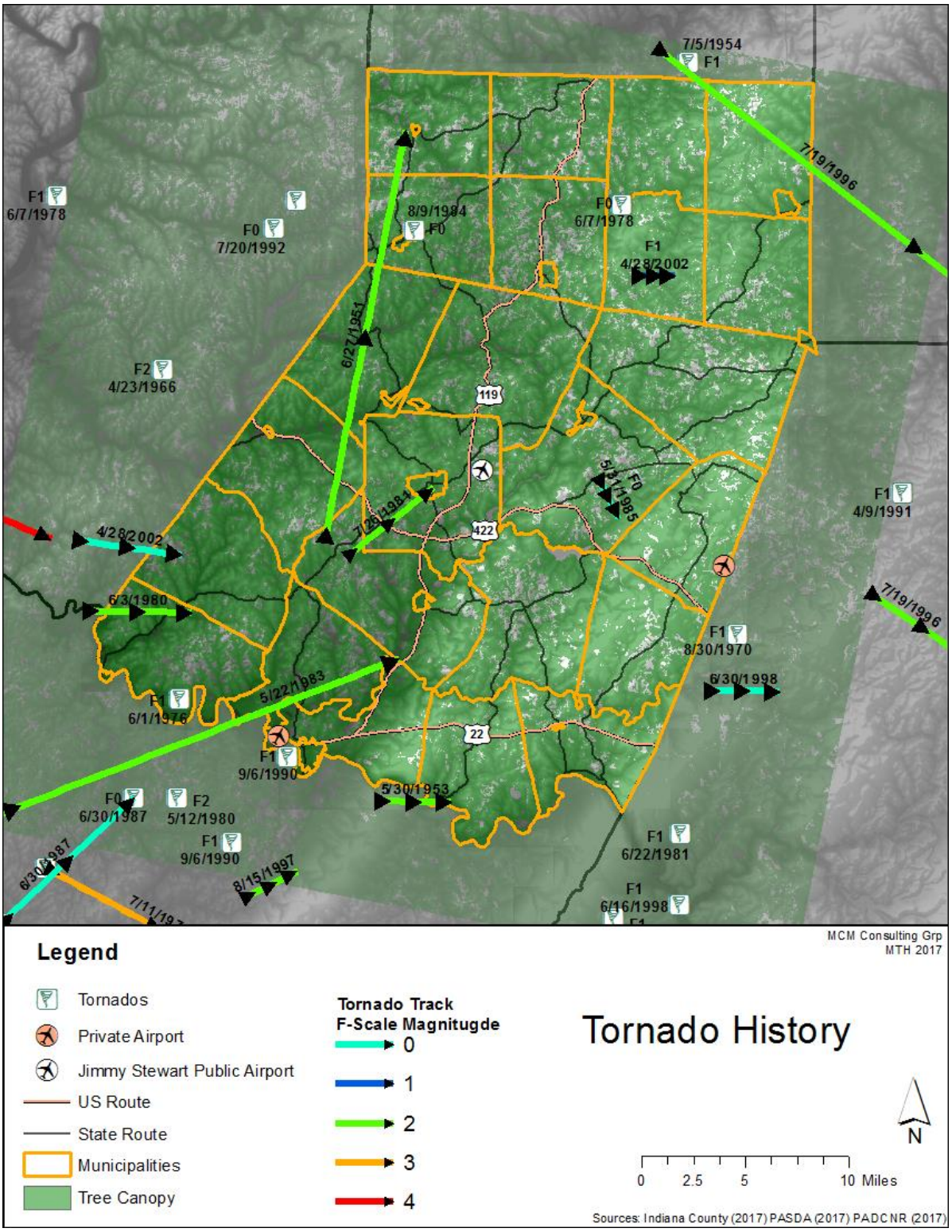
Tornadoes have occurred in all seasons and all regions of Pennsylvania, but the northern, western, and southeastern portions of the Commonwealth have been struck more frequently. *Table 32 - Indiana County Tornado Events* lists tornado events in Indiana County between 1950 and 2002 (NCDC, 2011). The associated Fujita or Enhanced Fujita Tornado Scale is also shown. A map showing the approximate locations of previous events is included in *Figure 20 - Indiana County Tornado History*. There have not been any fatalities reported with any of the tornado events in Indiana County.

Table 32 - Indiana County Tornado Events

Previous Tornado Events in Indiana County						
Location	**Date**	**Estimated Length**	**Estimated Width**	**Injuries**	**Magnitude**	**Estimated property damage ($)**
Countywide	06/27/51	19.70 miles	10 yards	0	F2	500 to 5,000
Countywide	05/30/53	1.90 miles	33 yards	0	F2	25,000
Countywide	07/05/54	0.10 miles	10 yards	0	F1	N/A
Countywide	06/07/78	0.10 miles	10 yards	0	F0	N/A
Countywide	06/03/80	4.90 miles	33 yards	0	F2	250,000
Countywide	07/26/81	0/10 miles	10 yards	0	F2	250,000
Countywide	05/22/83	6.00 miles	200 yards	10	F2	2,500,000
Countywide	08/09/84	0.10 miles	10 yards	0	F0	2,500
Countywide	05/31/85	6.00 miles	27 yards	0	F0	N/A
Countywide	07/19/96	27.40 miles	200 yards	6	F2	N/A
Iselin	04/28/02	1.00 mile	150 yards	0	F0	15,000
Indiana	04/28/02	5.00 miles	250 yards	1	F2	750,000
Deckers Pt.	04/28/02	2.00 miles	100 yards	1	F1	250,000

An F0 tornado occurred on July 19, 1996 in Punxsutawney, Jefferson County, that had the potential to affect the Indiana University of Pennsylvania Punxsutawney campus. This tornado reported approximately $1,000.00 in damages, with no injuries or deaths related to the incident.

Figure 20 - Indiana County Tornado History



Windstorms

Since 1950, high wind events have been recorded for Indiana County. The range of damage estimates from all wind events falls within the range of $1,500 - $600,000, with the highest estimates reflecting countywide losses. The highest wind speed recorded in the county occurred as a result of thunderstorm winds that took place on March 2, 1955; producing winds measuring ninety-two knots. A list of events with winds greater than fifty knots that have occurred since 1950 is shown in *Table 33 - Indiana County Windstorm Events (NOAA NCEI, 2017).*

Table 33 - Indiana County Windstorm Events

Previous Windstorm Events in Indiana County			
Location	**Date**	**Estimated Wind Speed (knots)**	**Estimated property damage ($)**
Countywide	03/22/55	92	Unknown
Countywide	07/24/65	55	Unknown
Indiana	04/08/98	53	Unknown
Shelocta	04/08/98	53	Unknown
Armagh	04/08/98	53	Unknown
Blairsville	05/29/98	65	3,000
Plumville	09/27/98	52	Unknown
Countywide	01/18/99	60	85,000
Clymer	07/09/99	53	3,000
Countywide	08/13/99	74	Unknown
Countywide	09/20/00	63	2,000
Countywide	12/12/00	57	600,000
Countywide	12/17/00	52	2,000
Countywide	02/10/01	56	20,000
Countywide	02/25/01	52	65,000
Countywide	02/01/02	55	50,000
Countywide	03/08/03	55	Unknown
Robinson	04/05/03	55	17,000
Marchand	05/10/03	55	2,000
Robinson	05/10/03	55	1,000
West Lebanon	06/08/03	55	5,000
Indiana	06/08/03	55	2,000
Clymer	08/26/03	52	30,000
Countywide	09/19/03	52	8,000
Indiana	10/14/03	52	5,000
Countywide	11/13/03	52	8,000
Clyde	05/25/04	52	3,000
Clarksburg	06/14/04	52	2,000

Previous Windstorm Events in Indiana County			
Location	**Date**	**Estimated Wind Speed (knots)**	**Estimated property damage ($)**
Armagh	08/04/04	54	5,000
Boltz	08/04/04	54	20,000
Countywide	12/01/04	54	6,000
Smicksburg	06/27/06	57	35,000
Marion Center	08/23/06	53	Unknown
Countywide	12/01/06	55	25,000
Blairsville	12/01/06	55	50,000
Penn Run	02/11/09	70	100,000
Boltz	07/26/12	64	Unknown
Plumville	06/11/15	61	10,000
Countywide	01/12/17	54	50,000
Purchase Line	05/01/17	52	Unknown

Also during the time frame of 1950 to 2017 there were 125 events with winds measuring fifty knots. Most of these were associated with thunderstorms *(NOAA NCEI, 2017)*.

4.3.8.4 Future Occurrence

Tornado

The highest probability of a tornado occurring exists between the months of May, June, and July, however, a moderate number of tornadoes have occurred in the months of March, April, August, and September. According to the National Weather Service, Pennsylvania has an annual average of ten tornadoes. The probability for Indiana County to be affected by a tornado can be considered possible as defined by the Risk Factor Methodology probability criteria (see *Table 48 - Risk Factor Assessment*).

Windstorm

Windstorms can occur with multiple weather patterns, and at any time of the year. The probability for Indiana County to be affected by a windstorm can be considered possible as defined by the Risk Factor Methodology probability criteria (see *Table 48 - Risk Factor Assessment*).

4.3.8.5 Vulnerability Assessment

High winds and tornadoes can affect the entire county equally. The age, condition, and building quality of homes can make structures more susceptible to damage from high winds. While the frequency of windstorms and minor tornadoes is expected to remain

relatively constant, vulnerability increases in more densely developed areas. It is important to identify specific critical facilities and assets that are most vulnerable to the high wind and/or tornado hazard.

4.3.9. Winter Storms

4.3.9.1 Location and Extent

Winter storms are regional events. Every county in the Commonwealth, including Indiana, is subject to severe winter storms.

Winter storms consist of cold temperatures and heavy snow or ice. Because winter storms are regular, annual occurrences in Pennsylvania, they are considered hazards only when they result in damage to specific structures and/or overwhelm local capabilities to handle disruptions to traffic, communications and electric power.

4.3.9.2 Range of Magnitude

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

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

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

Any of the above events can result in the closing of major or secondary roads, particularly in rural locations, stranded motorists, transportation accidents, loss of utility services, and depletion of oil heating supplies. Snow and ice buildup on flat or low-pitched roofs can cause collapse. Environmental impacts often include damage to shrubbery and trees due to heavy snow loading, ice build-up and/or high winds which can break limbs or even bring down large trees. Gradual melting of snow and ice provides excellent groundwater recharge. However, high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

The mean annual snowfall in Indiana County is 40 to 50 inches in the western part of the county and 50 to 60 inches in the eastern section. Fifteen of the thirty-six Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations affecting Indiana County have been in response to hazard events related to winter storms (see *Table 7 - Presidential & Gubernatorial Disaster Declarations*). Winter storm events, including those associated with Disaster Declarations, are listed in *Table 34 - Indiana County Winter Storms*.

As a recent and possible worst-case scenario, in 2010 Indiana Borough received 19.5" of snow between February 5th and 6th, (the fourth-deepest snow event in Western Pennsylvania), then received 4.5" more from a secondary storm over February 9th 10th. The snowfall crippled most forms of transportation across Western Pennsylvania and cut power to tens of thousands of homes, leaving people cold and stranded. Later in February, another storm hit the region, at the time leaving Indiana County with 36.5 inches of snow fall for the month and 65.7 inches of snow fall to that point throughout the winter season (according to measurements at the Pennsylvania American Water Co.'s Two Lick filter plant). The cost alone of snow removal had impacted numerous communities throughout the county. Total impact estimates for Indiana County as a result of emergency protective measures taken during this storm event was approximately $330,000 (FEMA-1898-DR).

4.3.9.3 Past Occurrence

The Commonwealth of Pennsylvania has a long history of severe winter weather. In the winter of 1993-4, the state was hit by a series of protracted winter storms. The severity and nature of these storms combined with accompanying record-breaking frigid temperatures posed a major threat to the lives, safety and well-being of Commonwealth residents and caused major disruptions to the activities of schools, businesses, hospitals, and nursing homes.

As mentioned above, the first of these devastating winter storms occurred in early January 1994 with record snowfall depths (in excess of thirty-three inches in the southwest and south-central portions of the Commonwealth), strong winds and sleet/freezing rains. Numerous storm-related power outages were reported, and as many as 600,000 residents were without electricity, in some cases for several days at

a time. A ravaging ice storm followed, affecting the southeastern portion of the Commonwealth, which closed major arterial roads and downed trees and power lines. Utility crews from a five-state area were called to assist in power restoration repairs. Officials from PP&L stated that this was the worst winter storm in the history of the company, and related damage-repair costs exceeded $5,000,000. Serious power supply shortages continued through mid-January because of record cold temperatures at many places, causing sporadic power generation outages across the Commonwealth. The entire Pennsylvania-New Jersey-Maryland grid and its partners in the District of Columbia, New York and Virginia experienced 15-30 minute rolling blackouts, threatening the lives of people and the safety of the facilities in which they resided. Power and fuel shortages affecting Pennsylvania and the East Coast power grid system required the governor to recommend power conservation measures be taken by all commercial, residential, and industrial power consumers. The record cold conditions resulted in numerous water-main breaks and interruptions of service to thousands of municipal and city water customers throughout the Commonwealth.

Additionally, the extreme cold in conjunction with accumulations of frozen precipitation resulted in acute shortages of road salt. As a result, trucks were dispatched to haul salt from New York to expedite deliveries to PA Department of Transportation (DOT) storage sites.

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

In January 1996, another series of severe winter storms with twenty-seven- and twenty-four-inch accumulated snow depths was followed by fifty to sixty-degree temperatures resulting in rapid melting and flooding (as described in the preceding section on *Flood Hazard Vulnerability Assessment*).

In addition to the events described above, other winter storm events are listed in *Table 34 - Indiana County Winter Storms* between January 1966 to November 2017. Winter storm events from 2008 to 2017 were obtained through the web-based tool Knowledge Center™ and the NOAA NCEI Storm Events Database.

Table 34 - Indiana County Winter Storms

Winter Storm Events in Indiana County (Knowledge Center, 2017; NOAA NCEI, 2017)		
Date	**Description**	**Property Damage**
January 1966	Heavy snow*	$ -
February 1972	Heavy snow*	$ -

Winter Storm Events in Indiana County (Knowledge Center, 2017; NOAA NCEI, 2017)		
Date	**Description**	**Property Damage**
January 1978	Heavy snow*	$ -
February 1978	Blizzard*	$ -
March 1993	Blizzard**	$ -
1/4/1994	Heavy snow**	$ -
1/17/1994	Heavy snow**	$ -
1/27/1994	Ice**	$ -
3/2/1994	Heavy snow/blizzard/avalanche	$ -
1/7/1995	Ice	$ -
2/3/1995	Heavy snow	$ -
2/15/1995	Ice	$ -
3/2/1995	Heavy snow	$ -
11/14/1995	Heavy snow	$ -
12/19/1995	Heavy snow	$ -
1/2/1996	Heavy Snow**	$ -
1/6/1996	Heavy Snow**	$ -
11/13/1997	Ice Storm	$5,000.00
12/29/1997	Heavy Snow	$ -
1/2/1999	Winter Storm	$ -
1/8/1999	Winter Storm	$ -
1/13/1999	Winter Storm	$ -
3/3/1999	Winter Storm	$15,000.00
1/20/2000	Winter Storm	$ -
11/22/2000	Heavy Snow	$ -
12/13/2000	Winter Storm	$ -
1/20/2001	Heavy Snow	$ -
3/4/2001	Winter Storm	$ -
1/6/2002	Heavy Snow	$ -
12/11/2002	Ice Storm	$ -
12/25/2002	Winter Storm	$ -
2/16/2003	Heavy Snow	$ -
4/7/2003	Ice Storm	$ -
12/5/2003	Heavy snow	$ -
12/6/2003	Heavy Snow	$ -
12/14/2003	Heavy Snow	$ -
12/20/2003	Heavy Snow	$ -
1/14/2004	Heavy snow	$ -
1/15/2004	Heavy Snow	$ -
1/27/2004	Heavy snow	$ -
1/28/2004	Heavy Snow	$ -
2/3/2004	Ice Storm	$ -
2/5/2004	Ice Storm	$ -
1/22/2005	Heavy Snow	$ -

Winter Storm Events in Indiana County (Knowledge Center, 2017; NOAA NCEI, 2017)		
Date	**Description**	**Property Damage**
3/1/2005	Heavy Snow	$ -
12/8/2005	Heavy snow	$ -
12/9/2005	Heavy Snow	$ -
12/15/2005	Ice Storm	$ -
2/13/2007	Severe Winter Storm*	$ -
2/24/2007	Winter storm watch and ice storm warning issued	$ -
April 2007	Severe Winter Storm**	$ -
2/1/2008	Winter Storm	$10,000.00
2/11/2008	Winter storm warning	$ -
2/12/2008	Winter Storm	$ -
2/29/2008	Heavy Snow	$ -
1/6/2009	Winter Storm	$ -
1/9/2009	Heavy Snow	$ -
1/17/2009	Heavy Snow	$ -
1/27/2009	Ice Storm	$ -
12/11/2009	Cold/Wind Chill	$ -
12/13/2009	Winter Weather	$ -
12/25/2009	Ice Storm	$ -
2/5/2010	Heavy Snow*	$ -
2/9/2010	Winter Storm*	$ -
April 2010	Severe Winter Storm**	$ -
1/31/2011	Ice Storm & Heavy Snow *	$ -
2/1/2011	Ice Storm	$ -
2/21/2011	Heavy Snow	$ -
4/23/2012	Spring winter storms*	$ -
12/26/2012	Heavy Snow	$ -
1/5/2014	Extreme Cold/Wind Chill	$ -
2/4/2014	Winter Storm	$ -
12/2/2014	Winter Weather	$ -
2/5/2015	Cold/Wind Chill	$ -
2/14/2015	Extreme Cold/Wind Chill**	$ -
2/19/2015	Extreme Cold/Wind Chill**	$ -
2/24/2015	Extreme Cold/Wind Chill**	$ -
1/22/2016	Heavy Snow	$ -
12/15/2016	Cold/Wind Chill	$ -
12/17/2016	Ice Storm	$ -
2/8/2017	Heavy Snow	$ -
*Gubernatorial Disaster Declaration		
**Presidential Disaster Declaration		

4.3.9.4 Future Occurrence

Winter storms are a regular, annual, occurrence in Indiana County. Therefore, the future occurrence of winter storms in the county can be considered highly likely as defined by the Risk Factor Methodology probability criteria (see *Table 48 - Risk Factor Assessment)*. Approximately thirty-five winter storm events occur across Pennsylvania and about two to five events in Indiana County annually.

4.3.9.5 Vulnerability Assessment

Winter storm events would likely affect the entire county. Wintertime snow accumulations are expected and normal in Indiana County. Residents of the mountainous areas of the county may be more susceptible, especially when emergency medical assistance is required. In addition, the more rural areas of Indiana County are susceptible to isolation caused by winter storms. Many areas are heavily wooded which make emergency response to these areas difficult when roadways are blocked by downed trees and wires.

The most common, but potentially serious effect of very heavy snowstorms with accumulations exceeding six or more inches in a twelve-hour period are traffic accidents; interruptions in power supply and communications; and the failure of inadequately designed and/or maintained roofing systems. Similar to the discussion under tornadoes and wind storms, vulnerability to the effects of winter storms on buildings is dependent on the age of the building (and what building codes may have been in effect at the time), type of construction, and condition of the structure (i.e., how well has the structure been maintained). Individual structure data was not available for this study so it was difficult to determine the exact number and types of structures within Indiana County that have heightened vulnerability to winter-storm snow loading.

Because of the frequency of winter storms, strategies have been developed to respond to these events. Snow removal and utility repair equipment is present to respond to typical events. The use of auxiliary heat and electricity supplies such as wood burning stoves, kerosene heaters and gasoline power generators reduces the vulnerability of humans to extreme cold temperatures commonly associated with winter storms. People residing in structures lacking adequate equipment to protect against cold temperatures or significant snow and ice are more vulnerable to winter storm events. Even for communities that are prepared to respond to winter storms, severe events involving snow accumulations that exceed six or more inches in a twelve-hour period can cause a large number of traffic accidents, strand motorists due to snow drifts, interrupt power supply and communications, and cause the failure of inadequately designed and/or maintained roof systems.

4.3.10. Civil Disturbance

4.3.10.1 - Location and Extent

The scale and scope of civil disturbance events varies widely. However, government facilities, local landmarks, prisons, and universities are common sites where crowds and mobs may gather.

4.3.10.2 - Range of Magnitude

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

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

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

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

A possible worst-case scenario would be an aggressive mob demonstration in White Township, or Indiana Borough, the two most populated municipalities in the county.

4.3.10.3 - Past Occurrence

Recorded events of civil disturbances for Indiana County are minimal. There was one event that took place on March 6th, 2014, in Indiana Borough, Indiana University of Pennsylvania (IUP), and White Township involving a large non-sponsored celebratory event or raucous party known to some as "IUPatty's Day." Activities primarily focused on the consumption of alcohol throughout numerous locations within the county. As a result, a potentially uncontrollable surge of alcohol related crimes, thefts, assaults, disorderly conducts, and medical calls occurred. Resources were quickly consumed, placing first responders, citizens, and event participants in danger. The scale and scope of civil disturbance events vary widely. Social media plays a huge role in the occurrence of misinformation. Students have the ability to spread word through Twitter, Facebook, e-mail, and text messaging sooner than some alert systems. There are no other recorded events of civil disturbances in Indiana County.

4.3.10.4 - Future Occurrence

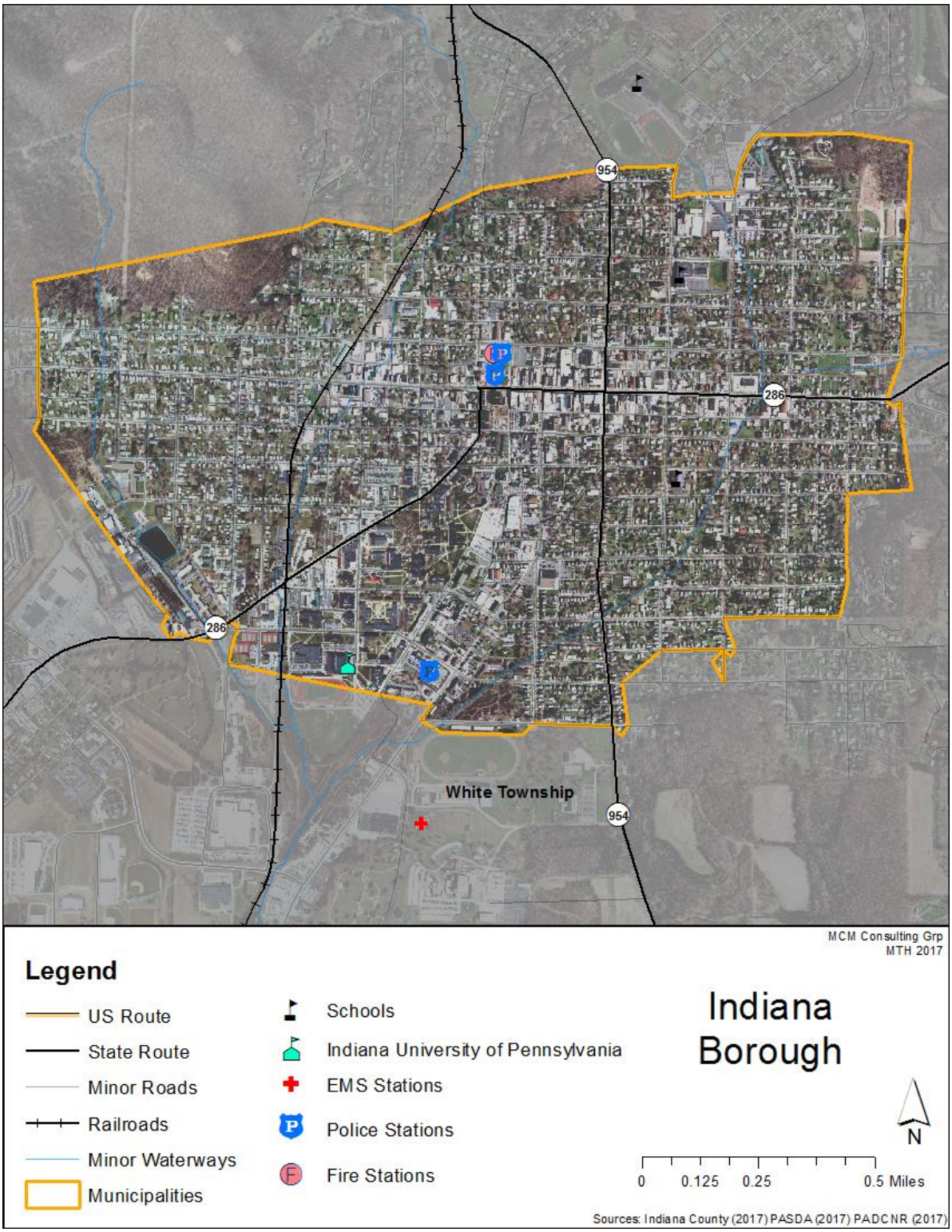
Civil disturbances may occur in Indiana County, but it is not possible to accurately predict the probability of future occurrence for civil disturbance events over the long-term. However, it may be possible to recognize the potential for an event to occur in the near-term. Indiana County is most likely to experience civil disturbance in the form of protests, faculty union strikes, or sporting event rivalry based on the large number of residents who either attend or are employed at IUP. Overall, the probability of future civil disturbances is considered as likely according to the Risk Factor Methodology. An overall risk factor of 2.2 has been determined by the local planning team using this methodology.

4.3.10.5 - Vulnerability Assessment

All municipalities in Indiana County are vulnerable to civil disturbance.

Critical facilities located in Indiana Borough, and White Township (*Figure 21 - Critical Facilities in Indiana Borough & White Township*) shows those facilities that are at risk) are most vulnerable to civil disturbances due to the relatively high population density. Civil disturbances can range from minor to significant events that can disrupt the functioning of a community for weeks or months. Adequate law enforcement should be present to minimize the chances of a small assembly of people turning into a civil disturbance.

Figure 21 - Critical Facilities in Indiana Borough & White Township



4.3.11. Dam Failure

Dam Failure will be addressed in Appendix I.

4.3.12. Environmental Hazards

Chemicals for industrial use and petroleum products can pose an environmental hazard when such materials are manufactured, extracted, used, stored or transported. Most hazardous materials incidents are unintentional, however hazardous materials could also be released in a criminal or terrorist act. A release can result in injury or death and may contaminate air, water and/or soils. Hazardous materials incidents can be generally broken down into the subcategories of transportation and fixed facility.

Tanker trucks, tractor trailers and rail cars often are used to transport hazardous materials. When there are transportation incidents involving these type of vehicles, hazardous materials can be released in significant quantities. *Section 4.3.16 Figure 31 - Major Transportation Routes* shows major transportation routes through Indiana County, including US Routes 22, 119 and 422 as well as State Routes 286.

Natural gas pipelines run throughout Indiana County, and are owned by several companies, including: Buckeye Partners, Columbia Gas Transmission, Domestic Energy Transmission, Peoples Natural Gas Company, Sunoco Pipeline, Texas Eastern Transmission, EQT Midstream, Enterprise Products Operating and CNX Gas Company. Natural gas pipelines are often at higher capacity during cold winter months when people are utilizing natural gas more.

In Pennsylvania, facilities that use, manufacture, or store hazardous materials must comply with Title III of the federal Superfund Amendments and Reauthorization Act (SARA), and the Commonwealth's reporting requirements under the Hazardous Materials Emergency Planning and Response Act (1990-165), as amended. There are fifteen SARA Title III facilities in Indiana County, though it is important to recognize that these facilities are not an exhaustive and comprehensive list of all locations where hazardous material resides in the county.

Fixed facilities are also monitored by the Environmental Protection Agency (EPA). The EPA has identified hazardous materials sites, not regulated by SARA Title III, and are known as Toxic Release Inventory (TRI) sites. Facilities which employ ten or more full-time employees and which manufacture or process more than 25,000 pounds (or use more than 10,000 pounds) of any SARA Section 313-listed toxic chemical in the course of a calendar year are required to report TRI information to the EPA, the federal enforcement agency for SARA Title III and PEMA. There are eight TRI facilities in Indiana County. *Figure 22 - Hazardous Material Locations* identifies SARA Title III facilities as well as several other locations that consume, store or release potentially hazardous materials and wastes. There are three Verizon Cell Towers that are SARA Title III facilities

that do not appear on the map as there was not sufficient data on their exact locations. The map also shows land recycling cleanup locations, which are locations that fall into the jurisdiction of the Hazardous Sites Cleanup Act (HSCA) and are locations where the Department of Environmental Protection (DEP) provides funding and the authority to conduct cleanup actions because of hazardous substances have been released. The DEP also has the authority to force the persons responsible for the release to conduct cleanup actions or to repay public funds spent on a DEP funded cleanup action.

Oil and gas extraction facilities can also be sources of hazardous material release. *Figure 23 - Oil & Gas Well Locations* shows the location of all oil and gas wells in the county along with their proximity to surface waters.

Figure 22 - Hazardous Material Locations

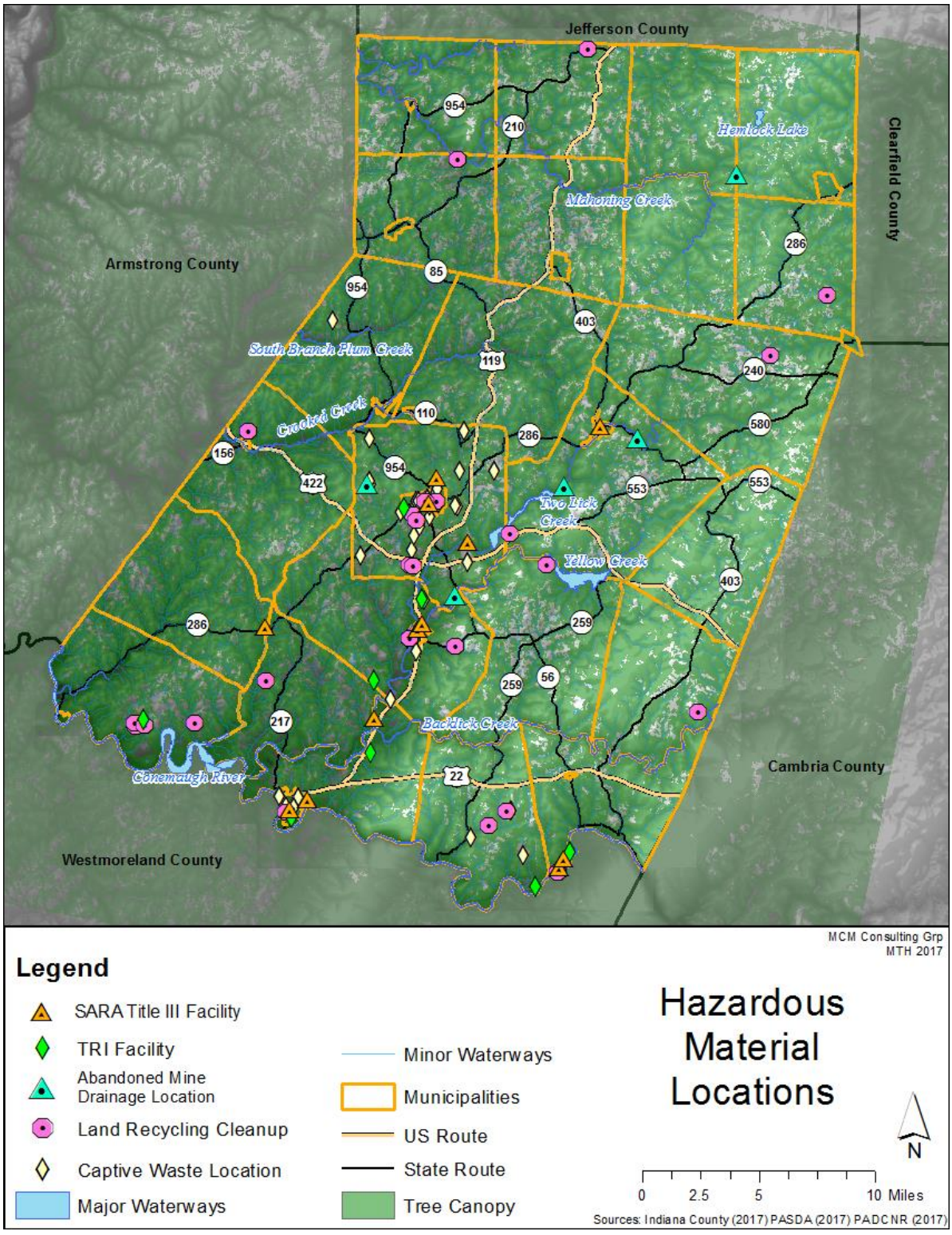


Figure 23 - Oil & Gas Well Locations

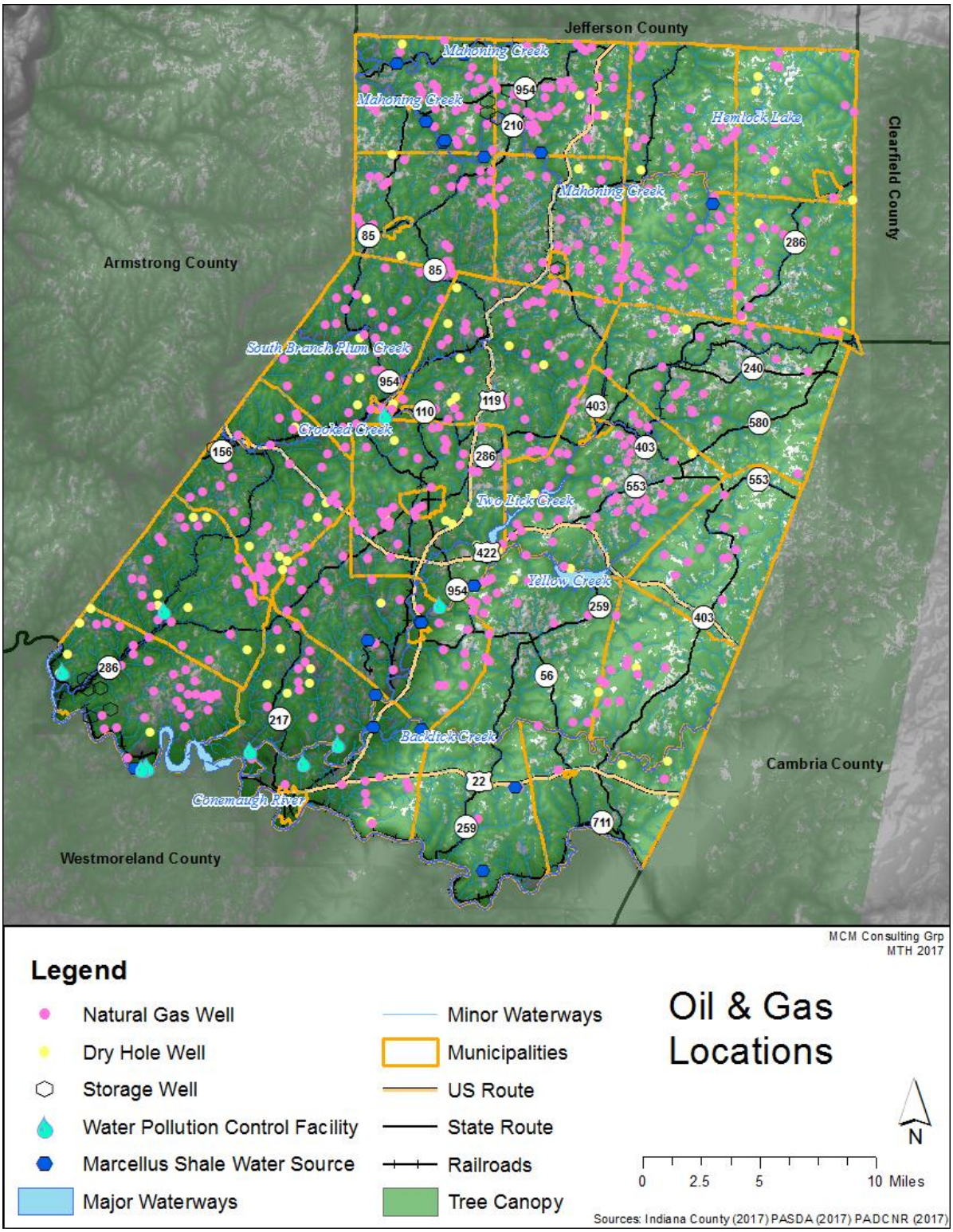
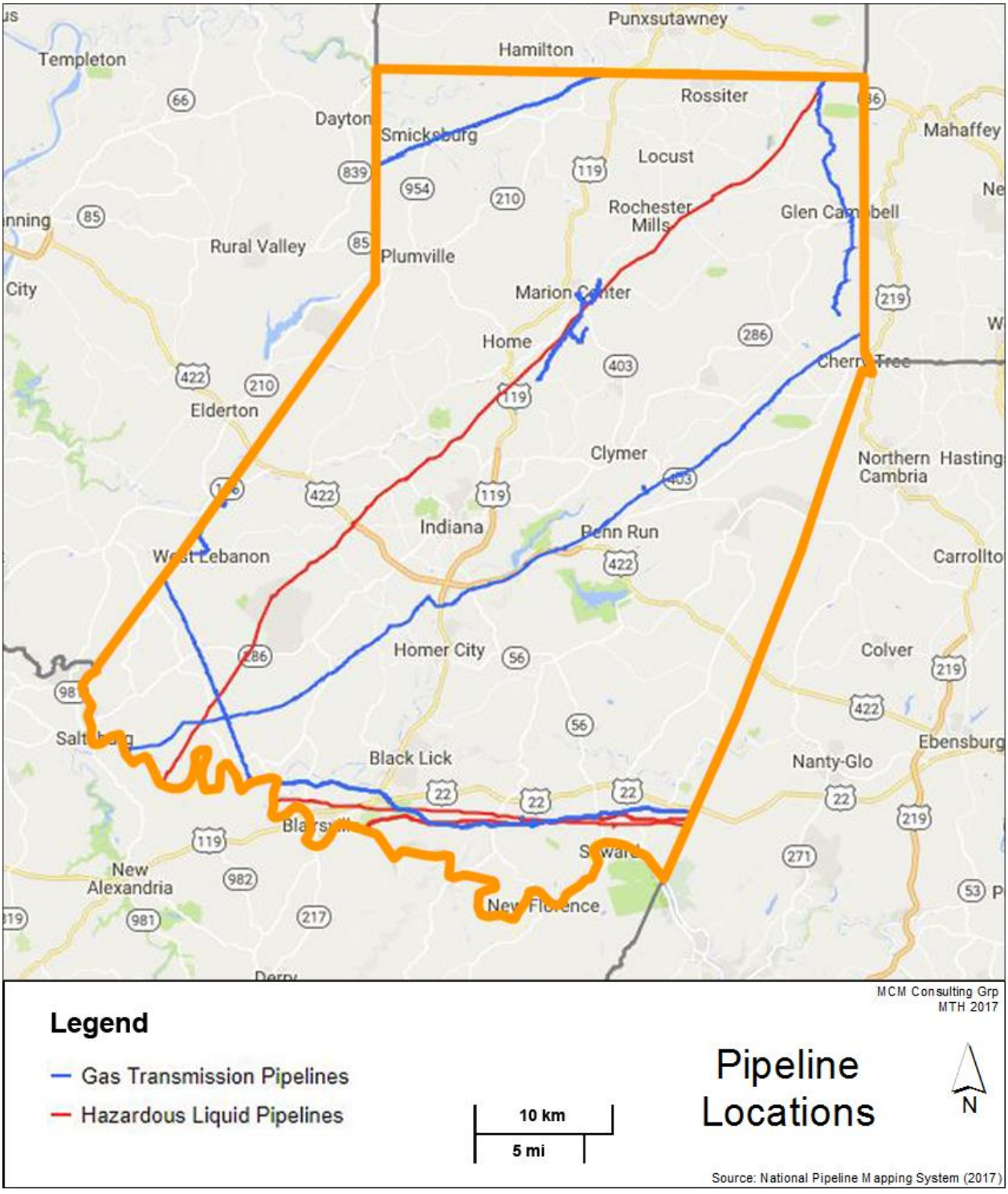


Figure 24 - Pipelines



4.3.12.2 Range of Magnitude

Hazardous material releases can contaminate air, water and soil, and can possibly cause injuries, poisonings, or deaths. Hazardous materials fall into nine hazard classes:

Class 1 - Explosives
Class 2 - Gases (flammable, non-flammable, non-toxic, and toxic)
Class 3 - Flammable and combustible liquids
Class 4 - Flammable solids (spontaneously combustible materials, and dangerous when wet materials/water-reactive substances)
Class 5 - Oxidizing substance and organic peroxides
Class 6 - Toxic substances and infectious substances
Class 7 - Radioactive materials
Class 8 - Corrosive substances
Class 9 - Miscellaneous hazardous materials/products, substances or organisms.

All nine hazard classes can be found being transported and stored at fixed facilities. Certain conditions can exacerbate release incidents:

- Weather conditions affect how the hazard occurs (e.g. transportation accidents) and develops (dispersion can take place rapidly when transported by water and/or wind). Release can be a secondary impact of natural hazards such as tornadoes or flooding.
- Micro-meteorological effects of buildings and terrain: alters dispersion of hazardous materials
- Proximity to surface and ground water sources
- Compliance with applicable codes (e.g. building or fire codes) and maintenance failures (e.g. fire protection and containment features) can substantially increase the damage to the facility itself and to surrounding buildings

The type of material released, distance and related response time of emergency responders also significantly impact the severity and scope of hazardous material releases and clean-up efforts. Areas most proximal to the release are usually at greatest risk, but depending on the material, a release can travel great distances or remain present in the environment for long periods of time (e.g. centuries or millennia for some radioactive materials) resulting in chronic and extensive impacts on people and the environment.

Oil and gas well drilling can have a variety of detrimental effects on the environment. Surface waters and soil are sometimes polluted by a salty wastewater product of oil and gas well drilling (brine) and from oil spills occurring at the drilling site or from a pipeline breach. This can spoil public drinking water supplies and be particularly detrimental to vegetation and aquatic animals, making water safety an important factor in oil and gas extraction (Gregory et al., 2011). In some cases, associated with hydraulic fracturing (fracking), methane has been found contaminating drinking water in surrounding areas (Osborn et al., 2011).

Abandoned oil, gas, coal and other types of wells and mines can contaminate groundwater and consequently drinking water wells when not properly plugged or remediated. Acid Mine Drainage (or AMD) is a term referring to the acidic and environmentally hazardous run-off that comes from abandoned mines.

Natural gas well fires occur when natural gas is ignited at the well site. Often, these fires erupt during drilling when a spark from machinery or equipment ignites the gas. The initial explosion and resulting flames have the potential to seriously injure or kill individuals in the immediate area. These fires are often difficult to extinguish due to the intensity of the flame and the abundant fuel source.

4.3.12.3 Past Occurrence

As of November 2017, Indiana County has a reported 699 active oil and gas wells, largely from Marcellus shale natural gas extraction (PA DEP, 2017). The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration holds detailed accounts of hazardous material incident records. Detailed past occurrence of thirty-eight different hazardous materials release incidents in Indiana County between 1972 and November 2017 from the Pipeline and Hazardous Materials Safety Administration (PHMSA) can be found in *Hazardous Material Incidents* ***in Appendix I***. Between 2006 and November 2017 there were 120 Hazardous Material Incidents reported to the Knowledge Center. *Table 35 - Environmental Hazard KC Incidents* reports the full list of Knowledge Center incidents, which comprises of many natural gas releases, fuel leaks, and pipeline incidents among other events.

As of November 2017, the PA DEP identifies five abandoned mine drainage treatment locations in Indiana County, four of which have undergone remediation actions and one in Banks Township where reclamation actions are planned to start (See *Figure 22 - Hazardous Material Locations*).

Table 35 - Environmental Hazard KC Incidents

Environmental Hazard KC Incidents (Knowledge Center, 2017)		
Date	**Location**	**Description**
07/20/17	Indiana County	HAZMAT Assist
03/30/17	Indiana County	CO incident
12/17/16	Cherryhill Township	Fuel Spill due to Vehicle Collision
10/09/16	Washington Township	Fuel Spill
09/20/16	Indiana County	Fuel Spill
08/06/16	Indiana County	Unknown Substance in a Water Way
07/28/16	Blairsville Borough	Coal Spill
05/10/16	Burrell Township	Natural Gas Leak
05/01/16	Cherryhill Township	Transmission Fluid Spill
04/24/16	Burrell Township	Fuel Spill inside a residence

Environmental Hazard KC Incidents (Knowledge Center, 2017)		
Date	**Location**	**Description**
11/11/15	North Mahoning Township	NRC #1133227 Warren County
10/21/15	Indiana County	HAZMAT Fire
07/28/15	White Township	Hazmat Decon / Cadmium Oxide
07/09/15	Center Township	Diesel Fuel Spill
05/21/15	Indiana County	Fuel Spill
04/15/15	Green Township	NRC#1113664-Dumping Complaint-Indiana Co
04/04/15	White Township	Gas Leak
03/04/15	Indiana County	HAZMAT spill
12/09/14	Burrell Township	Fuel Spill
12/03/14	White Township	Fuel Spill
10/16/14	East Mahoning Township	School Evacuation
10/08/14	White Township	Diesel Fuel Spill
09/22/14	East Mahoning Township	Mercury Spill inside a residence
09/16/14	Armstrong Township	Purge Natural Gas Main Line
09/11/14	South Mahoning Township	Planned purging of natural gas line
08/13/14	East Mahoning Township	Planned purging of Natural Gas
07/25/14	East Mahoning Township	Planned purging of natural gas line
06/27/14	Indiana County	HAZMAT Spill
05/21/14	Indiana County	HAZMAT Spill
05/17/14	Blairsville Borough	NRC # 1083089 Indiana County
05/09/14	Banks Township	Planned purging of Natural Gas
04/09/14	Grant Township	Planned Natural Gas Purge
03/27/14	Brush Valley Township	Planned Purging Natural Gas Line
03/14/14	Brush Valley Township	Blowing down natural gas line
02/04/14	Brush Valley Township	Blowing down Gas main line
12/05/13	Indiana County	Petroleum accumulation
11/26/13	West Mahoning Township	Planned blow down natural gas line
11/13/13	North Mahoning Township	Planned Natural Gas Purge
10/24/13	Burrell Township	Planned blow down of gas line
10/15/13	Conemaugh Township	Planned Release of Natural Gas
10/14/13	Pine Township	Coal Truck Fire
09/27/13	Canoe Township	Fuel Spill
08/03/13	Indiana County	Fuel Spill Overturned Tractor Trailer
07/30/13	Marion Center Borough	Logging Wissinger well
07/21/13	Indiana County	Hazmat Team Assist
07/20/13	West Wheatfield Township	Diesel fuel spill
07/17/13	Indiana County	Natural gas leak
07/16/13	Washington Township	Blowing Down Gas Main Line
05/14/13	Clymer Borough	Fish Kill

Environmental Hazard KC Incidents (Knowledge Center, 2017)		
Date	**Location**	**Description**
05/14/13	Indiana County	Road Closure - diesel spill
03/25/13	North Mahoning Township	Fuel Spill
03/04/13	Rayne Township	Brine Water Leak
01/09/13	Montgomery Township	Fuel Spill
12/14/12	White Township	Planned Natural Gas Purge
11/19/12	White Township	Planned high pressure gas purging
11/07/12	North Mahoning Township	Planned Natural Gas Purging
11/06/12	Indiana County	Planned Natural Gas Purging
08/21/12	East Mahoning Township	Possible HAZMAT Incident
07/03/12	Black Lick Township	Tear Gas Explosion
07/03/12	Pine Township	MVA / diesel fuel leaking
06/13/12	West Wheatfield Township	Meth Lab Investigation
05/31/12	East Wheatfield Township	Diesel fuel spill
05/17/12	Black Lick Township	Fuel Spill
05/07/12	Blairsville Borough	unknown substance found in a barrel
03/05/12	Center Township	Diesel Fuel Spill
02/20/12	Conemaugh Township	HAZMAT SPILL
01/10/12	Indiana Borough	Odor investigation
10/17/11	Rayne Township	fuel spill
09/30/11	North Mahoning Township	Fuel Spill
09/02/11	White Township	MVA - Diesel Fuel Spill
08/15/11	White Township	Chlorine Leak
08/05/11	North Mahoning Township	HAZMAT Spill
05/04/11	White Township	HAZMAT
02/07/11	Indiana Borough	CO Leak
11/19/10	Center Township	Fuel Spill
08/17/10	Conemaugh Township	Heating Fuel Spill
07/04/10	Pine Township	Petroleum product
06/02/10	Brush Valley Township	Diesel fuel spill from a MVA
05/24/10	Brush Valley Township	Fuel Lean/ MVA
05/06/10	Burrell Township	Fuel Spill due to MVA
05/05/10	Cherryhill Township	vehicle accident / fuel spill
04/21/10	White Township	Gas Well Leak
04/08/10	East Wheatfield Township	MVA with Haz Mat Spill
01/13/10	Center Township	Suspicious Letter
09/25/09	Armstrong Township	Propane Release
09/14/09	Armstrong Township	Potential HazMat in a Residence
05/22/09	Center Township	Chemicail Spill
05/11/09	White Township	Chemical release

Environmental Hazard KC Incidents (Knowledge Center, 2017)		
Date	**Location**	**Description**
04/18/09	White Township	Odor Investigation
01/10/09	Cherryhill Township	Fuel Spill - Via MVA
12/12/08	East Wheatfield Township	Fuel Spill
12/09/08	Indiana Borough	Odor Investigation
11/13/08	Blairsville Borough	Unknown Substance on the Roadway
10/23/08	White Township	HazMat Incident
09/14/08	White Township	Heating Oil Spill
09/02/08	Creekside Borough	Misc Oils Release
07/16/08	White Township	Fuel Spill from a vehicle accident
07/05/08	Indiana Borough	Explosives Found
06/30/08	South Mahoning Township	Diesel fuel spill from vehicle accident
06/27/08	Cherry Tree Borough	Fuel Spill
05/23/08	North Mahoning Township	Gas Leak
02/21/08	Burrell Township	Fuel spill
01/17/08	Pine Township	Vehicle Accident w/ fuel leaking
12/24/07	Montgomery Township	Hazmat
10/02/07	East Wheatfield Township	Hydraulic Fluid Spill
09/02/07	Center Township	Assist Coroner
08/31/07	Indiana Borough	Fuel Spill
08/12/07	Cherryhill Township	Propane Leak
08/02/07	Homer City Borough	Gas line leak
05/31/07	Green Township	Fuel Spill
04/24/07	East Wheatfield Township	Diesel Fuel Spill
03/14/07	Rayne Township	HazMat Spill
02/15/07	East Wheatfield Township	Chemical Spill
01/22/07	Indiana Borough	Fuel Spill
01/14/07	Clymer Borough	Hydrocarbon Spill
12/27/06	Brush Valley Township	HazMat Assist
12/13/06	White Township	Gasoline Spill
11/30/06	Clymer Borough	Hazardous Waste Material Spill
11/29/06	Indiana Borough	Fuel Spill, 1020 Washington Street, Indiana Borough
10/31/06	Blairsville Borough	Natural gas well leak

The EPA tracks the management of hazardous materials in facilities that handle significant amounts of hazardous materials. There are eight TRI facilities in Indiana County as of 2017, and they are summarized in *Table 36 - SARA & TRI Facilities*. Details about SARA Title III facilities as well as Tier II facilities can also be found in *Table 36 - SARA & TRI Facilities.*

Table 36 - SARA & TRI Facilities

SARA & TRI Facilities (Indiana County, 2017)		
Company Name	**Facility Name**	**Type**
Verizon Pennsylvania Inc	Blairsville Co (PA57239)	SARA Title III
Comcast of Pennsylvania II, L.P.-Blairsville	Comcast Cable-Blairsville Headend and Service Center	SARA Title III
Comcast of CO/PA/WV, LLC-Chevy Chase Heights	Comcast Cable-Indiana Hubsite	SARA Title III
NRG Energy	Conemaugh Power Plant	SARA Title III, TRI
Pennsylvania American Water	Paw Two Lick Creek Plant	SARA Title III
FirstEnergy Corp.	Penelec\Homer City Substation	SARA Title III
Clymer Borough Municipal Authority	Potable Water Filter Building	SARA Title III
Seward Generation, LLC	Seward Generation LLC, Seward Generating Station	SARA Title III, TRI
Verizon Pennsylvania Inc	Verizon Cherry Tree DO (PA31369)	SARA Title III
Verizon Pennsylvania Inc	Verizon Homer City CDO (PA57010)	SARA Title III
Verizon Pennsylvania Inc	Verizon Indiana Co (PA57006)	SARA Title III
Verizon Pennsylvania Inc	Verizon Jacksonville CDO (PA57102)	SARA Title III
Verizon Pennsylvania Inc	Verizon North Mahoning Twp CDO (PA57344)	SARA Title III
Verizon Pennsylvania Inc	Verizon Washington Twp CDO (PA57278)	SARA Title III
Central Indiana County Water Auth	Water Treatment Plant	SARA Title III
Alliance Petroleum Corporation	Alliance Petroleum Corp - Lukehart J 3	Tier II
Alliance Petroleum Corporation	Alliance Petroleum Corp - Martin Road Tanks	Tier II
Alliance Petroleum Corporation	Alliance Petroleum Corp - Shelocta Sportsman 1,2,3	Tier II
AmeriGas Propane	Amerigas	Tier II
BLX, Inc.	BLX Inc-Reken-36002	Tier II
BLX, Inc.	BLX Inc-Sleppy-36534	Tier II
C&J Energy Services, Inc.	C&J Energy Services, Inc. - Blacklick	Tier II
Chevron Appalachia, LLC	Chevron AMBU Buterbaugh Pad A	Tier II
Clark Metal Products	Clark Metal Products Co	Tier II
CNX Gas Company LLC	CNX - Marchand Pad 3	Tier II
CNX Gas Company LLC	CNX - W Crawford 5	Tier II
CNX Gas Company LLC	CNX 05733, Beatty CL #4	Tier II
CNX Gas Company LLC	CNX 1424 Stiffler #3	Tier II
CNX Gas Company LLC	CNX 1591 Marchand Compressor	Tier II
CNX Gas Company LLC	CNX 2332 Pollack	Tier II
CNX Gas Company LLC	CNX 3048 Bryan Carpenter #3	Tier II
CNX Gas Company LLC	CNX 5310 H Taylor	Tier II
CNX Gas Company LLC	CNX 5543-Beatty Wright 4	Tier II
CNX Gas Company LLC	CNX 5909 Grube Wright Unit 1	Tier II
CNX Gas Company LLC	CNX 6121 Ray N5	Tier II

SARA & TRI Facilities (Indiana County, 2017)		
Company Name	**Facility Name**	**Type**
CNX Gas Company LLC	CNX 6122 Ernick N2	Tier II
CNX Gas Company LLC	CNX 8148 Winsheimer	Tier II
CNX Gas Company LLC	CNX 8357 D Palmer	Tier II
CNX Gas Company LLC	CNX 8377 Alan Hovis	Tier II
CNX Gas Company LLC	CNX 8378 Alan Hovis	Tier II
CNX Gas Company LLC	CNX 861 Taylor	Tier II
CNX Gas Company LLC	CNX Brown Road Tank Battery	Tier II
CNX Gas Company LLC	CNX Consol Compressor	Tier II
CNX Gas Company LLC	CNX Krantx #2	Tier II
CNX Gas Company LLC	CNX Well No 2602 Sheffield O&	Tier II
CNX Gas Company LLC	CNX West Lebanon Compressor	Tier II
CNX Gas Company LLC	CNXCompressor- Trimarchi	Tier II
Dale Oxygen & Acetylene Service, Inc.	Dale Oxygen & Acetylene Service, Inc.	Tier II
Department of Transportation	PENNDOT 1040-01 Indiana County	Tier II
Dept. of Mil. & Vet. Affairs	DMVA, Indiana RC	Tier II
Energy Corporation of America	Penrose R. #1-Energy Corporation of America	Tier II
L&I	DEPI 8314 G R Sebold	Tier II
Martin Oil Company	Martin Oil, Martin General Stores #212	Tier II
Matheson Tri-Gas, Inc.	Matheson - Indiana	Tier II
Mays Chemical Co.	Mays Chemical Co. Indiana PA	Tier II
MDS Energy, LTD	MDS Energy, LTD - James Ray 1-81	Tier II
MDS Energy, LTD	MDS Energy, LTD - Susie M Hile 2M	Tier II
MDS Energy, LTD	MDS Energy, LTD - Wade E Helman et ux 1-39	Tier II
MGK Technologies, Inc.	MGK Technologies, Inc.	Tier II
Mountain Gathering, LLC	Mountain Gathering, LLC - HCPP Compressor Station	Tier II
New Cingular Wireless PCS, LLC	AT&T Homer City - USID96180	Tier II
New Cingular Wireless PCS, LLC	AT&T Indiana North - USID96186	Tier II
Peoples Natural Gas Company, LLC - Creakside Station	Peoples Natural Gas Company, LLC - Creekside Station	Tier II
Peoples Twp, LLC - Kinter Station	Peoples Twp, LLC - Kinter Station	Tier II
Polymer Enterprises, Inc.	Specialty Tires of America Inc	Tier II, TRI
Rance Resources - 23-2 Shirey 201-1	Blakley Road, Armstrong Township, PA 15774	Tier II
Range Resources	Range Resources - 23-1 Hamilton 205-1	Tier II
REA Energy Cooperative Inc	REA Energy Cooperative Inc	Tier II
REA Energy Cooperative Inc	REA Energy Cooperative, Inc. -Cherryhill Substation	Tier II
REA Energy Cooperative Inc	REA Energy Cooperative Inc. - Clyde Substation	Tier II
REA Energy Cooperative Inc	REA Energy Cooperative Inc. - Shadowwood Substation	Tier II

SARA & TRI Facilities (Indiana County, 2017)		
Company Name	**Facility Name**	**Type**
REA Energy Cooperative Inc	REA Energy Cooperative Inc. - Smithport Substation	Tier II
REA Energy Cooperative Inc	REA Energy Cooperative Inc. - Strongstown Substation	Tier II
REA Energy Cooperative Inc	REA Energy Cooperative Inc. - Uniontown Substation	Tier II
Schroth Industries, Inc.	Schroth Industries, Inc.	Tier II
Senex Esplosives Inc	Senex Explosives Inc	Tier II
Specialty Bar Products Co	Specialty Bar Products Co	Tier II, TRI
Spectra Energy	Texas Eastern Transmission, LP	Tier II
Suburban Propane L.P.	Suburban Propane L.P.	Tier II
Townsend Gas & Oil, Inc.	Townsend Gas & Oil Inc	Tier II
True Oil LLC	True Oil LLC, Sweet M-1	Tier II
Verizon Pennsylvania Inc	Clymer CDO (PA57009)	Tier II
William G Satterlee and Sons Inc	286 Cardlock	Tier II
William G Satterlee and Sons Inc	Cherry Tree Cardlock	Tier II
William G Satterlee and Sons Inc	Rochester Mills Bulk Plant	Tier II
William G. Satterlee & Sons Inc	Armagh Cardlock	Tier II
William G. Satterlee & Sons Inc	Black Gold Transport Inc	Tier II
XTO Energy	XTO Energy -	Tier II
XTO Energy	XTO Energy - George Dickie #2	Tier II
XTO Energy	XTO Energy - HCPP 1HU	Tier II
XTO Energy	XTO Energy - HCPP A H 2,3,4 & 8	Tier II
XTO Energy Inc.	Dilltown Compressor	Tier II
XTO Energy Inc.	Pineton	Tier II
Homer City Generation LP	Homer City Generation LP	TRI
Norma Pennsylvania	Norma Pennsylvania	TRI
Dlubak Corp	Dlubak Corp	TRI
Prime Metals & Alloys Inc	Prime Metals & Alloys Inc	TRI

4.3.11.4 Future Occurrence

Hazardous material release incidents are generally difficult to predict, but the presence and use of such known dangerous materials warrants preparation for release events. Emergency response in Indiana County should be prepared to handle the types of hazardous materials housed and used in the SARA Title III facilities, TRI facilities and oil and gas wells that are located in the county. The federal Superfund Amendments and Reauthorization Act (SARA) is also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), and Local Emergency Planning Committees (LEPCs) are designed by EPCRA to ensure that state and local communities are prepared to respond to potential chemical accidents.

4.3.12.5 Vulnerability Assessment

Class 3 flammables and specifically UN1203 (gasoline) are typically the most commonly transported hazardous material in Pennsylvania. Rail incidents are low probability as compared to highway incidents. It is recommended that Indiana County conducts a commodity flow study in order to best understand the movement of hazardous materials and which materials emergency responders should be prepared to mitigate.

Populations, critical facilities and natural habitats within a quarter mile of major highways and railways are considered to be at risk for hazardous material transportation incidents, and are covered in more detail in section 4.3.16 transportation profile. Additionally, populations, critical facilities and natural habitats within 1.5 miles of SARA Title III and Toxic Release Inventory sites are also vulnerable to hazardous material incidents.

Private water supplies such as domestic drinking water wells in the vicinity of oil and gas wells are at risk of contamination from brine and other pollutants, including methane which can pose a fire and explosive hazard. Ideally, vulnerability of private drinking well owners would be established by comparing the distance of drinking water wells to known oil and gas well locations, but this extensive detailed data is not readily available at this time. Private drinking water is largely unregulated and information on these wells is voluntarily submitted to the Pennsylvania Topographic and Geologic Survey by water well drillers, and the existing data is largely incomplete and/or not completely accurate.

Table 37 - Oil Gas & Drinking Water Wells

Oil Gas & Drinking Water Wells (PASDA & PAGWIS, 2017)		
Municipality	**Oil & Gas Wells**	**Domestic Water Wells**
Armagh Borough	0	2
Armstrong Township	52	339
Banks Township	19	177
Black Lick Township	20	195
Blairsville Borough	0	58
Brush Valley Township	23	342
Buffington Township	13	379
Burrell Township	12	212
Canoe Township	21	252
Center Township	29	263
Cherry Tree Borough	0	13
Cherryhill Township	56	412
Clymer Borough	0	24
Conemaugh Township	41	248
Creekside Borough	1	2

Oil Gas & Drinking Water Wells (PASDA & PAGWIS, 2017)		
Municipality	**Oil & Gas Wells**	**Domestic Water Wells**
East Mahoning Township	37	166
East Wheatfield Township	5	444
Ernest Borough	0	0
Glen Campbell Borough	1	3
Grant Township	34	118
Green Township	24	504
Homer City Borough	0	12
Indiana Borough	0	88
Marion Center Borough	1	26
Montgomery Township	20	213
North Mahoning Township	46	248
Pine Township	10	334
Plumville Borough	0	15
Rayne Township	46	356
Saltsburgh Borough	0	51
Shelocta Borough	0	18
Smicksburg Borough	0	2
South Mahoning Township	26	196
Washington Township	50	200
West Mahoning Township	34	104
West Wheatfield Township	1	480
White Township	45	427
Young Township	32	163
Undesignated Location	0	238
Total	**699**	**7324**

4.3.13. Levee Failure

4.3.13.1 - Location and Extent

Levees and floodwalls are man-made structures designed to protect specific areas from flooding. These structures fail when floodwaters exceed the height of the structure, or when the maximum pressure exerted by the floodwaters against the levee/floodwall exceeds its capability.

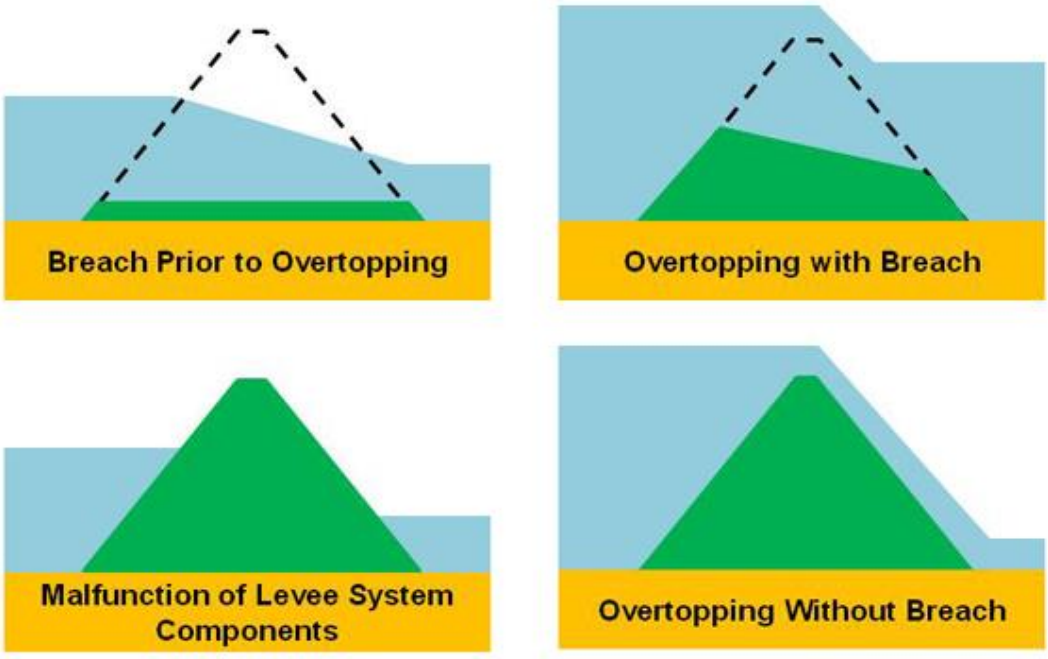
There is a levee protecting the town of Cherry Tree. This levee prevents the overflow of water from Cush Cushion Creek that eventually feeds into the west branch of the Susquehanna River. The levees extent is pictured in *Figure 27 - Potential Impacted Area in Case of Levee Failure*.

4.3.13.2 - Range of Magnitude

See Section 4.3.4 for a description of flood events in Indiana County.

Levee failures can pose a serious threat to communities located in flat or low-lying areas near bodies of water that are protected by levees. The impact of a levee failure is dependent on the volume of water behind the levee, the size of the failure and the amount of population or assets located in the protected area. The U.S. Army Corps of Engineers quantify flood risk associated with four scenarios as shown below in *Figure 25 - Types of Levee Failure*.

Figure 25 - Types of Levee Failure



Any of these failures could lead to significant damages to the town of Cherry Tree and could affect all of the critical infrastructure and other structures that the levee protects.

4.3.13.3 - Past Occurrence

There have been no past occurrences of levee failures in Indiana County.

4.3.13.4 - Future Occurrence

Given certain circumstances, a levee failure can occur at any time. The overall likelihood of levee failure can be reduced through proper design and routine maintenance. The probability of levee failure in Indiana County is characterized as unlikely as defined by the Risk Factor Methodology. An overall risk factor of 1.6 has been determined by the local planning team using this methodology.

4.3.13.5 - Vulnerability Assessment

When assessing the vulnerability of a community protected by a levee, there are three questions that the USACOE uses to help judge the potential impact of a levee failure.

Figure 26 - Judging the Impact of Levee failure

1. What event could occur? (flood, storm, earthquake)
2. How will the levee perform during these events?
3. What are the consequences if the levee doesn't perform well, in particular, could any loss of life occur?

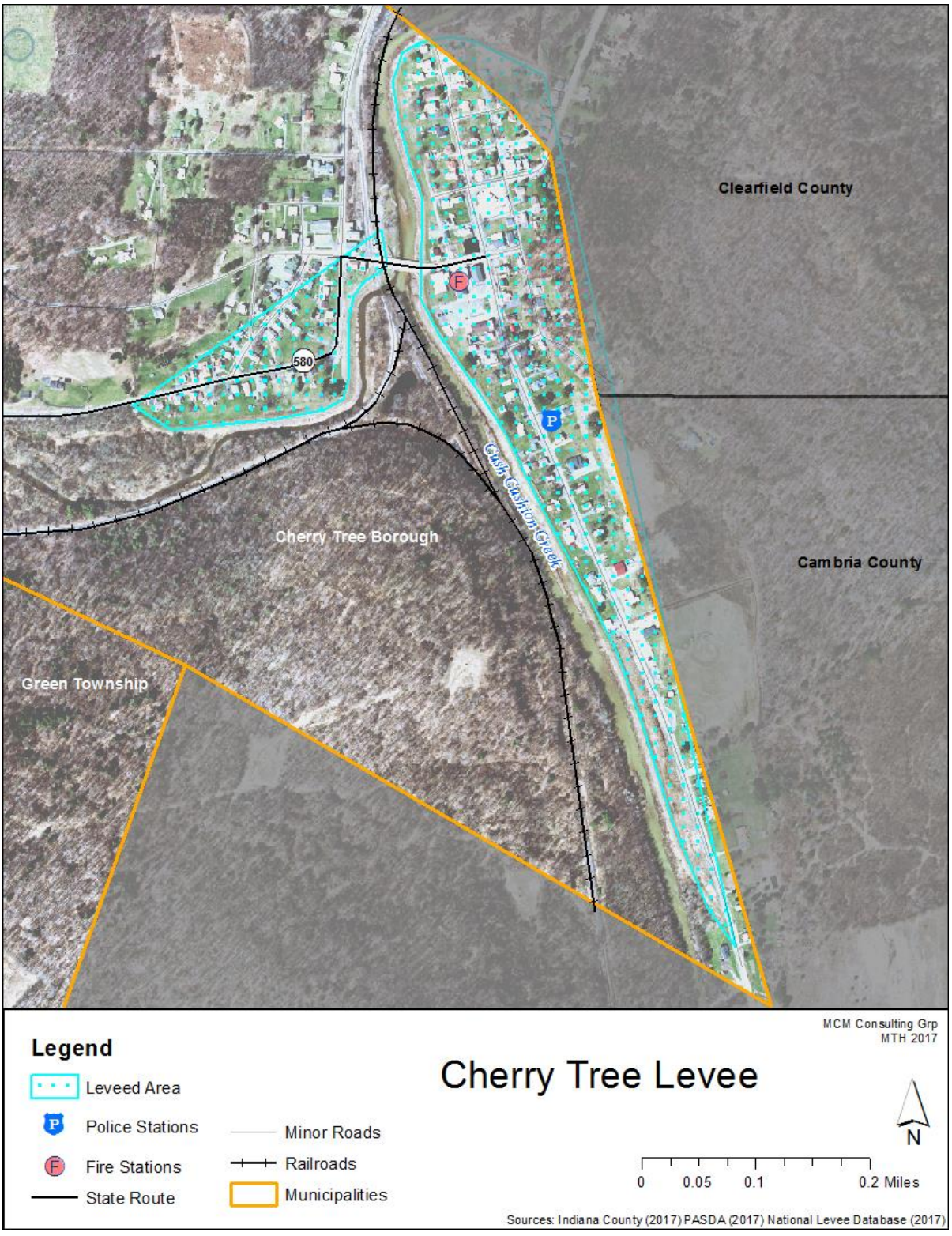
Using these questions as a framework, we can judge a levees risk and vulnerability.

Table 38 - Levee System Inspection Ratings

Levee System Inspection Ratings	
Acceptable	All inspection items are rated as Acceptable.
Minimally Acceptable	One or more inspection items are rated as Minimally Acceptable or one or more items are rated as Unacceptable and an engineering determination concludes that the Unacceptable inspection items would not prevent the segment/system from performing as intended during the next flood event.
Unacceptable	One or more inspection items are rated as Unacceptable and would prevent the segment/system from performing as intended, or a serious deficiency noted in past inspections (previous Unacceptable items in a Minimally Acceptable overall rating) has not been corrected within the established timeframe, not to exceed two years.

If the levee in Cherry Tree Borough were to fail, certain structures and critical facilities would be at risk, such as Cherry Tree Borough Police Station and Cherry Tree Fire Department. The levee in Cherry Tree Borough is currently unacceptable and not eligible for federal funding under the PL 84-99 Rehabilitation and Inspection Program. This federal law gives the U.S. Army Corps the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood damage reduction projects that are damaged by floods.

Figure 27 - Potential Impacted Area in Case of Levee Failure

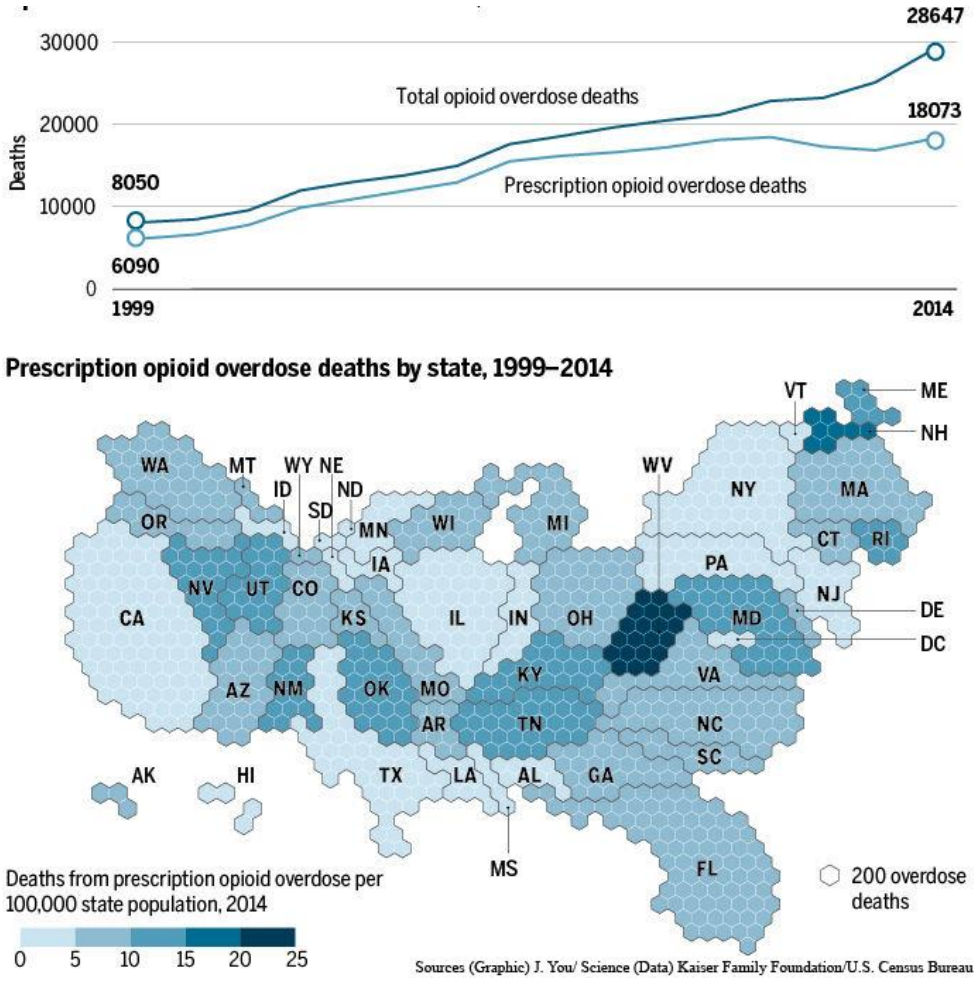


4.3.14. Opioid Epidemic

4.3.14.1 Location and Extent

Opioids are a class of drugs that interact with receptors on nerve cells in the body and brain, producing euphoria and pain relief (NIH, 2017). Opioid drugs are highly addictive, and the Commonwealth and Country at large have been experiencing an epidemic of opioid addiction and abuse, resulting in increasing numbers of overdose deaths from both prescribed (e.g. fentanyl) and illicit (e.g. heroine) opioids (see *Figure 28 - US Opioid Deaths 1999-2014 (Science, 2016)*). Overdose deaths from opioids occur when a large dose slows breathing, which can be especially likely when opioids are combined with alcohol or antianxiety drugs. While generally prescribed with good intentions, opioids can often be over-prescribed, resulting in addiction due to their highly addictive nature. The opioid crisis was declared to be a public health emergency October 26th 2017. While the declaration provides validation for the scope and severity of the problem, it was not accompanied by any release of funding for mitigating actions.

Figure 28 - US Opioid Deaths 1999-2014 (Science, 2016)



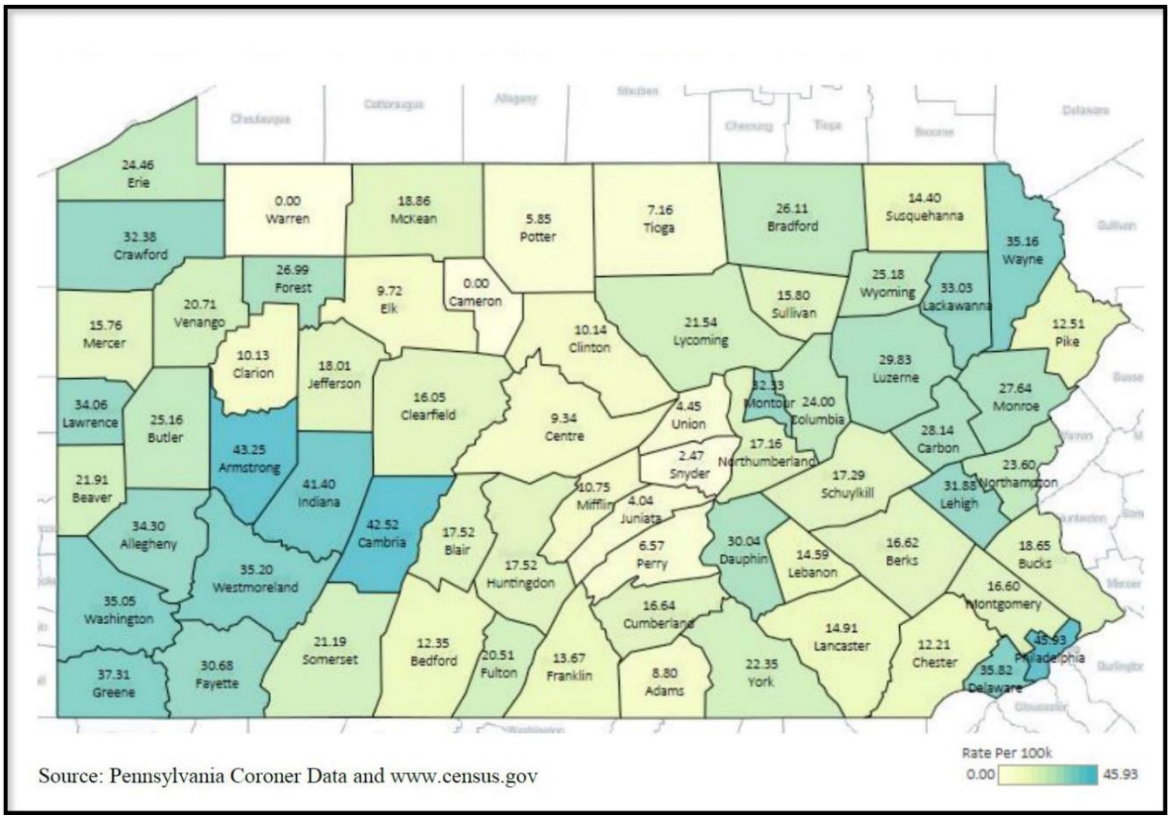
4.3.14.2 Range of Magnitude

According to the CDC, more than 140 Americans die every day from an opioid overdose. In 2015, 3,383 overdose deaths were reported in Pennsylvania, compared to 2014, when there were 2,742 overdose deaths in PA – an increase of 23.4 percent (DEA, 2015). Pennsylvania ranked 8th in the country for overdose deaths in 2014 at 21.9 deaths per 100,000 people (DEA, 2015).

4.3.14.3 Past Occurrence

For the year of 2015, Indiana County had 41.4 overdose deaths per 100,000 people, with 36 recorded overdose deaths occurring in the county (see *Figure 29 - PA Opioid Overdose Deaths 2015 (DEA, 2016)*), compared to 2014, where the county had 11.5 overdose deaths per 100,000 people with 10 recorded overdose deaths (DEA, 2015). According to a report from the Indiana County Coroner's Office on October 19th 2017, five opioid drugs were found in three recent deaths in Indiana County: three synthetic opioids (cyclopropyl fentanyl, para-fluorobutyryl fentanyl and methoxyacetyl fentanyl), despropionyl fentanyl which is a precursor chemical used in the production of fentanyl, and carfentanil which is an opioid used to immobilize large animals and is approximately 100 times more potent than fentanyl. The coroner's office recommends that all EMS responders carry Naloxone in the case of encountering an overdose.

Figure 29 - PA Opioid Overdose Deaths 2015 (DEA, 2016)



4.3.14.4 Future Occurrence

According to recent research, in states where medical marijuana has been permitted, overdose deaths from opioids have decreased about twenty-five percent, and the effect was even stronger five to six years after medical marijuana was allowed (Bachhuber et al., 2014). In those states where medical marijuana is permitted, each physician prescribed an average of 1826 fewer doses of pain medication each year (Bradford & Bradford, 2016), suggesting that medical marijuana could help prevent patients from ever being exposed to addicting opioids (Miller, 2016).

Rather than reduce pain, in some cases high doses of opioid painkillers can actually increase pain due to a phenomenon known as opioid-induced hyperalgesia (OIH). However, it is difficult to know how much of an influence OIH has on the opioid epidemic. Some researchers think that OIH could be increasing patients' pain and in turn, increasing their dosages and dependence on opioid drugs, suggesting that patients should work with lower dosages of opioids (Servick, 2016). However, other researchers are unsure of the importance of OIH for opioid users (Servick, 2016).

In the event of an opioid overdose, death can sometimes be prevented with the use of the drug naloxone. Emergency medical responders have access to the treatment, and as of 2015, naloxone is available without a prescription in Pennsylvania.

4.3.14.5 Vulnerability Assessment

Deaths from prescription opioid drugs like oxycodone, hydrocodone, and methadone have increased by more than four fold since 1999. In 2015, Indiana County was among the highest overdose death rates in the Commonwealth. While opioid addiction is often viewed as a criminal problem, a more productive way to view the epidemic can be to view opioid addiction as a chronic disease. This paradigm shift moves away from faulting the abuser and incentivizing quick cures, to viewing the abuser as a patient and working towards long-term management of the disease (ASAM, 2014).

The CDC offers a list of suggested actions and precautions that can be taken to prevent overdose deaths:

- Improve opioid prescribing to reduce exposure to opioids, prevent abuse, and stop addiction.
- Expand access to evidence-based substance abuse treatment, such as medication-assisted treatment, for people already struggling with opioid addiction.
- Expand access and use of naloxone- a safe antidote to reverse opioid overdose.
- Promote the use of state prescription drug monitoring programs, which give health care providers information to improve patient safety and prevent abuse.
- Implement and strengthen state strategies that help prevent high-risk prescribing and prevent opioid overdose.
- Improve detection of the trends of illegal opioid use by working with state and local public health agencies, medical examiners and coroners, and law enforcement.

4.3.15. Terrorism

4.3.15.1 Location and Extent

Following several serious international and domestic terrorist incidents during the 1990's and early 2000's, citizens across the United States paid increased attention to the potential for deliberate, harmful actions of individuals or groups. The term "terrorism" refers to intentional, criminal, malicious acts. The functional definition of terrorism can be interpreted in many ways. Officially, terrorism is defined in the Code of Federal Regulations as "*...the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.*" (28 CFR §0.85)

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

Critical facilities are either in the public or private sector that provide essential products and/or services to the general public. Critical facilities are often necessary to preserve the welfare and quality of life in the county, or fulfill important public safety, emergency response, and/or disaster recovery functions. Critical facilities identified in the county are shelters; gas, electric and communication utilities; hospitals and other health care facilities; water and wastewater treatment plants, hazardous waste sites; and schools.

In addition to critical facilities, the county contains at risk populations that should be factored into a vulnerability assessment. These populations include not only the residents and workforce in the county, but also the tourists that visit the area on a daily basis, those that are traveling through the county on any of the interstate or major highways and marginalized groups such as LGBTQ persons and racial minorities. Potential targets for attack include:

- Commercial facilities
- Abortion or family planning clinics and other organizations associated with controversial issues.
- Education facilities
- Events attracting large amounts of people
- Places of worship
- Industrial facilities, especially those utilizing large quantities of hazardous materials
- Transportation infrastructure
- Historical sites
- Government facilities

4.3.15.2 Range of Magnitude

Terrorism refers to the use of weapons of mass destruction (WMD) (including, biological, chemical, nuclear, and radiological weapons) arson, incendiary, explosive, armed attacks, industrial sabotage, intentional hazardous materials releases and cyber-terrorism. Within these general categories, however, there are many variations. Particularly in the area of biological and chemical weapons, there are a wide variety of agents and ways for them to be disseminated. Terrorist methods can take many forms, including:

- Active assailant
- Agri-terrorism
- Arson/incendiary attack
- Armed attack
- Biological agent
- Chemical agent
- Cyber-terrorism
- Conventional bomb or bomb threat
- Hazardous material release (intentional)
- Nuclear bomb
- Radiological agent

Cyber terrorism is becoming increasingly prevalent. Cyber terrorism can be defined as activities intended to damage or disrupt vital computer systems. These acts can range from taking control of a host website to using networked resources to directly cause destruction and harm. Protection of databases and infrastructure are the main goals for a safe cyber environment. Cyber terrorists can be difficult to identify because the internet provides a meeting place for individuals from various parts of the world. Individuals or groups planning a cyber-attack are not organized in a traditional manner, as they are able to effectively communicate over long distances without delay. The largest threat to institutions from cyber terrorism comes from any processes that are networked and controlled via computer. Any vulnerability that could allow access to sensitive data or processes should be addressed and any possible measures taken to harden those resources to attack.

4.3.15.3 Past Occurrence

Active assailants, as defined by the US Department of Homeland Security, is an individual actively engaged in killing or attempting to kill people in a confined area; in most cases, active assailants use firearm[s] and there is no pattern or method to their selection of victims. One of the more recent high-profile shootings took place at a country music festival in Las Vegas, Nevada, on October 1, 2017 where fifty-nine people were killed and over 500 injured, making it the deadliest mass shooting in modern US history. Another recent shooting occurred at the Pulse Nightclub in Orlando, Florida, on June 12, 2016 where the LGBTQ community was targeted – forty-nine people were killed and fifty three were wounded. A few other significant active shooter events include those that

occurred at Virginia Tech (April 2007), Sandy Hook Elementary School (December 2012), San Bernardino, California, (December 2015) an Aurora, Colorado movie theater (July 2012) and a church in Charleston, South Carolina (June 2015). A 2014 study by the Federal Bureau of Investigations (FBI) concluded that there has been a significant recent increase in frequency of active assailant incidents, and the vast majority (154 of 160 shooters between 2000 and 2013) were male (FBI, 2014). Of these 160 incidents, 45.6% took place in commercial environments, 24.4% took place in an educational environment, and the remaining 30% took place at other locations such as open spaces, military and other government properties, residential locations, houses of worship, and health care facilities (FBI, 2014). *Figure 30 - Active Assailant Incidents 2000-2013* summarizes the FBI's findings in the study. There are no active assailant related incidents on record in Indiana County.

Significant international terrorism incidents in the USA include: the World Trade Center bombing in 1993, the bombing of the Murrow Building in Oklahoma City in 1995, and the September 11th 2001 attack on the World Trade Center. Indiana County has not been directly impacted by any significant international terrorist incidents. However, terrorism cannot be predicted which necessitates Indiana County to profile and address the hazard, possible locations, and vulnerabilities of the county.

While the largest scale terrorist incidents have mainly had international stimulus, many other incidents are caused by home grown actors who may have become radicalized through hate groups either in real life or online, and who may have mental health struggles. Hate groups such as the Ku Klux Klan (KKK), Aryan Nation and, more recently, the Alt-Reich have in one way or another been a part of domestic terrorism in different forms.

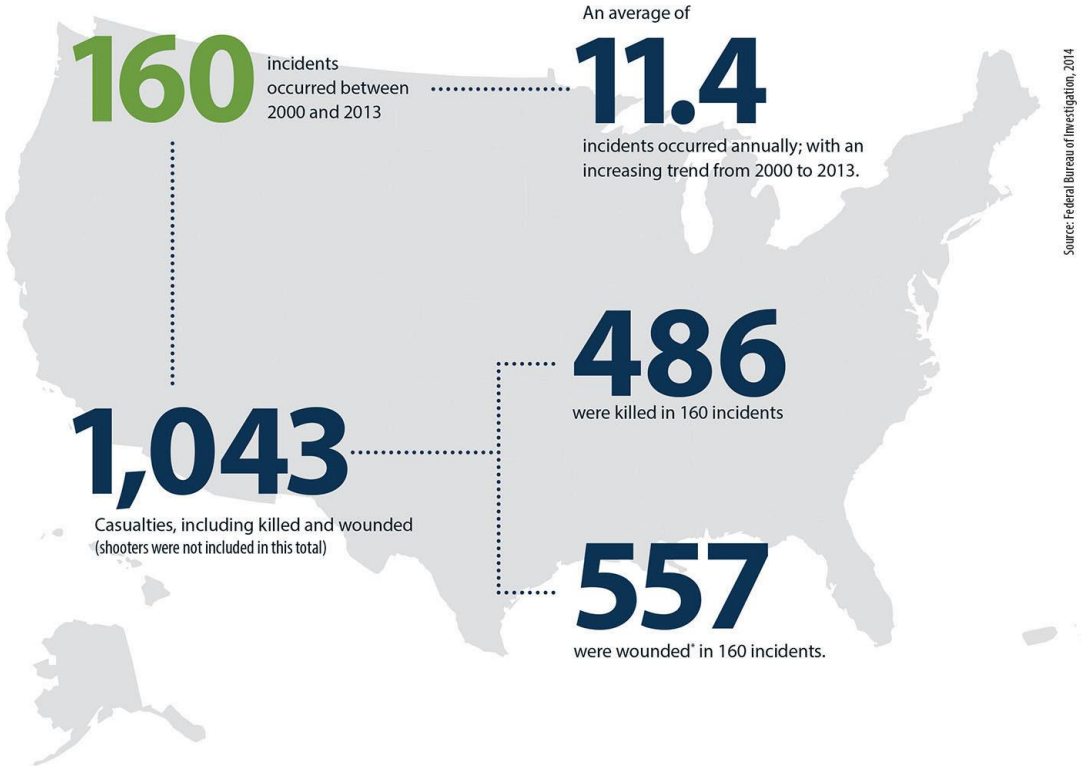
According to Knowledge Center™, the most common terrorist incident experienced by Indiana County are bomb threats. Knowledge Center reports of terrorist activity in Indiana County from 2007 to September 2017 can be found in *Table 39 - Knowledge Center™ Incidents*.

Table 39 - Knowledge Center™ Incidents

Knowledge Center™ Incidents		
Description	**Location**	**Date**
Bomb Detonated	Clymer Borough	4/3/2007
Bomb Threat	Burrell Township	9/9/2010
Bomb Threat	Burrell Township	10/29/2010
Stand Off	Rayne Township	8/10/2011
Bomb Threat	White Township	4/2/2011
Bomb Threat	Indiana	9/18/2012
Suspicious Package	Indiana Borough	3/27/2012
Bomb Threat	Indiana	8/23/2013
Bomb Threat	Indiana	11/6/2014

Knowledge Center™ Incidents		
Description	**Location**	**Date**
Bomb Threat	Indiana	11/17/2014
Bomb Threat - Salvation Army Retail Store	White Township	12/1/2014
Hostage Situation	Blairsville Borough	7/22/2015
Suspicious Package	Indiana	9/26/2017

Figure 30 - Active Assailant Incidents 2000-2013



4.3.15.4 Future Occurrence

The likelihood of Indiana County being a primary target for a major international terrorist attack is somewhat small. More likely, terrorist activity in Indiana County are bomb threats or incidents at schools. The local planning team gave this hazard a risk factor of 1.6.

4.3.15.5 Vulnerability Assessment

The probability of terrorist activity is more difficult to quantify than some other hazards. Instead of considering likelihood of occurrence, vulnerability is assessed in terms of specific assets. By identifying potentially at-risk terrorist targets in a community, planning efforts can be put in place to reduce the risk of attack. Planning should work towards identifying potentially at-risk critical facilities and systems in the community,

prioritizing those assets and locations, and identify their vulnerabilities relative to known potential threats.

All communities in Indiana County are vulnerable on some level, directly or indirectly, to a terrorist attack. However, communities where critical facilities are located should be considered more vulnerable. Site-specific assessments should be based on the relative importance of a particular site to the surrounding community or population, threats that are known to exist, and vulnerabilities, including:

Inherent vulnerability:

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

Tactical vulnerability:

Site Perimeter:

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

Building Envelope:

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

Facility Interior:

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

4.3.16. Transportation Accidents

4.3.16.1 Location and Extent

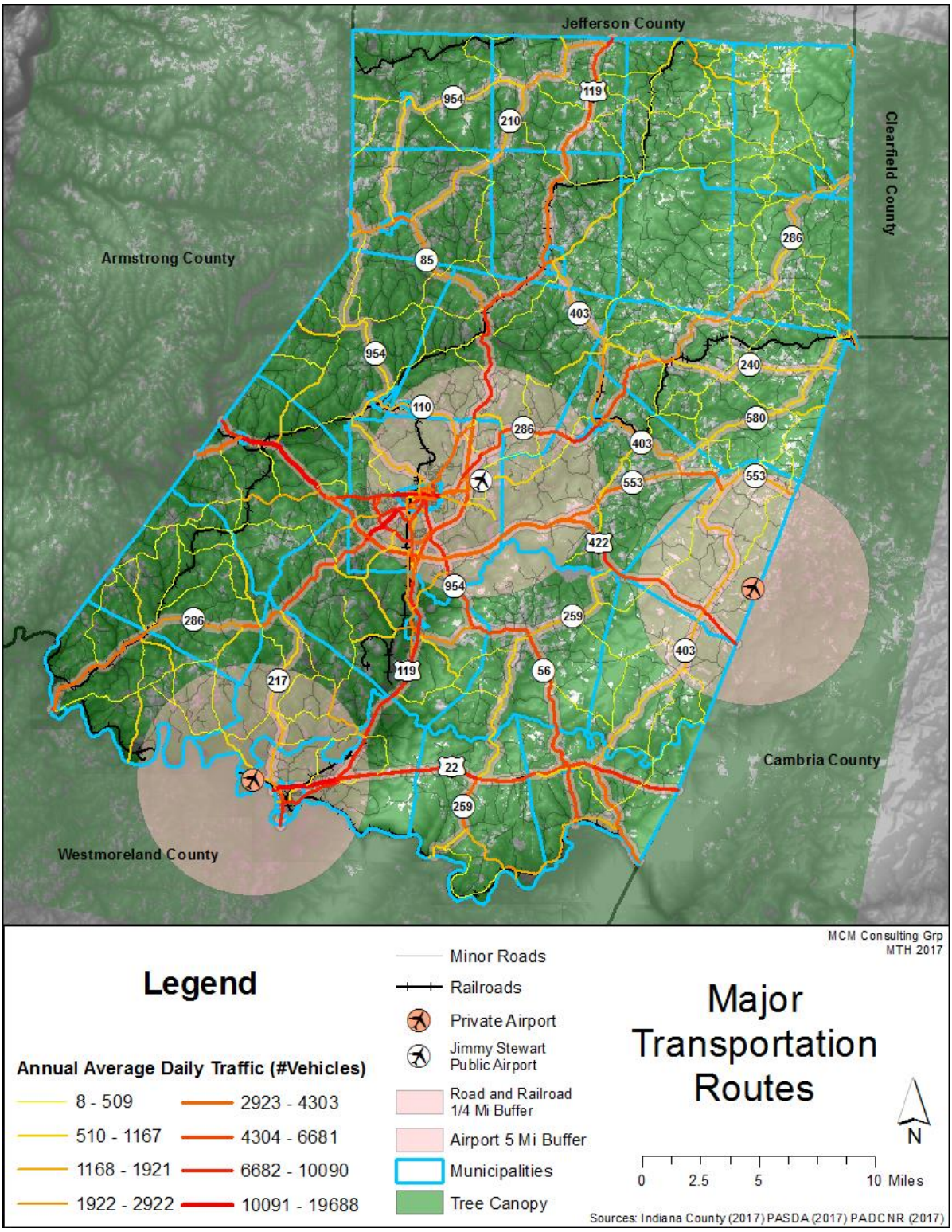
There is a total of approximately 2,066 miles of developed roads within Indiana County. This includes 809 miles of state and federal highways and 1,256 miles of secondary or municipal roads. Indiana County serves as a major transportation corridor and is heavily traveled by various motorists. Major highways include US Routes 422, 22, and 119. *Figure 31 - Major Transportation Routes* shows the major transportation systems in Indiana County.

The coal mining industry prompted the construction of numerous rail lines that run through Indiana County including– Norfolk Southern Railway (NS), CSX Transportation (CSX), and the R.J. Corman Rail Road Group. Each of these rail lines transport various forms of freight including hazardous materials such as coal. Certain areas are more prone to railway incidents because of heavier railroad traffic such as Blairsville Borough, Burrell Township, Cherryhill Township, and downtown Indiana. There is one public airport in the county, the Indiana County – Jimmy Stewart Airport, four private airports, and two heliports. For more details see *Table 40 - Airports.*

Table 40 - Airports

Indiana County Airports			
Name	**Address**	**Ownership**	**Usage**
Indiana County – Jimmy Stewart Airport - IDI	398 Airport Road Indiana, PA 15701	Public	Airport
Muddy Creek Airport – 4PS5	500 Jacobs Ferry Road Carmichael, PA 15320	Private	Airport
Blomster Field Farm Airport – 5PA0	129 Rutters Lane Carmichaels, PA 15320	Private	Airport
Travis Airport – PS98	1737 Goodville Road Smicksburg, PA 16256	Private	Airport
S W Jack Heliport	P.O. Box 697 Indiana, PA 15701	Private	Heliport
Indiana Hospital Heliport – PN32	835 Hospital Rd Indiana, PA 15701	Private	Heliport
Rayne Airport – PN36	Rd. 1 Marion Center, PA 15759	Private	Airport

Figure 31 - Major Transportation Routes



4.3.16.2 Range and Magnitude

Transportation accidents can result in death or serious injury and extensive property loss or damage. In the United States, over 37,000 people die in road crashes annually (ASIRT, 2017). Inclement weather and higher traffic volume and speed increase the risk for automobile accidents. Road and railway accidents in particular have a potential to result in hazardous material releases. Accidents involving hazardous materials can pose an environmental hazard and potentially contaminate the air, water and or soil. Hazardous material release is covered in more detail in *Section 4.3.12 Environmental Hazards*.

Aviation incidents most often occur near landing or take-off sites; a five-mile radius around each airport in Indiana County is considered high-risk areas.

4.3.16.3 Past Occurrence

The most serious transportation concerns in Indiana County involve State Routes 422, 119, and 88. *Table 41 - Transportation Incidents* shows the accidents that were reported to the Indiana County 9-1-1 as entered into the Indiana County Knowledge Center™ database between January 2007 and October 2017. Table 41 - Transportation Incidents shows crash statistics recorded by the Pennsylvania Department of Transportation between 2007 and 2016.

There have been several transportation incidents involving hazardous materials in Indiana County. One notable incident occurred in October 2015 involving a tractor trailer carrying ammonium hydroxide. The incident started from a flat tire that quickly erupted into flames on Route 22 westbound in Burrell Township. Hazmat was called immediately to the scene and fortunately no hazardous materials had leaked into any waterways and no one was injured.

Table 41 - Transportation Incidents

Indiana County Transportation Incidents		
Description	**Location**	**Date**
Tanker Truck Overturned	Black Lick Township	1/5/2007
School Bus Accident	Brush Valley Township	1/10/2007
School Bus Accident	Washington Township	2/28/2007
Water Rescue	White Township	3/11/2007
Plane Crash	North Mahoning Township	7/22/2007
Coal Truck Overturned	Burrell Township	7/24/2007
School Bus Accident	Canoe Township	9/21/2007
Aircraft Crash	White Township	9/30/2007
School Bus Accident	Burrell Township	10/4/2007
Railroad Incident	Blairsville Borough	10/19/2007
Railroad Incident	West Wheatfield Township	12/28/2007

Indiana County Transportation Incidents		
Description	**Location**	**Date**
Vehicle Accident with Fuel Spill	North Mahoning Township	2/26/2008
Vehicle Accident with Fatality	South Mahoning Township	8/24/2008
School Bus Accident with Car	White Township	10/31/2008
MVA with Sheriff Unit	White Township	12/12/2008
Aircraft Incident	White Township	1/4/2009
Coal Truck Overturned	Cherryhill Township	1/22/2009
Vehicle Accident with Fatality	West Wheatfield Township	2/4/2009
Vehicle Hit Pedestrian	Rayne Township	3/11/2009
Vehicle Accident with Fatality	White Township	6/3/2009
Vehicle Accident with Fatality	Burrell Township	12/3/2009
Vehicle Accident with Entrapment	Armstrong Township	5/31/2010
MVA – Road Closure	Cherryhill Township	7/10/2010
MVA with Fatality	Pine Township	11/19/2010
Hazardous Road Conditions	Burrell Township	1/17/2011
Bridge Closed	Blairsville Borough	3/8/2011
Aircraft Down	Indiana Borough	4/30/2011
MVA with Ambulance	White Township	7/30/2011
Aircraft Down	White Township	8/18/2011
Train Derailment	Blairsville Borough	11/11/2011
School Bus Accident	White Township	12/7/2011
Vehicle Accident with Ambulance	East Mahoning Township	1/4/2012
School Bus Accident	White Township	2/8/2012
Tractor Trailer Fire Hauling Tires	Pine Township	7/3/2012
Vehicle Accident with Fatality	Banks Township	9/13/2012
Vehicle Accident with School Bus	Rayne Township	1/15/2013
MVA with Fatality	East Mahoning Township	3/5/2013
Road Closure Involving Hazardous Materials	Center Township	4/9/2013
Light Plane Crash	Indiana Borough	6/17/2013
MVA with Fatality	Burrell Township	7/11/2013
MVA with Fatality	Black Lick Township	7/14/2013
Fatal MVA	Young Township	12/2/2013
Accident Involving Ambulance	East Wheatfield Township	12/10/2013
MVA with PennDOT Vehicle	Indiana Borough	1/12/2014
Fire Truck Accident	Indiana Borough	1/18/2014
MVA with Road Closure	Cherryhill Township	5/3/2014
School Bus Accident	Indiana Borough	10/2/2014
Vehicle Accident with Firefighter	Green Township	12/18/2014
Accident Involving School Bus	South Mahoning Township	1/13/2015
Accident Involving School Bus	Canoe Township	3/5/2015
Locomotive on Fire	West Wheatfield Township	4/20/2015
Plane Crash	Conemaugh Township	8/23/2015
MVA with Fatality	Indiana Borough	3/19/2016
MVA Involving Ambulance	Indiana Borough	7/16/2016

Indiana County Transportation Incidents		
Description	**Location**	**Date**
Diesel Fuel Leak	East Wheatfield Township	10/9/2016
Hazmat Incident on Rt. 22	Burrell Township	10/21/2015
MVA with School Bus	Indiana Borough	11/14/2016
MVC with Road Closure	Indiana Borough	3/10/2017
MVC Involving a Medic Unit	Center Township	3/29/2017
Fuel Spill	Indiana Borough	4/29/2017
Police Car Involved in MVC	Indiana Borough	5/29/2017
School Bus Accident	White Township	5/30/2017
Injured Dog on Railroad Track	Blairsville Borough	6/8/2017
MVC with Road Closure	Indiana Borough	10/6/2017

Over a nine-year period from 2007-2016, traffic accidents on both state and local roads have slowly decreased. Additionally, the total number of alcohol related accidents have also slowly decreased since 2007. *Table 42 - PennDOT Indiana County Crash Report* summarizes the overall crash data within a nine-year period for Indiana County. Information was gathered from PennDOT Crash Information Tool.

Table 42 - PennDOT Indiana County Crash Report

PennDOT Indiana County Crash Report											
Type	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
State Road	785	747	749	712	713	648	659	675	633	523	6844
Local Road	143	143	124	132	106	138	123	105	124	71	1200
Hazardous Truck	2	2	1	2	1	0	3	1	1	1	14
School Bus	5	4	4	1	5	3	3	2	5	6	38
Alcohol Related	110	107	92	92	96	92	87	80	82	77	915
Pedestrian	26	10	12	13	12	21	5	9	11	8	127
Fatal	14	11	18	22	15	8	12	9	15	17	141
Total Incidents	**386**	**436**	**356**	**391**	**396**	**418**	**369**	**382**	**389**	**315**	**3838**

4.3.16.4 Future Occurrence

Automobile accidents occur frequently, and typically occur more frequently than a rail or aviation accident. State Routes 422, 22, and 119 are the most traveled roadways in Indiana County. These roadways are also the most traveled by heavy freight vehicles which can often carry hazardous materials.

The average rate of aviation accidents occurs at a rate of one per 1.2 million flights; with the chances of dying in a plane crash at 1 in 11 million. Therefore, the likelihood of an aviation incident in Indiana County is considered low, however past events show that they are not impossible. While they are infrequent, railroad accidents have a greater likelihood of affecting larger areas of population and/or the environment.

The probability of transportation accidents is characterized as highly likely as defined by the risk factor methodology probability criteria. An overall risk factor of 2.8 has been determined by the local planning team using this methodology.

4.3.16.5 Vulnerability Assessment

The combination of high traffic volume and severe winter weather in the county increase the chances of traffic accidents occurring. Vulnerability for highway accidents falls within a ¼ mile of Interstate and US highways. Like highway incidents, rail incidents can impact populations living near rail lines. Vulnerability for rail incidents fall within a ¼ mile of the rail line. This includes populations in Armstrong, Banks, Canoe, East Mahoning, North Mahoning, South Mahoning, White, and Young townships, and in the boroughs of Cherry Tree, Clymer, Creekside, Ernest, Homer City, Indiana, Marion Center, Plumville, and Shelocta. Indiana County is also prone to aviation incidents near Indiana Borough and White Township based on their close proximity to the Indiana County – Jimmy Stewart Airport.

Table 43 - Transportation Vulnerability

Transportation Vulnerability (Indiana County GIS, 2017)				
Municipalities	Roads & Railroads		Airports	
	Addressable Structures	Critical Facilities	Addressable Structures	Critical Facilities
Armagh Borough	80	0	0	0
Armstrong Township	441	0	0	0
Banks Township	33	0	0	0
Black Lick Township	280	1	441	0
Blairsville Borough	2008	4	2709	5
Brush Valley Township	509	1	55	0
Buffington Township	218	0	196	0
Burrell Township	1491	1	1579	0
Canoe Township	0	0	0	0
Center Township	1483	2	1	0
Cherry Tree Borough	175	3	0	0
Cherryhill Township	672	1	591	0
Clymer Borough	1164	3	54	0
Conemaugh Township	470	0	255	0
Creekside Borough	222	1	0	0

Transportation Vulnerability (Indiana County GIS, 2017)				
Municipalities	**Roads & Railroads**		**Airports**	
	Addressable Structures	**Critical Facilities**	**Addressable Structures**	**Critical Facilities**
East Mahoning Township	133	0	0	0
East Wheatfield Township	1038	1	0	0
Ernest Borough	264	0	264	0
Glen Campbell Borough	70	0	0	0
Grant Township	10	0	0	0
Green Township	1065	1	0	0
Homer City Borough	694	1	0	0
Indiana Borough	2754	8	3855	9
Marion Center Borough	241	1	0	0
Montgomery Township	311	1	0	0
North Mahoning Township	413	0	0	0
Pine Township	881	1	1152	1
Plumville Borough	215	1	0	0
Rayne Township	591	0	700	0
Saltsburgh Borough	186	3	0	0
Shelocta Borough	107	0	0	0
Smicksburg Borough	67	0	0	0
South Mahoning Township	391	1	0	0
Washington Township	242	1	0	0
West Mahoning Township	149	0	0	0
West Wheatfield Township	762	2	0	0
White Township	1750	1	4466	3
Young Township	163	0	13	0
Total	**21743**	**40**	**16331**	**18**

4.3.17. Utility Interruptions

4.3.17.1 Location and Extent

Utility interruptions include any damage to electricity, natural gas, telecommunications, and water. Energy interruptions can be caused by severe solar storms, regional or national fuel or resource shortages, an electromagnetic pulse, public works failure, transmission facility accidents, and other major utility failures. Indiana County has utility services for electric, water, fuel and telecommunications, all of which can experience interruptions for several different reasons.

Often, utility interruptions are a secondary impact of other hazards such as severe thunderstorms, windstorms, tornadoes, winter storms and even traffic accidents. Heat waves may also result in rolling blackouts causing electric to not be available for an extended period of time. All municipalities within the county have a probability of experiencing a utility interruption.

Solar flares are concentrated releases of magnetic energy that emanate from sunspots, and can last for minutes or hours. Solar flares can also cause coronal mass ejections (CME) from the outer solar atmosphere which are large clouds of plasma and magnetic field which induce geomagnetic currents when they reach the surface of Earth. A combination of these events can be referred to as solar storms or solar weather. Solar weather only impacts Earth when it occurs on the side of the sun that is actively facing Earth. A severe solar storm can have a geographically wide-ranging impact that can last for days or weeks (NASA, 2016). Most significantly, a severe solar storm has the potential to disrupt power grids, resulting is rolling blackouts.

Minor solar flares have no negative impacts on Earth thanks to the protection afforded by Earth's magnetic field and atmosphere. In fact, minor solar flares cause beautiful visual displays known as the Northern Lights or Aurora Borealis. However, severe solar storms can cause an electromagnetic pulse (EMP) that is able to break through Earth's magnetic field and send current to Earth's surface, inducing geomagnetic currents. Geomagnetic ally induced currents (GICs) impact the electrical grid and can cause transformers to burn and fail, potentially knocking out wide swatches of electricity infrastructure resulting in blackouts (Phillips, 2009).

4.3.17.2 Range of Magnitude

At a minimum, energy emergencies can cause short term disruption in the daily operation of business, government, healthcare, and private citizens. A loss of energy and other utility services can have numerous impacts including, losing perishable foods and medicines, loss of functionality at health care and emergency medical facilities, limited water distribution capabilities, losing heating and air conditioning, losing telecommunication and internet services, basement flooding (sump pump failure), and lack of lighting. Energy emergencies can be most troubling when temperatures are at extremes due to the

loss of heating or cooling capabilities and the added hazard that extreme heat and extreme cold present. Fuel shortages can result in increased cost of automotive gasoline, long lines at gas stations, disruptions in freight traffic, and shortage of heating fuels. On a small scale, these hazards can be a nuisance, but impacts can be devastating when an energy emergency has a large scope and impacts wide areas and a large population. Severe energy emergencies are often regional or national events.

4.3.17.3 Past Occurrence

The OPEC oil embargo of 1973 – 1974 caused fuel shortages and long lines at gasoline pumps nationwide. Government actions were taken to ensure that fuels and power were available for emergency and priority users. Between 1976 and 1977 there was a rapid increase in fuel prices accompanied by a severe winter resulting in a similar if less extreme fuel shortage. Those two events as well as the national gasoline shortage in 1979 emphasized the vulnerability of all residents in Indiana County to energy emergencies.

Minor outages of electric and phone services occur annually. A significant outage occurred on November 11, 2013 when power and phone lines were lost at Indiana Regional Medical Center. In Indiana County, power outages are most often associated with winter storms and wind storms. *Table 44 - Electrical Service Interruptions* show events reported to the Knowledge Center from 2007 until September 2017.

Electricity

Table 44 - Electrical Service Interruptions

Electrical Service Interruptions		
Description	**Location**	**Date**
Power Outage	Clymer Borough	3/2/2007
Power Outage	Saltsburg Borough	3/22/2007
Power Outage	Canoe Township	12/13/2007
Power Outage	Indiana	5/28/2009
Power Outage at Radio Tower	Cherryhill Township	8/10/2009
Power Outage at Tower Site	Cherryhill Township	8/11/2009
Power Outage	Blairsville Borough	3/9/2011
Power Outage	Glen Campbell Borough	7/30/2011
Power Outage	White Township	8/6/2011
Power Outage/MVA	South Mahoning Township	1/2/2012
Power Outage	Homer City Borough	8/27/2013
Power Outage at Medical Center	White Township	11/12/2013
Power Outage	White Township	12/26/2013
Power Outage	Blairsville Borough	7/14/2014
Power Outage	Marion Center Borough	5/18/2015
Power Outage – Tornado Warning	Pine Township	6/14/2015
Power Outage	Center Township	8/19/2015
Power Outage – Western Area	Indiana Borough	12/11/2015

Electrical Service Interruptions		
Description	**Location**	**Date**
Power Outage	Cherryhill Township	12/28/2015
Power Outage	White Township	3/8/2017
Power Outage – Stephenson Hall IUP	White Township	9/12/2017

Telecommunications

Table 45 - Telephone Service Interruptions

Telephone Service Interruptions		
Description	**Location**	**Date**
Telephone Outage	Young Township	3/13/2008
9-1-1 Phone Issue	Indiana	12/27/2008
Telephone Interruption/Outage	Indiana	6/28/2009
Power Outage at Radio Tower	Cherryhill Township	8/11/2009
Phone/communication Problems	West Wheatfield Township	8/14/2009
Disruption of Phone Service	Green Township	10/15/2009
Telephone Outage	Green Township	11/1/2009
Telephone Service Outage	Armstrong Township	2/9/2010
Telephone Problems	Indiana	2/1/2011
Verizon Phone Outage	Indiana	3/1/2011
Verizon Cellular Outage	Indiana	11/5/2011
Phone Outage	White Township	9/25/2012
Phone Problems	White Township	8/23/2013
Mobile Phone Tower Issue	Indiana	10/30/2013
Phone Outage at Medical Center	White Township	11/12/2013
Phone Outage	Saltsburg Borough	10/17/2014
Admin Phone Line Issue	Indiana	1/29/2015
9-1-1 Phone Outage	Indiana	7/24/2015
9-1-1 Phone Outage	Indiana	10/27/2015
Public Safety Phone Outage	Indiana	4/15/2016

Water

Table 46 - Water Service Interruptions

Water Service Interruptions		
Description	**Location**	**Date**
Water Main Break	Ernest Borough	1/28/2007
Water Main Break	Indiana Borough	1/28/2007
Water Main Break	Indiana Borough	7/9/2007
Water Main Break	Blairsville Borough	7/9/2009
Water Shortage	Glen Campbell Borough	2/13/2010
Water Shortage	Banks Township	9/13/2010
Water Conservation	Blairsville Borough	7/19/2012

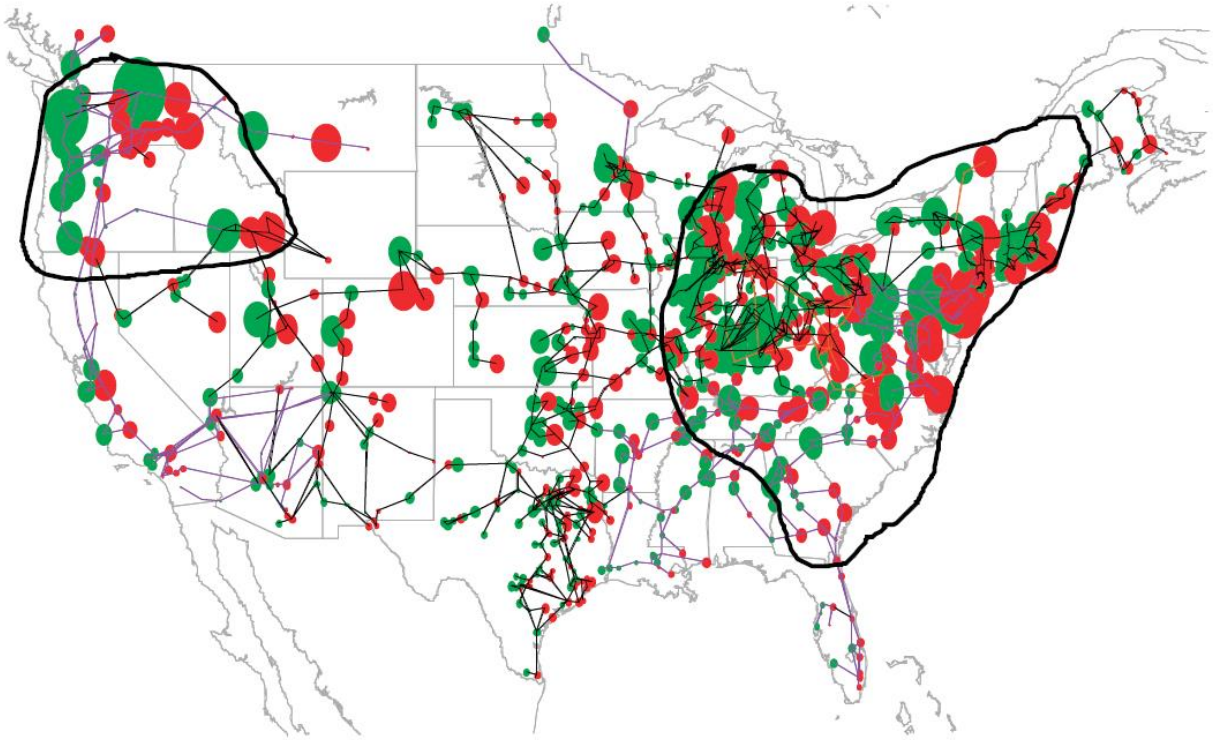
Water Service Interruptions		
Description	**Location**	**Date**
Water Outage	Cherryhill Township	7/27/2012
Water Main Break	White Township	11/1/2012
Boil Water Notice	Indiana	4/25/2014
Hospital Water Outage	White Township	7/3/2014
Water Main Break	Center Township	12/10/2015

4.3.17.4 Future Occurrence

Minor, short-term outage events may occur several times a year for any given area in Indiana County, while major, widespread and long-term events may take place once every few years. Utility interruptions are difficult to predict, even though minor interruptions to utilities may occur several times a year. Utility interruptions are most often by-products of severe weather events. Therefore, citizens should also prepare for such interruptions in addition to severe weather events alone.

As utility infrastructure ages, interruption events could occur more frequently. Utility providers can reduce Indiana County's vulnerability to power outages by implementing improvements. The probability of transportation accidents is characterized as highly likely as defined by the risk factor methodology probability criteria. An overall risk factor of 3.1 has been determined by the local planning team using this methodology.

Figure 32 - Potential Electricity Grid Failure



Scenario showing effects of a 4800 nT/min geomagnetic field disturbance at 50° geomagnetic latitude scenario. The regions outlined are susceptible to system collapse due to the effects of the GIC disturbance; the impacts would be of unprecedented scale and involve populations in excess of 130 million. SOURCE: J. Kappenman, Metatech Corp., "The Future: Solutions or Vulnerabilities?," presentation to the space weather workshop, May 23, 2008.

4.3.17.5 Vulnerability Assessment

All municipalities in Indiana County are vulnerable to utility interruptions. Critical facilities such as emergency medical facilities, retirement homes and senior centers are particularly vulnerable to power outages. While back-up generators are often used at these facilities, loss of electricity accompanied by temperature extremes can be dangerous for elderly and other high-risk populations. Appendix E provides a list of critical facilities located in Indiana County.

Extreme temperatures can disrupt fuel and electricity supplies, with extreme cold weather triggering a higher demand for heating oil and natural gas as well as causing low gas pressure, and extreme hot weather possibly overloading electrical grids resulting in blackouts.

Pennsylvania Power and Lighting implemented a dispatch communications system called Mobile Operations Management (MOM). This system links every Pennsylvania

Power and Lighting crew to a central emergency response coordination center. This technology has reduced average outage times in Pennsylvania from an average of 108 minutes between 2004 and 2008 to seventy-one minutes in 2009.

The National Oceanic and Atmospheric Administration (NOAA) monitors solar activity from the Space Weather Prediction Center (SWPC), and is able to alert power grid operators of the impending geomagnetic storm so they may make efforts to protect the grid from GICs (Baker et al., 2008). Events such as the 1989 Hydro-Quebec blackout have illuminated the hazard that solar storms pose to electricity infrastructure, however modern power grids are more vulnerable than ever. Power grids have become increasingly interconnected, improving efficiency in many ways, but also making them more vulnerable to wide ranging rolling failures as illustrated in *Figure 32 - Potential Electricity Grid Failure* (Baker et al., 2008).

Geomagnetic storms can cause permanent damage to transformers that could result in much longer restoration times than experienced in the 1989 Hydro-Quebec outage. Transformer damage occurs when GICs cause excessive internal heating resulting in melting and burning of many large-amperage copper windings and leads. Such damage cannot be repaired, and the damaged transformer must be replaced. Transformers are extremely large and heavy apparatuses, and replacement can be a long process, suggesting that efforts should be taken to protect resident transformers from GICs. A workshop held by the Committee on the Societal and Economic Impacts of Severe Space Weather Events offered solutions to mitigating negative impacts of GICs, suggesting that supplemental transformer neutral ground resistors should be installed because they are relatively inexpensive, have low engineering trade-offs, and can produce sixty to seventy percent reduction of GIC levels during severe solar storms (Baker et al., 2008).

The Department of Homeland Security (DHS) has a Solar Storm Mitigation effort, which "aims to provide owners and operators of the electricity grid with advanced and actionable information about anticipated GCI current levels in the event of a solar storm" (US GAO, 2017). According to the DHS, when provided with accurate solar storm warnings, utility operators can "make operational decisions to mitigate the impacts from solar storms. This can range from canceling maintenance work to temporarily shutting down vulnerable grid components and preventing permanent damage" (DHS, 2015).

4.4. Hazard Vulnerability Summary

4.4.1. Methodology

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

RF values were obtained by assigning varying degrees of risk to five categories for each of the hazards profiled in the HMP update. Those categories include *probability*, *impact*, *spatial extent*, *warning time and duration*. Each degree of risk was assigned a value ranging from one to four. The weighting factor agreed upon by the planning team is shown in *Table 47 - Risk Factor Approach Summary*. To calculate the RF value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories equals the final RF value, as demonstrated in the following example equation:

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

Table 47 - Risk Factor Approach Summary summarizes each of the five categories used for calculating a RF for each hazard. According to the weighting scheme applied, the highest possible RF value is 4.0.

Table 47 - Risk Factor Approach Summary

Summary of Risk Factor Approach Used to Rank Hazard Risk.					
RISK ASSESSMENT CATEGORY	**DEGREE OF RISK**				**WEIGHT VALUE**
	LEVEL	**CRITERIA**		**INDEX**	
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY		1	30%
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY		2	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY		3	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY		4	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.		1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.		2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.		3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.		4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED		1	20%
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED		2	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED		3	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED		4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**MORE THAN 24 HRS**	SELF-DEFINED	*(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	1	10%
	12 TO 24 HRS	SELF-DEFINED		2	
	6 TO 12 HRS	SELF-DEFINED		3	
	LESS THAN 6 HRS	SELF-DEFINED		4	
DURATION *How long does the hazard event usually last?*	**LESS THAN 6 HRS**	SELF-DEFINED	*(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	1	10%
	LESS THAN 24 HRS	SELF-DEFINED		2	
	LESS THAN 1 WEEK	SELF-DEFINED		3	
	MORE THAN 1 WEEK	SELF-DEFINED		4	

4.4.2. Ranking Results

Using the methodology described in Section 4.4.1, *Table 48 - Risk Factor Assessment* lists the risk factor calculated for each of the seventeen potential hazards identified in the 2018 HMP. *It should be noted that the flooding, flash flooding, ice jam flooding, tornado and windstorm were ranked individually instead of together*. Hazards identified as *high* risk have risk factors greater than 2.5. Risk Factors ranging from 2.0 to 2.4 were deemed *moderate* risk hazards. Hazards with Risk Factors 1.9 and less are considered *low* risk.

Table 48 - Risk Factor Assessment

Indiana County Hazard Ranking Based on RF Methodology.							
HAZARD RISK	HAZARD	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROBABILITY	ECONOMIC IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Opioid Epidemic	4	4	4	4	4	**4**
	Invasive Species	4	3	4	1	4	**3.4**
	Pandemic, Epidemic and Infectious Disease	4	3	4	1	4	**3.4**
	Flash Flooding	4	3	2	4	2	**3.1**
	Utility Interruptions	4	3	2	4	2	**3.1**
	Environmental Hazards	4	2	3	4	1	**2.9**
	Windstorm	3	3	2	4	3	**2.9**
	Transportation Accidents	4	3	1	4	1	**2.8**
	Droughts and Water Supply Deficiency	2	2	4	1	4	**2.5**
	Subsidence	3	2	1	4	4	**2.5**
	Radon	4	2	1	1	4	**2.5**
MODERATE	Winter Storm	3	2	3	1	2	**2.4**
	Flooding (100 Year)	3	2	2	1	4	**2.4**
	Dam Failure	1	3	2	4	2	**2.2**
	Civil Unrest/Disturbance	3	2	1	4	1	**2.2**
	Tornado	2	2	1	4	3	**2.1**
LOW	Earthquake	1	2	2	4	1	**1.8**
	Levee Failure	1	1	1	4	4	**1.6**
	Terrorism	2	1	1	4	1	**1.6**
	Landslides	1	1	1	4	2	**1.4**
	Ice Jam Flooding	1	1	1	1	4	**1.3**

Based on these results, there are eleven *high* risk hazards, five *moderate* risk hazards and five *low* risk hazards in Indiana County. Mitigation actions were developed for all high, moderate and low risk hazards (see Section 6.4). The threat posed to life and property for moderate and high-risk hazards is considered significant enough to warrant the

need for establishing hazard-specific mitigation actions. Mitigation actions related to future public outreach and emergency service activities are identified to address low risk hazard events.

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk to each hazard *Table 49 - Countywide Risk Factor by Hazard* shows the different municipalities in Indiana County and whether their risk is greater than (>), less than (<), or equal to (=) the risk factor assigned to the county as a whole. This table was developed by the consultant based on the findings in the hazard profiles located in sections 4.3.1 through 4.3.17. The flooding hazard (100-year flood) was assessed by each municipality for risk factor. These risk factor assessment results are identified per municipality below.

Table 49 - Countywide Risk Factor by Hazard

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk											
Identified Hazard And Corresponding Countywide Risk Factor											
JURISDICTION	Opioid Epidemic	Invasive Species	Pandemic, Epidemic and Infectious Disease	Flash Flooding	Utility Interruptions	Environmental Hazards	Windstorms	Transportation Accidents	Drought and Water Supply	Subsidence	Radon
	4.0	***3.4***	***3.4***	***3.1***	***3.1***	***2.9***	***2.9***	***2.8***	***2.5***	***2.5***	***2.5***
Armagh Borough	=	=	=	>	=	=	=	=	=	<	=
Armstrong Township	=	=	=	=	=	=	=	=	=	<	=
Banks Township	=	=	=	=	=	=	=	=	=	=	=
Black Lick Township	=	=	=	=	=	=	=	=	=	=	=
Blairsville Borough	=	=	=	>	=	=	=	=	=	=	=
Brush Valley Township	=	=	=	=	=	=	=	=	=	=	=
Buffington Township	=	=	=	=	=	=	=	=	=	=	=
Burrell Township	=	=	=	=	=	=	=	=	=	>	=
Canoe Township	=	=	=	=	=	=	=	=	=	>	=
Center Township	=	=	=	=	=	=	=	=	=	>	=
Cherry Tree Borough	=	=	=	>	=	=	=	=	=	<	=
Cherryhill Township	=	=	=	=	=	=	=	=	=	>	=
Clymer Borough	=	=	=	>	=	=	=	=	=	=	=
Conemaugh Township	=	=	=	=	=	=	=	=	=	>	=
Creekside Borough	=	=	=	>	=	=	=	=	=	=	=
East Mahoning Township	=	=	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk											
Identified Hazard And Corresponding Countywide Risk Factor											
JURISDICTION	Opioid Epidemic	Invasive Species	Pandemic, Epidemic and Infectious Disease	Flash Flooding	Utility Interruptions	Environmental Hazards	Windstorms	Transportation Accidents	Drought and Water Supply	Subsidence	Radon
	4.0	***3.4***	***3.4***	***3.1***	***3.1***	***2.9***	***2.9***	***2.8***	***2.5***	***2.5***	***2.5***
East Wheatfield Township	=	=	=	=	=	=	=	=	=	=	=
Ernest Borough	=	=	=	=	=	=	=	=	=	=	=
Glen Campbell Borough	=	=	=	=	=	=	=	=	=	<	=
Grant Township	=	=	=	=	=	=	=	=	=	>	=
Green Township	=	=	=	=	=	=	=	=	=	>	=
Homer City Borough	=	=	=	>	=	=	=	=	=	=	=
Indiana Borough	>	=	>	>	=	=	=	=	=	=	=
Indiana University	>	=	>	>	=	=	=	=	=	=	=
Marion Center Borough	=	=	=	>	=	=	=	=	=	=	=
Montgomery Township	=	=	=	=	=	=	=	=	=	=	=
North Mahoning Township	=	=	=	=	=	=	=	=	=	<	=
Pine Township	=	=	=	=	=	=	=	=	=	>	=
Plumville Borough	=	=	=	>	=	=	=	=	=	>	=
Rayne Township	=	=	=	=	=	=	=	=	=	>	=
Saltsburgh Borough	=	=	=	>	=	=	=	=	=	<	=
Shelocta Borough	=	=	=	>	=	=	=	=	=	>	=
Smicksburg Borough	=	=	=	=	=	=	=	=	=	<	=
South Mahoning Township	=	=	=	=	=	=	=	=	=	=	=
Washington Township	=	=	=	=	=	=	=	=	=	=	=
West Mahoning Township	=	=	=	=	=	=	=	=	=	<	=
West Wheatfield Township	=	=	=	=	=	=	=	=	=	>	=
White Township	>	=	>	>	=	=	=	=	=	<	=
Young Township	=	=	=	=	=	=	=	=	=	>	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk										
Identified Hazard And Corresponding Countywide Risk Factor										
JURISDICTION	Winter Storm	Flooding	Dam Failure	Civil Unrest / Disturbance	Tornado	Earthquake	Levee Failure	Terrorism	Landslides	Ice Jam Flooding
	2.4	*2.4*	*2.2*	*2.2*	*2.1*	*1.8*	*1.6*	*1.6*	*1.4*	*1.3*
Armagh Borough	=	*1.0*	=	=	=	=	<	=	=	=
Armstrong Township	=	*1.9*	=	=	=	=	<	=	=	=
Banks Township	=	2.4	=	=	=	=	<	=	=	=
Black Lick Township	=	1.5	=	=	=	=	<	=	=	=
Blairsville Borough	=	2.4	=	=	=	=	<	=	=	=
Brush Valley Township	=	2.3	=	=	=	=	<	=	=	=
Buffington Township	=	2.4	=	=	=	=	<	=	=	=
Burrell Township	=	2.4	=	=	=	=	<	=	=	=
Canoe Township	=	2.4	=	=	=	=	<	=	=	=
Center Township	=	2.7	=	=	=	=	<	=	=	=
Cherry Tree Borough	=	2.4	=	=	=	=	>	=	=	=
Cherryhill Township	=	2.4	=	=	=	=	<	=	=	>
Clymer Borough	=	2.4	=	=	=	=	<	=	=	=
Conemaugh Township	=	2.4	=	=	=	=	<	=	=	=
Creekside Borough	=	2.4	=	=	=	=	<	=	=	=
East Mahoning Township	=	2.3	=	=	=	=	<	=	=	=
East Wheatfield Township	=	3.0	=	=	=	=	<	=	=	=
Ernest Borough	=	1.6	=	=	=	=	<	=	=	=
Glen Campbell Borough	=	2.4	=	=	=	=	<	=	=	=
Grant Township	=	2.4	=	=	=	=	<	=	=	=
Green Township	=	2.6	=	=	=	=	<	=	=	=
Homer City Borough	=	2.4	=	=	=	=	<	=	=	=
Indiana Borough	=	2.4	=	>	=	=	<	=	=	=
Indiana University	=	2.4	=	>	=	=	<	=	=	=
Marion Center Borough	=	2.4	=	=	=	=	<	=	=	=
Montgomery Township	=	2.4	=	=	=	=	<	=	=	=
North Mahoning Township	=	1.5	=	=	=	=	<	=	=	=
Pine Township	=	1.6	=	=	=	=	<	=	=	=
Plumville Borough	=	1.1	=	=	=	=	<	=	=	=
Rayne Township	=	2.2	=	=	=	=	<	=	=	=
Saltsburgh Borough	=	2.3	=	=	=	=	<	=	=	=
Shelocta Borough	=	2.4	=	=	=	=	<	=	=	=
Smicksburg Borough	=	2.4	=	=	=	=	<	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk										
Identified Hazard And Corresponding Countywide Risk Factor										
JURISDICTION	Winter Storm	Flooding	Dam Failure	Civil Unrest / Disturbance	Tornado	Earthquake	Levee Failure	Terrorism	Landslides	Ice Jam Flooding
	2.4	*2.4*	*2.2*	*2.2*	*2.1*	*1.8*	*1.6*	*1.6*	*1.4*	*1.3*
South Mahoning Township	=	1.7	=	=	=	=	<	=	=	=
Washington Township	=	2.4	=	=	=	=	<	=	=	=
West Mahoning Township	=	2.4	=	=	=	=	<	=	=	=
West Wheatfield Township	=	2.4	=	=	=	=	<	=	=	=
White Township	=	2.4	=	=	=	=	<	=	=	=
Young Township	=	2.4	=	=	=	=	<	=	=	=

4.4.3. Potential Loss Estimates

Based on various kinds of available data, potential loss estimates were established for flood, flash flood, and ice jam flooding, tornado and windstorms. Estimates provided in this section are based on HAZUS-MH, version 3.2, geospatial analysis, and previous events. Estimates are considered *potential* in that they generally represent losses that could occur in a countywide hazard scenario. In events that are localized, losses may be lower, while regional events could yield higher losses.

Potential loss estimates have four basic components, including:

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

The parcel data used in this plan includes building values provided in the county tax assessment database. These values are representative of replacement value alone; content loss, functional loss, and displacement cost are not included.

Flooding Loss Estimation:

Flooding is a high risk natural hazard in Indiana County. The estimation of potential loss in this assessment focuses on the monetary damage that could result from flooding. The potential property loss was determined for each municipality and for the entire county. The quantity of commercial and residential structures in each Indiana County municipality is outlined in section 4.3.3 of the flooding hazard profile.

MCM Consulting Group conducted a county wide flood study using the Hazards U.S. Multi-Hazard (HAZUS-MH) software that is provided by the Federal Emergency Management Agency. This software is a standardized loss estimation software deriving economic loss, building damage, content damage and other economic impacts that can be used in local flood mitigation planning activities.

Using HAZUS-MH, total building-related losses from a 1%-annual-chance flood in Indiana County are estimated to equal $111,260,000. Residential occupancies make up 46.29% of the total estimated building-related losses. Total economic loss, including replacement value, content loss, functional loss and displacement cost, from a county-wide 1%-annual-chance flood are estimated to equal $112,180,000. These estimates provide a general baseline for anticipated damage and loss values. The estimates appear to be lower than anticipated. Additional loss estimates will be completed during the next planning period.

4.4.4. Future Development and Vulnerability

Risk and vulnerability to natural and human-caused hazard events are not static. Risk will increase or decrease as counties and municipalities see changes in land use and development as well as changes in population. Indiana County is expected to experience a variety of factors that will, in some areas, increase vulnerability to hazards while in other areas, vulnerability may stay static or even be reduced.

The total population in Indiana County decreased less than one percent between 2000 and 2000 from 89,605 to 88,880. The population changes can be seen in *Table 50 - 2000-2015 Population Change*. This overall change reflects areas of growth in ten municipalities along with no change or a loss in population in the remaining twenty-eight. Of the ten municipalities that grew in this time period, three experienced growth of over 10 percent: Burrell Township grew by 17.3%, West Mahoning Township grew by 20.3%, and White Township grew by 12.7%. The 2015 estimated population for Indiana County is 86,977 which is 1,903 less than the 2010 census. There was an overall decrease of 2.1% in population based on the estimate. There were only two municipalities that had an estimated in-crease with the 2015 estimate as identified in *Table 50 - 2000-2015 Population Change* below.

White Township surpassed Indiana Borough as the most populous municipality following the 2010 US Census. White Township completed a Comprehensive Plan in 2008 and regarding its growth status, it stated that “The development target areas identified

future development areas of the township have the greatest near-term development potential of anywhere within the community. They are primarily tracts of land that are presently being used for agriculture, or vacant, but lie near major development, major road corridors, or near existing infrastructure. The township anticipates that these areas will absorb most future growth and development. To prevent land use conflicts and maximize good site planning, the township will look at a wide range of planning tools." For the few growing municipalities, such as White Township, the increased population will translate into a greater vulnerability to hazards that may impact a more dense population (for example - pandemic, transportation accidents, and environmental hazards).

With concentrated and limited growth, the majority of Indiana County is not facing residential development pressure. Existing locations that already feature dense population and are experiencing demographic shifts will continue to face an increased vulnerability and loss estimates in most hazard events. However, the more remote and sparsely populated municipalities face higher vulnerability because they do not have as easy access to care facilities or response personnel.

Table 50 - 2000-2015 Population Change

Municipality	2000 Population	2010 Population	2015 Estimated Population	Percent of Change
Armagh Borough	131	122	118	-3.3%
Armstrong Township	3,090	2,998	2,902	-3.2%
Banks Township	997	1,018	976	-4.1%
Black Lick Township	1,317	1,237	1,190	-3.8%
Blairsville Borough	3,607	3,412	3,319	-2.7%
Brush Valley Township	1,881	1,858	1,790	-3.7%
Buffington Township	1,275	1,328	1,299	-2.2%
Burrell Township	3,746	4,393	4,220	-3.9%
Canoe Township	1,670	1,505	1,450	-3.7%
Center Township	4,876	4,764	4,582	-3.8%
Cherryhill Township	2,842	2,765	2,685	-2.9%
Cherry Tree Borough	443	364	353	-3.0%
Clymer Borough	1,547	1,357	1,303	-4.0%
Conemaugh Township	2,437	2,294	2,209	-3.7%

Municipality	2000 Population	2010 Population	2015 Estimated Population	Percent of Change
Creekside Borough	323	309	300	-2.9%
East Mahoning Township	1,196	1,077	1,033	-4.1%
East Wheatfield Township	2,607	2,366	2,275	-3.8%
Ernest Borough	501	462	444	-3.9%
Glen Campbell Borough	306	245	237	-3.3%
Grant Township	696	741	709	-4.3%
Green Township	3,995	3,839	3,670	-4.4%
Homer City Borough	1,844	1,707	1,638	-4.0%
Indiana Borough	14,895	13,975	14,061	0.6%
Marion Center Borough	451	451	433	-4.0%
Montgomery Township	1,706	1,568	1,504	-4.1%
North Mahoning Township	1,383	1,568	1,371	-4.0%
Pine Township	2,140	2,033	1,948	-4.2%
Plumville Borough	342	307	298	-2.9%
Rayne Township	3,292	2,992	2,877	-3.8%
Saltsburgh Borough	955	873	830	-4.9%
Shelocta Borough	127	130	126	-3.1%
Smicksburg Borough	49	46	45	-2.2%
South Mahoning Township	1,852	1,841	1,768	-4.0%
Washington Township	1,805	1,808	1,732	-4.2%
West Mahoning Township	1,128	1,357	1,302	-4.1%
West Wheatfield Township	2,375	2,314	2,218	-4.1%
White Township	14,034	15,821	16,063	1.5%
Young Township	1,744	1,775	1,699	-4.3%
TOTAL	89,605	88,880	86,977	-2.1%

5. Capability Assessment

5.1. Update Process Summary

The capability assessment is an evaluation of Indiana County's governmental structure, political framework, legal jurisdiction, fiscal status, policies and programs, regulations and ordinances and resource availability. Each category is evaluated for its strengths and weaknesses in responding to, preparing for and mitigating the effects of the profiled hazards. A capability assessment is an integral part of the hazard mitigation planning process. Here, the county and municipalities identify, review and analyze what they are currently doing to reduce losses and identify the framework necessary to implement new mitigation actions. This information will help the county and municipalities evaluate alternative mitigation actions and address shortfalls in the mitigation plan.

A capabilities assessment survey was provided to the municipalities during the planning process held with Indiana County officials. These meetings were designed to seek input from key county and municipal stakeholders on legal, fiscal, technical and administrative capabilities of all jurisdictions. As such, the capabilities assessment helps guide the implementation of mitigation projects and will help evaluate the effectiveness of existing mitigation measures, policies, plans, practices and programs.

Throughout the planning process, the mitigation local planning team considered the county's thirty-eight municipalities, as well as one of fourteen Pennsylvania state-owned universities, Indiana University of Pennsylvania (IUP). Pennsylvania municipalities have their own governing bodies, pass and enforce their own ordinances and regulations, purchase equipment and manage their own resources, including critical infrastructure. These capability assessments, therefore, consider the various characteristics and capabilities of municipalities under study. Additionally, NFPA 1600 recommends that a corrective action program be established to address shortfalls and provide mechanisms to manage the capabilities improvement process.

The evaluation of the following categories – political framework, legal jurisdiction, fiscal status, policies and programs and regulations and ordinances – allows the mitigation planning team to determine the viability of certain mitigation actions. The capability assessment analyzes what Indiana County and its municipalities have the capacity to do and provides an understanding of what must be changed to mitigate loss.

Indiana County has several 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 hazardous event. While the capability assessment serves as a good instrument for identifying local capa-

bilities, it also provides a means for recognizing gaps and weaknesses that can be resolved through future mitigation actions. The results of this assessment lend critical information for developing an effective mitigation strategy.

5.2. Capability Assessment Findings

Of the thirty-eight municipalities within Indiana County, as well as IUP, thirty five completed and submitted a capability assessment survey. The results of the survey were collected, aggregated and analyzed.

5.2.1. Planning and Regulatory Capability

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

Municipalities regulate land use via the adoption and enforcement of zoning, subdivision and land development, building codes, building permits, floodplain management and/or storm-water management ordinances. When effectively prepared and administered, these regulations can lead to an opportunity for hazard mitigation. For example, the National Flood Insurance Program (NFIP) established minimum floodplain management criteria. Adoption of the Pennsylvania Floodplain Management Act (Act 166 of 1978) established higher standards. A municipality must adopt and enforce these minimum criteria to be eligible for participation in the NFIP. Municipalities have the option of adopting a single-purpose ordinance or incorporating these provisions into their zoning, subdivision and land development, or building codes; thereby mitigating the potential impacts of local flooding. This capability assessment details the existing Indiana County and municipal legal capabilities to mitigate the profiled hazards. It identifies the county's and the municipalities' existing planning documents and their hazard mitigation potential. Hazard mitigation recommendations are, in part, based on the information contained in the assessment.

Building Codes

Building codes are important in mitigation because they are developed for a region of the country in respect to the hazards existing in that area. Consequently, structures that are built according to applicable codes are inherently resistant to many hazards, such as strong winds, floods and earthquakes; and can help mitigate regional hazards, such as wildfires. In 2003, Pennsylvania implemented the Uniform Construction Code

(UCC) (Act 45), a comprehensive building code that establishes minimum regulations for most new construction, including additions and renovations to existing structures.

The code applies to almost all buildings, excluding manufactured and industrialized housing (which are covered by other laws), agricultural buildings and certain utility and miscellaneous buildings. The UCC has many advantages. It requires builders to use materials and methods that have been professionally evaluated for quality and safety, as well as inspections to ensure compliance.

The initial election period, during which all of Pennsylvania's 2,565 municipalities were allowed to decide whether the UCC would be administered and enforced locally, officially closed on August 7, 2004. The codes adopted for use under the UCC are the 2003 International Codes issued by the International Code Council (ICC). Supplements to the 2003 codes have been adopted for use over the years since.

If a municipality has "opted in", all UCC enforcement is local, except where municipal (or third party) code officials lack the certification necessary to approve plans and inspect commercial construction for compliance with UCC accessibility requirements. If a municipality has "opted out", the Pennsylvania Department of Labor and Industry is responsible for all commercial code enforcement in that municipality; and all residential construction is inspected by independent third-party agencies selected by the owner. The department also has sole jurisdiction for all state-owned buildings, no matter where they are located. Historical buildings may be exempt from such inspections, and Act 45 provides quasi-exclusion from UCC requirements.

The municipalities in Indiana County adhere to the standards of the Pennsylvania Uniform Construction Code (Act 45). Seventeen of the twenty-two municipalities who submitted a capability assessment have opted in on building code enforcement.

Zoning Ordinance

Article VI of the Municipalities Planning Code (MPC) authorizes municipalities to prepare and enact zoning to regulate land use. Its regulations can apply to: the permitted use of land; the height and bulk of structures; the percentage of a lot that may be occupied by buildings and other impervious surfaces; yard setbacks; the density of development; the height and size of signs; the parking regulations. A zoning ordinance has two parts, including the zoning map that delineates zoning districts and the text that sets forth the regulations that apply to each district. In total, six percent of Indiana County is regulated by zoning ordinances including Blairsville Borough, Homer City Borough and Indiana Borough.

Subdivision Ordinance

Subdivision and land development ordinances include regulations to control the layout of streets, the planning of lots and the provision of utilities and other site improvements. The objectives of a subdivision and land development ordinance are to: coordinate street

patterns; assure adequate utilities and other improvements are provided in a manner that will not pollute streams, wells and/or soils; reduce traffic congestion; and provide sound design standards as a guide to developers, the elected officials, planning commissions and other municipal officials. Article V of the municipality planning code authorizes municipalities to prepare and enact a subdivision and land development ordinance. Subdivision and land development ordinances provide for the division and improvement of land. To date, six of the municipalities in Indiana County, including IUP, have developed their own subdivision ordinance. The remaining municipalities have adopted the countywide plan. Indiana County is currently in the process of updating their subdivision and land development ordinance and anticipate more municipalities adopting this plan.

Storm-water Management Plan/Storm-water Ordinance

The proper management of storm-water runoff can improve conditions and decrease the chance of flooding. Pennsylvania's Storm Water Management Act (Act 167) confers on counties the responsibility for development of watershed plans. The Act specifies that counties must complete their watershed storm-water plans within two years following the promulgation of these guidelines by the DEP, which may grant an extension of time to any county for the preparation and adoption of plans. Counties must prepare the watershed plans in consultation with municipalities and residents. This is to be accomplished through the establishment of a watershed plan advisory committee. The counties must also establish a mechanism to periodically review and revise watershed plans so they are current. Plan revisions must be done every five years or sooner, if necessary.

Municipalities have an obligation to implement the criteria and standards developed in each watershed storm-water management plan by amending or adopting laws and regulation for land use and development. The implementation of storm-water management criteria and standards at the local level are necessary, since municipalities are responsible for local land use decisions and planning. The degree of detail in the ordinances depends on the extent of existing and projected development. The watershed storm-water management plan is designed to aid the municipality in setting standards for the land uses it has proposed. Municipalities within rapidly developing watersheds will benefit from the watershed storm-water management plan and will use the information for sound land use considerations. A major goal of the watershed plan and the attendant municipal regulations is to prevent future drainage problems and avoid the aggravation of existing problems.

There are twelve watersheds in Indiana County. Indiana County and other local municipalities have general (non-Act 167 compliant) storm-water management regulations as part of either the county or local subdivision and land development plan. Of the twenty-two municipalities, including IUP, who submitted the capability assessment survey, seven indicated that they have adopted the countywide plan or have their own municipal storm-water management plan in place.

Comprehensive Plan

A comprehensive plan is a policy document that states objectives and guides the future growth and physical development of a municipality. The comprehensive plan is a blueprint for housing, transportation, community facilities, utilities and land use. It examines how the past led to the present and charts the community's future path. The Pennsylvania Municipalities Planning Code (MPC Act 247 of 1968, as reauthorized and amended) requires counties to prepare and maintain a county comprehensive plan. In addition, the MPC requires counties to update the comprehensive plan every ten years.

With regard to hazard mitigation planning, Section 301.a(2) of the Municipality Planning Code requires comprehensive plans to include a plan for land use, which, among other provisions, suggests that the plan considers floodplains and other areas of special hazards and other similar uses. The MPC also requires comprehensive plans to include a plan for community facilities and services and recommends giving consideration to storm drainage and floodplain management.

Indiana County has a county comprehensive plan that was adopted on September 12, 2012.

Article III of the Municipality Planning Code (MPC) enables municipalities to prepare a comprehensive plan however, development of a comprehensive plan is voluntary. Of the twenty-two municipalities who submitted a capability assessment, as well as IUP, nine indicated that they have adopted a comprehensive plan.

Capital Improvements Plan

The capital improvements plan is a multi-year policy guide that identifies needed capital projects and is used to coordinate the financing and timing of public improvements. Capital improvements relate to streets, storm-water systems, water distribution, sewage treatment and other major public facilities. A capital improvements plan should be prepared by the respective county's planning department and should include a capital budget. This budget identifies the highest priority projects recommended for funding in the next annual budget. The capital improvements plan is dynamic and can be tailored to specific circumstances. There are no municipalities within Indiana County that have an identified capital improvement plan.

Participation in the National Flood Insurance Program (NFIP)

Floodplain management is the operation of programs or activities that may consist of both corrective and preventive measures for reducing flood damage, including but not limited to such things as emergency preparedness plans, flood control works and flood plain management regulations. The Pennsylvania Floodplain Management Act (Act 166) requires every municipality identified by the Federal Emergency Management Agency (FEMA) to participate in the National Flood Insurance Program (NFIP) and permits all municipalities to adopt floodplain management regulations. It is in the interest of all

property owners in the floodplain to keep development and land usage within the scope of the floodplain regulations for their community. This helps keep insurance rates low and makes sure that the risk of flood damage is not increased by property development.

The Pennsylvania DCED provides communities, based on their CFR, Title 44, Section 60.3 level of regulations, with a suggested ordinance document to assist municipalities in meeting the minimum requirements of the NFIP along with the Pennsylvania Flood Plain 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:

1. Prohibiting manufactured homes in the floodway.
2. Prohibiting manufactured homes within the area measured 50 feet landward from the top-of bank of any watercourse within a special flood hazard area.
3. Special requirements for recreational vehicles within the special flood hazard area.
4. Special requirement for accessory structures.
5. Prohibiting new construction and development within the area measured 50 feet landward from the top-of bank of any watercourse within a special flood hazard area.
6. Providing the Indiana 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 which are 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 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.

The NFIP's Community Rating System (CRS) provides discounts on flood insurance premiums in those communities that establish floodplain management programs that go beyond NFIP minimum requirements. Under the CRS, communities receive credit for more restrictive regulations; acquisition, relocation, or flood-proofing of flood-prone buildings; preservation of open space; and other measures that reduce flood damages or protect the natural resources and functions of floodplains.

The CRS was implemented in 1990 to recognize and encourage community floodplain management activities that exceed the minimum NFIP standards. Section 541 of the 1994 Act amends Section 1315 of the 1968 Act to codify the Community Rating System in the NFIP. The section also expands the CRS goals to specifically include incentives to reduce the risk of flood-related erosion and to encourage measures that protect natural and beneficial floodplain functions. These goals have been incorporated into the CRS

and communities now receive credit toward premium reductions for activities that contribute to them.

Under the Community Rating System, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that meet a minimum of three of the following CRS goals:

1. Reduce flood losses
2. Protect public health and safety
3. Reduce damage to property
4. Prevent increases in flood damage from new construction
5. Reduce the risk of erosion damage
6. Protect natural and beneficial floodplain functions
7. Facilitate accurate insurance rating
8. Promote the awareness of flood insurance

There are ten Community Rating System classes. Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction. CRS premium discounts on flood insurance range from five percent for Class 9 communities up to forty-five percent for Class 1 communities. The CRS recognizes 18 credible activities, organized under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction and Flood Preparedness.

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

Of the municipalities who completed the capability assessment survey, eleven indicated that they participate in the NFIP. Currently, no municipalities have completed or started to complete the CRS program. Additional research will be conducted on the CRS program and mitigation actions will be developed in support of the CRS. Informational classes that provide general information about the CRS for municipal elected officials will be conducted during the next five-year period.

5.2.2. Administrative and Technical Capability

There are twenty-four townships, and fourteen boroughs within Indiana County. Each of these municipalities conducts its daily operations and provides various community services according to local needs and limitations. Some of these municipalities have formed cooperative agreements and work jointly with their neighboring municipalities to provide services such as police protection, fire and emergency response, infrastructure maintenance and water supply management. Others choose to operate on their own. Municipalities vary in staff size, resource availability, fiscal status, service provision, constituent population, overall size and vulnerability to the profiled hazards.

County Planning Department

In Pennsylvania, planning responsibilities traditionally have been delegated to each county and local municipality through the Municipalities Planning Code (MPC). A planning agency acts as an advisor to the governing body on matters of community growth and development. A governing body may appoint individuals to serve as legal or engineering advisors to the planning agency. In addition to the duties and responsibilities authorized by Article II of the MPC, a governing body may, by ordinance, delegate approval authority to a planning agency for subdivision and land development applications. A governing body has considerable flexibility, not only as to which powers and duties are assigned to a planning agency, but also as to what form an agency will possess. A governing body can create a planning commission, a planning department, or both. The Indiana County Office of Planning and Development assists all municipalities in the county as needed.

Municipal Engineer

A municipal engineer performs duties as directed in the areas of construction, reconstruction, maintenance and repair of streets, roads, pavements, sanitary sewers, bridges, culverts and other engineering work. The municipal engineer prepares plans, specifications and estimates of the work undertaken by the township. Each municipality within Indiana County employs or subcontracts a municipal engineer. Also in place is Indiana County Municipal Services Authority (ICMSA) which currently owns and operates nine public water systems in Indiana County.

Personnel Skilled in GIS or FEMA HAZUS Software

A geographic information system (GIS) is an integrated, computer-based system designed to capture, store, edit, analyze and display geographic information. Some examples of uses for GIS technology in local government are: land records management, land use planning, infrastructure management and natural resources planning. A GIS automates existing operations such as map production and maintenance, saving a great deal of time and money. The GIS also includes information about map features such as the capacity of a municipal water supply or the acres of public land. GIS is utilized by a

majority of the Indiana County Departments/Offices and IUP. There were no employees that have completed Basic HAZUS-MH identified in the completed capability assessments.

Emergency Management Coordinator

Emergency Management is a comprehensive, integrated program of mitigation, preparedness, response and recovery for emergencies/disasters of any kind. No public or private entity is immune to disasters and no single segment of society can meet the complex needs of a major emergency or disaster on its own.

A municipal emergency management coordinator is responsible for emergency management – preparedness, response, recovery and mitigation within the respective authority having jurisdiction (AHJ). The responsibilities of the emergency management coordinator are outlined in PA Title 35 §7503:

- Prepare and maintain a current disaster emergency management plan
- Establish, equip and staff an emergency operations center
- Provide individuals and organizational training programs
- Organize and coordinate all locally available manpower, materials, supplies, equipment and services necessary for disaster emergency readiness, response and recovery
- Adopt and implement precautionary measures to mitigate the anticipated effects of a disaster
- Cooperate and coordinate with any public and private agency or entity
- Provide prompt information regarding local disaster emergencies to appropriate Commonwealth and local officials or agencies and the general public
- Participate in all tests, drills and exercises, including remedial drills and exercises, scheduled by the agency or by the federal government

Title 35 requires Indiana County and its municipalities to have an emergency management coordinator.

The Indiana County Emergency Management Agency coordinates countywide emergency management efforts. Each municipality has a designated local emergency management coordinator who possesses a unique knowledge of the impact hazard events have on their community.

The Emergency Management Services Code (PA Title 35) requires that all municipalities in the Commonwealth have a local emergency operations plan (EOP) which is updated every two years. Each municipality is required to adopt a municipal EOP. Some municipalities have implemented a regional approach to emergency management and the requirements of Title 35. A copy of each EOP is on file at the Indiana County Emergency

Management Agency. The Indiana County Emergency Management Agency updates their EOP as needed.

Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to mitigate hazard events. The adoption of hazard mitigation measures may be seen as an impediment to growth and economic development. In many cases, mitigation may not generate interest among local officials when compared with competing priorities. Therefore, the local political climate must be considered when designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing the adoption or implementation of specific actions.

The capability assessment survey was used to capture information on each jurisdiction's political capability. Survey respondents were asked to identify examples of political capability, such as guiding development away from hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (i.e. building codes, floodplain management ordinances, etc.). These examples were used to guide respondents in scoring their community on a scale of "unwilling" (0) to "very willing" (5) to adopt policies and programs that reduce hazard vulnerabilities. Of the municipalities that responded, none of the municipalities completed this section with a numerical response.

Self-Assessment

In addition to the inventory and analysis of specific local capabilities, the *Capability Assessment Survey* required each local jurisdiction to conduct its own self-assessment of its capability to effectively implement hazard mitigation activities. As part of this process, county and municipal officials were encouraged 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 "L = limited" "M = moderate" or "H = high." *Table 51 - Capability Self-Assessment Matrix* summarizes the results of the self-assessment survey. Thirty three out of thirty eight municipalities and IUP, returned this section of the assessment completed.

Table 51 - Capability Self-Assessment Matrix

Indiana County Capability Self-Assessment Matrix				
Municipality Name	**Capability Category**			
	Planning and Regulatory Capability	**Administrative and Technical Capability**	**Fiscal Capability**	**Community Political Capability**
Armagh Borough	L	L	L	L
Armstrong Township	L	L	L	L
Banks Township	L	L	L	L
Black Lick Township	L	L	L	L
Blairsville Borough	L	L	L	L
Brush Valley Township	L	L	L	L
Buffington Township	L	L	L	L
Burrell Township	L	M	L	L
Canoe Township	L	L	L	L
Center Township	L	L	L	L
Cherry Tree Borough	Not completed by municipality			
Cherryhill Township	M	L	M	M
Clymer Borough	L	L	L	L
Conemaugh Township	L	L	L	M
Creekside Borough	L	L	L	L
East Mahoning Township	M	M	M	M
East Wheatfield Township	L	M	L	L
Ernest Borough	L	L	L	L
Glen Campbell Borough	Not completed by municipality			
Grant Township	L	L	L	L
Green Township	M	L	L	L
Homer City Borough	Not completed by municipality			
Indiana Borough	This section of assessment not completed by municipality			
IUP	M	M	M	M
Marion Center Borough	Not completed by municipality			
Montgomery Township	L	L	L	L
North Mahoning Township	L	L	L	L
Pine Township	L	L	L	L
Plumville Borough	L	L	L	L
Rayne Township	L	L	L	L
Saltsburgh Borough	M	H	M	M
Shelocta Borough	Not completed by municipality			
Smicksburg Borough	L	L	L	L
South Mahoning Township	L	L	L	L
Washington Township	L	L	L	L
West Mahoning Township	L	L	L	L
West Wheatfield Township	L	L	L	L
White Township	L	H	M	L
Young Township	L	H	M	L

Existing Limitations

Funding has been identified as the largest limitation for a municipality to complete mitigation activities. The acquisition of grants is the best way to augment this process for the municipalities. The county and municipalities representatives will need to rely on regional, state and federal partnerships for future financial assistance. Development of intra-county regional partnerships and intra-municipality regional partnerships will bolster this process.

5.2.3. Financial Capability

Fiscal capability is significant to the implementation of hazard mitigation activities. Every jurisdiction must operate within the constraints of limited financial resources. The following information pertains to various financial assistance programs relevant to hazard mitigation.

State and Federal Grants

During the 1960s and 1970s, state and federal grants-in-aid were available to finance a large number of municipal programs, including streets, water and sewer facilities, airports, parks and playgrounds. During the early 1980s, there was a significant change in federal policy, based on rising deficits and a political philosophy that encouraged states and local governments to raise their own revenues for capital programs. The result has been a growing interest in "creative financing."

Capital Improvement Financing

Because most capital investments involve the outlay of substantial funds, local governments can seldom pay for these facilities through annual appropriations in the annual operating budget. Therefore, numerous techniques have evolved to enable local government to pay for capital improvements over a time period exceeding one year. Public finance literature and state laws governing local government finance classify techniques that are used to finance capital improvements. The techniques include: revenue bonds; lease-purchase, authorities and special district; current revenue (pay-as-you-go); reserve funds; and tax increment financing. Most municipalities have very limited local tax funds for capital projects. Grants and other funding is always a priority.

Indebtedness through General Obligation Bonds

Some projects may be financed with general obligation bonds. With this method, the jurisdiction's taxing power is pledged to pay interest and principal to retire debt. General obligation bonds can be sold to finance permanent types of improvements, such as schools, municipal buildings, parks and recreation facilities. Voter approval may be required.

Municipal Authorities

Municipal authorities are most often used when major capital investments are required. In addition to sewage treatment, municipal authorities have been formed for water supply, airports, bus transit systems, swimming pools and other purposes. Joint authorities have the power to receive grants, borrow money and operate revenue generating programs. Municipal authorities are authorized to sell bonds, acquire property, sign contracts and take similar actions. Authorities are governed by authority board members, who are appointed by the elected officials of the member municipalities.

Sewer Authorities

Sewer authorities include multi-purpose authorities with sewer projects. They sell bonds to finance acquisition of existing systems or for construction, extension, or system improvement. Sewer authority operating revenues originate from user fees. The fee frequently is based on the amount of water consumed and payment is enforced by the ability to terminate service or by the imposition of liens against real estate. In areas with no public water supply, flat rate charges are calculated on average use per dwelling unit.

Water Authorities

Water authorities are multi-purpose authorities with water projects, many of which operate both water and sewer systems. The financing of water systems for lease back to the municipality is among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage. The cost of construction or extending water supply lines can be funded by special assessments against abutting property owners. Tapping fees also help fund water system capital costs. Water utilities are also directly operated by municipal governments and by privately owned public utilities regulated by the PA Public Utility Commission. The PA Department of Environmental Protection has a program to assist with consolidating small water systems to make system upgrades more cost effective.

Circuit Riding Program (Engineer)

The Circuit Riding Program is an example of intergovernmental cooperation. This program offers municipalities the ability to join together to accomplish a common goal. The circuit rider is a municipal engineer who serves several small municipalities simultaneously. These are municipalities that may be too small to hire a professional engineer for their own operations, yet need the skills and expertise the engineer offers. Municipalities can jointly obtain what no one municipality could obtain on its own.

5.2.4. Education and Outreach

Indiana County has a limited education and outreach program. The Indiana County Emergency Management Agency conducts some public outreach at public events to update the citizens and visitors of the county on natural and human-caused hazards. The county conservation district also conducts outreach on various activities and projects in the county. Many of these projects are related to or directly impact hazard mitigation projects.

Educational activities that directly impact hazard mitigation in Indiana County predominantly revolve around the first responders. Providing fire, medical and search and rescue training and education enhances the response and recovery capabilities of response agencies in the county. Additional training is always a goal within Indiana County.

Education and outreach on the NFIP is necessary. With new regulations in floodplain management, updated digital flood insurance rate maps and new rate for insurance policies, education and outreach on the NFIP would assist the program. The Indiana County Local Planning Team will identify actions necessary to complete this.

5.2.5. Plan Integration

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. These tools include the 2013 Pennsylvania All-Hazard Mitigation Plan, local floodplain management ordinances, the Indiana County Comprehensive Plan, Indiana County Emergency Operations Plan, Indiana University of Pennsylvania Disaster Resistant University Plan, stormwater management plan, local emergency operation plans, local zoning ordinances, local subdivision and land development ordinances.

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 Indiana County Comprehensive Plan so that vulnerability pertaining to future development could be established. Floodplain management ordinance information was used to aid in the establishment of local capabilities in addition to participation in the National Flood Insurance Program (NFIP).

Pennsylvania All-Hazard Mitigation Plan-2013

The Pennsylvania All-Hazard Mitigation Plan (PAHMP) is the baseline document for all county hazard mitigation plans in the Commonwealth of Pennsylvania. During the 2018 Indiana County HMP update, the local planning team and steering committee reviewed and utilized the various sections of the PAHMP to provide information specific to the same sections of the Indiana County HMP. As an example, the PAHMP risk assessment

section provided copious amounts of past occurrence and vulnerability data for every hazard profile that was updated or developed new in the Indiana County HMP. The PAHMT also provided information and data on contiguous counties to Indiana County within the Commonwealth. Contiguous counties to Indiana County are Armstrong County, Cambria County, Clearfield County, Jefferson County and Westmoreland County in Pennsylvania. Information on past occurrences of hazards and mitigation actions and opportunities was utilized.

The PAHMP was also utilized to ensure that the updated Indiana County mitigation strategy was aligned with the PAHMP mitigation strategy. High priority mitigation strategies in the PAHMP (like removal of repetitive loss and severe repetitive loss properties from the floodplain) were considered with the Indiana County HMP mitigation strategy development. As the local planning team developed new actions and project opportunities, review and comparison to the PAHMP was conducted.

Indiana County Comprehensive Plan

Article III of the Pennsylvania Municipalities Planning code (Act 247 of 1968, as reenacted and amended) requires all Pennsylvania counties (except Philadelphia) to adopt a comprehensive plan and update it at least every ten years. The Indiana County Commissioners adopted Indiana County Comprehensive Plan, Where We Live on September 12, 2012.

The Indiana County Planning Commission is responsible for maintaining and updating the Indiana County Comprehensive Plan and many other regulatory tools. Technical assistance on community planning matters is provided to the Indiana County Board of Commissioners through the Indiana County Planning Commission. The planning commission administers the Indiana County Comprehensive Plan. The planning commission also performs technical reviews of municipal subdivision and land development plans, municipal floodplain ordinances and other community planning and development matters.

The Indiana County Comprehensive Plan was one of the primary documents integrated into the 2018 Indiana County HMP update. Chapter 2, Our County provided a solid foundation for the community profile section of the 2018 HMP. County history information, economics, population, households and community information was all used in the development and update of this section in the 2018 HMP.

Identified future growth and development areas was specific information from the comprehensive plan that was used when updating the 2018 vulnerability assessment sections for all hazard profiles in the section 4.3 of the 2018 HMP. Very specific information about new and existing developments in high population areas was used in vulnerability assessments for the hazards that could impact these areas. In some cases, the new development areas and the community infrastructure that supports these developments

was identified in specific hazard areas. Any residential, commercial or critical infrastructure that was identified in the hazard vulnerable area was noted in the vulnerability assessment for each hazard profile. Information and data specific to storm water management and planning was utilized to identify new project opportunities for municipalities as well.

The Indiana County Comprehensive Plan, Chapter 13 identified a five year implementation plan for various projects and actions that supported updates and growth for programs identified in the comprehensive plan. This five year plan was an important chapter from the comprehensive plan that provided numerous actions and projects that were integrated into the 2018 HMP mitigation strategy. The following are some of the goals and actions from the 2012 comprehensive plan, followed by the 2018 HMP mitigation actions that were developed or supported by the goals and actions from the 2012 comprehensive plan:

- Chapter 4, goal 3 of the five year action plan identified that enhancements to the county GIS capabilities to ensure prompt access to data needed for emergency management activities was needed and chapter 10, goal 1 identifies an action to develop a comprehensive GIS based inventory of county historic buildings, structures, objects, sites and districts. The 2018 HMP local planning team and steering committee developed mitigation action 2.1.1 that identified to expand capabilities of GIS database of at-risk buildings and public infrastructure. These actions directly relate to each other and show and integrated approach to updating GIS data at the county level. These actions also identify that numerous county and local agencies have a common need for updated GIS data.
- Chapter 5, goal 1 of the county comprehensive plan identified that continued expansion and enhancements of the county public water and sewer systems will continue in accordance with the water supply plan This action assisted the steering committee and local planning team in the identification of current water and sewer infrastructure and the future vision for expansion of these services. This directly impacted vulnerability assessments and the update of the drought hazard profile.
- Chapter 8, goal 1 of the county comprehensive plan identifies an action to develop, adopt and implement a stormwater management plan. Action 4.1.3 of the 2018 HMP, develop a countywide storm water management plan and action 4.1.6, explore opportunities and create stormwater infiltration areas in new developments was developed by the local planning team and steering committee during the 2018 HMP update. Storm water planning and projects greatly decrease the impact of flooding and flash flooding in communities. The alignment of these actions will ensure that both plans are integrated and as new projects are identified, they can be added as well.

- Chapter 8, goal 1 has an action for the identification and prioritization of streams for the development of riparian buffers of at least 150 feet on both sides of a waterway and chapter 8, goal 2 action identifies the development of a riparian buffer ordinance to protect county waterways. Riparian buffers are extremely important to the development of natural flood control capabilities. The 2018 HMP action 4.1.8 identifies that research avenues for restoring degraded natural resources and open space to improve their flood control functions will be conducted. This action directly supports both actions from the 2012 comprehensive plan.

Although specific portions of the comprehensive plan outlined projects, actions or specific planning items that would support hazard mitigation, the information will be more comprehensive with the integration of new hazard mitigation principals and data from the 2018 Indiana County HMP. During discussions with county planning personnel as part of this hazard mitigation plan update, discussions about the importance of hazard mitigation integration during the next comprehensive plan update was expressed. Specifically, the risk assessment section and mitigation strategy section hold vital information that requires integration into the next plan update. Identification of hazard areas, vulnerable structures and developments and future risk is critical in the determination of and management of economic growth and development areas in the county. Numerous mitigation opportunity forms have been received during the planning period and would provide beneficial information for the next comprehensive plan update as well. The local planning team determined that an action to integrate 2018 hazard mitigation principals and data into the next updated county comprehensive plan was needed in the 2018 Indiana County Hazard Mitigation Plan. Action 3.3.8 identifies this

Indiana County Emergency Operations Plan

The Pennsylvania Emergency Management Services Code, 35 PA C.S. Sections 7701-7707, as amended, requires each county and municipality to prepare, maintain and keep current an Emergency Operations Plan (EOP). Indiana County Emergency Management Agency is responsible for preparing and maintaining the county's EOP, which applies to both the county and municipal emergency management operations and procedures.

The EOP is reviewed annually. Whenever portions of the EOP are implemented in an emergency event or training exercise, a review is performed and changes are made where necessary. These changes are then distributed to the county's municipalities.

The complete risk assessment section, mitigation actions and mitigation project opportunities identified in the 2018 Indiana County Hazard Mitigation Plan will assist with decreasing hazard specific risk and vulnerability. Understanding the risks and vulnerability in the county and municipalities will allow for emergency management and other response agencies to better direct planning, response and recovery aspects.

EMA will consider the 2018 Indiana County Hazard Mitigation Plan during its annual review of the county EOP. Recommended changes to the HMP will then be coordinated with the hazard mitigation local planning team. Each municipality has a municipal EOP as well. The Indiana County Emergency Management Agency will provide guidance and education to municipal elected and appointed officials on the integration of the specific sections of the 2018 HMP into the municipal EOP during the update period.

Action 3.3.7 of the 2018 Indiana HMP identifies that a review of the existing Indiana County Emergency Operations Plan (EOP) will be completed and the EOP will be updated where necessary based on any new information contained in the 2018 HMP. Action 3.3.8 states that a review of existing ordinances and other regulatory or planning mechanisms will be conducted for consistency with the 2018 HMP. Action 3.3.8 directly supports the updating of county and municipal EOP's.

National Flood Insurance Program and Municipal Floodplain Ordinance

The National Flood Insurance Program provided specific information that was incorporated into the section 4.3.3 flooding profile and section 5.2. Specifically, the amount of active insurance policies per municipality, repetitive loss properties and severe repetitive loss properties were used in the vulnerability assessment section of the flooding profile. This then afforded the local planning team specific vulnerability information that was then used to develop mitigation actions and municipal mitigation project opportunity forms. Numerous municipalities identified flooding, flash flooding and ice jam flooding project opportunities that would decrease the loss of life and property damage when completed. These opportunities are identified in Appendix G.

Indiana County municipalities have adopted floodplain management ordinances. At a minimum, these ordinances included the minimum language necessary to manage the floodplain in each municipality. The ordinance information was integrated into the 2018 HMP update. Ordinance information was included in section 5 and section 4.3.3 of this plan update. New mitigation actions like the enforcement of floodplain ordinances, action 1.3.1 and stormwater planning, action 4.1.3 was identified during this planning process as a direct result of using municipal specific floodplain ordinances.

In the future, Indiana County will ensure that all floodplain ordinance updates have integrated hazard mitigation principles. Participation in NFIP programs and integrating the NFIP program data into any applicable hazard mitigation sections is a future action that the Indiana County local planning team will accomplish.

Indiana University of Pennsylvania Disaster Resistant University Plan

Indiana University of Pennsylvania (IUP) is located within Indiana Borough and White Township in Indiana County. IUP participated in the Pennsylvanian disaster resistant university (DRU) planning process in previous years. The DRU program was developed to ensure that all Commonwealth universities have a FEMA approved hazard mitigation

plan. Recent activities have identified that the funding for the DRU program will not be available for the next DRU update for IUP. IUP participated in the planning process during this hazard mitigation plan update.

The Indiana County steering committee and local planning team utilized the current 2015 IUP DRU during this HMP update. At the initial steering committee planning meeting, IUP was represented on the steering committee membership. A copy of the 2015 IUP DRU was provided to the committee members. During the 2018 HMP update, review and integration of the 2015 IUP DRU was completed.

Section 2 of the IUP DRU provided specific information like university history information, economics, population, and campus layout. This can be found in the 2018 HMP in section 2.2 community facts of the 2018 HMP.

Section 4.3 of the IUP DRU provided information and statistics on many of the hazards that are identified in the 2018 Indiana HMP. Information on the locations of specific hazards on campus, past occurrences of hazards specific to the campus and vulnerability assessment data specific to campus locations and infrastructure was used to update all seventeen hazard profiles in the 2018 Indiana HMP. The following are some of the integrated portions of the IUP DRU into the 2018 HMP:

- Specific information on the status of IUP with flood insurance and past flooding events are identified in section 4.3.3.3 of the 2018 HMP. The specific flood vulnerability assessment data and the IUP flood hazard areas was integrated directly into section 4.3.3.5 of the 2018 HMP flooding profile.
- Section 4.3.5.5 of the 2018 HMP has very specific information from the IUP DRU integrated. Discussions on the various vulnerabilities to pandemic, epidemic and other infectious diseases is identified. The capabilities of IUP to respond to these diseases and continue operations is also noted.
- Section 4.3.10 of the IUP DRU provided past occurrence incidents, future occurrence data and vulnerability data that was included in the 2018 HMP section 4.3.7.4 and section 4.3.7.5. Specifically the DRU identifies that the campus is vulnerable to subsidence due to previous underground mining operations in Indiana Borough and White Township.
- Section 4.3.13 of the IUP DRU provided future occurrence data and vulnerability data that was included in the 2018 HMP section 4.3.10.3 through 4.3.10.5. Most of the primary past occurrences and future vulnerability in the civil disturbance profile were integrated from the IUP DRU.

Section 6 of the IUP DRU outlines the mitigation strategy for IUP. Information contained in this section of the DRU assisted the local planning team and steering committee with the development of the 2018 HMP mitigation strategy. The DRU strategy is defined to

actions and projects that can be completed to decrease the impact of natural and human-caused hazards identified in the DRU risk assessment. Upon review of the DRU HMP by the 2018 Indiana HMP steering committee and local planning team, future integration into the Indiana County HMP is critical. The steering committee recognized that the DRU is still a valid and FEMA approved plan. Kevin Thelen from IUP Public Safety advised that some of the actions and projects are currently in progress. The steering committee identified that a new mitigation action was required for the 2018 HMP. Action 3.3.10 of the 2018 Indiana HMP identifies that further integration of the 2015 Indiana University of Pennsylvania Hazard Mitigation Plan into the 2018 HMP will continue during the duration of the 2015 DRU.

Plan Interrelationships

Ensuring consistency between these planning mechanisms is critical. In fact, Section 301 (4.1) of the Pennsylvania Municipalities Planning Code requires that comprehensive plans include a discussion of the interrelationships among their various plan components, "which may include an estimate of the environmental, energy conservation, fiscal, economic development and social consequences on the environment."

To that end, Indiana County and its municipalities must ensure that the components of the hazard mitigation plan are integrated into existing community planning mechanisms and are generally consistent with goals, policies and recommended actions. Indiana County and the hazard mitigation planning team will utilize the existing maintenance schedule of each plan to incorporate the goals, policies and recommended actions as each plan is updated.

6. Mitigation Strategy

6.1. Update Process Summary

Mitigation goals are general guidelines that explain what the county wants to achieve. Goals are usually expressed as broad policy statements representing desired long-term results. Mitigation objectives describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals; the described steps are usually measurable and can have a defined completion date. There were six goals and nineteen objectives identified in the 2012 Indiana County Hazard Mitigation Plan. The 2018 Indiana County Hazard Mitigation Plan Update has six goals and twenty objectives. Objectives have been added and arranged in order to associate them with the most appropriate goal. A list of the 2012 goals and objectives as well as a review summary based on comments received from stakeholders who participated in the HMP update process is included in *Table 52 - 2012 Mitigation Goals and Objectives*. These reviews are based on the 5-Year hazard mitigation plan review worksheet, which includes a survey on existing goals and objectives, completed by the local planning team. Municipal officials then provided feedback on the changes to the goals and objectives via a mitigation strategy update meeting. Copies of these meetings and all documentation associated with the meetings are located in Appendix C.

Actions provide more detailed descriptions of specific work tasks to help the county and its municipalities achieve prescribed goals and objectives. There were forty five actions identified in the 2012 mitigation strategy. A review of the 2012 mitigation actions was completed by the local planning team. A list of these actions as well as a review and summary of their progress based on comments from the Indiana County Local Planning Team is included in *Table 53 – 2012 Mitigation Actions* Review. Actions were evaluated by the local planning team with the intent of carrying over any actions that were not started or continuous for the next five years.

Table 52 - 2012 Mitigation Goals and Objectives

Indiana County 2012 Mitigation Goals and Objectives Review Worksheet		
GOAL Objective	**Description**	**Review**
GOAL 1	***Attempt to reduce the current and future risk of flood damage in Indiana County.***	The steering committee and local planning team reviewed this goal. No changes were suggested. The goal will carry forward to 2018.
Objective 1.1	*Direct new development away from high hazard areas by reviewing comprehensive plans, capital improvement plans, etc. and enforcing existing regulations to*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.

GOAL Objective	Description	Review
	ensure adequacy in reducing the amount of future development proposed for identified flood hazard areas.	
Objective 1.2	*Encourage municipal participation in the National Flood Insurance Program (NFIP).*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
Objective 1.3	*Evaluate and update existing floodplain ordinances to meet or exceed the NFIP standards.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
Objective 1.4	*Promote the use of flood insurance by property owners, recommending that flood insurance policies remain affordable through county and municipal government programs.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
Objective 1.5	*Identify and evaluate strategies for repetitive-loss properties.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
Objective 1.6	*Improve the enforcement of existing floodplain regulations.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
GOAL 2	***Reduce the potential impact and losses stemming from natural and human disasters on public and private property.***	The steering committee and local planning team reviewed this goal. Update the wording to reflect human caused disasters.
Objective 2.1	*Identify by municipality the most vulnerable residents and critical existing structures and infrastructure due to the hazards identified in this plan.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
Objective 2.2	*Encourage municipal enforcement of statewide Uniform Construction Code (UCC).*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.

GOAL Objective	Description	Review
Objective 2.3	*Protect Indiana County's most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation projects.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
GOAL 3	***Improve upon the protection of the citizens of Indiana County from all natural and human-made hazards before, during, and after events.***	The steering committee and local planning team reviewed this goal. Update the wording to reflect human caused disasters.
Objective 3.1	*Evaluate existing shelters to determine adequacy for current and future populations.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
Objective 3.2	*Ensure adequate training and resources for emergency organizations and personnel.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
Objective 3.3	*Improve emergency preparedness in Indiana County and its municipalities.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
Objective 3.4	*Improve coordination and communication among disaster response organizations, local, and county governments.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
Objective 3.5	*Evaluate cost-effective ways of augmenting existing broadcast and communication systems to enable better response, monitor warning information continuously and to disseminate the appropriate warnings.*	The steering committee and local planning team reviewed this objective. No changes were suggested. The goal will carry forward to 2018.
GOAL 4	***Reduce or redirect the impact of natural disasters (especially floods) away from at-risk population areas.***	The steering committee and local planning team reviewed this goal. It was suggested to remove the portion (especially floods) from the goal and carry the goal forward to 2018.

GOAL Objective	Description	Review
Objective 4.1	*Research possible mitigation projects to reduce flooding, reduce/eliminate sewage leakage and inflow/infiltration problems. Some projects may include reservoirs, levees, floodwalls, diversions, channel modification, and storm sewers.*	The steering committee and local planning team reviewed this objective. Recommendations were made to change the objective to read as follows, "Research and implement possible mitigation projects to reduce impacts of natural and human-caused disasters like generator installations, dead tree removals, reservoirs, levees, floodwalls, diversions, channel modification, and storm sewers"
GOAL 5	***Protect existing natural resources and open space, including parks and wetlands, to help prevent natural and human-made disasters.***	The steering committee and local planning team reviewed this goal. Update the wording to reflect human caused disasters.
Objective 5.1	*Protect Indiana County's natural resources through the implementation of cost-effective and technically feasible mitigation projects.*	The steering committee and local planning team reviewed this goal. Update the wording to reflect human caused disasters.
Objective 5.2	*Protect Indiana County's natural resources through the implementation and, where appropriate, enforcement, of recreation planning and stormwater management planning.*	The steering committee and local planning team reviewed this goal. Update the wording to reflect human caused disasters.
GOAL 6	***Protect public health, safety, and welfare by increasing the public awareness of existing hazards and by fostering both individual and public responsibility in mitigating risks due to those hazards.***	The steering committee and local planning team reviewed this goal. No changes were suggested. The goal will carry forward to 2018.
Objective 6.1	*Distribute public awareness materials about natural hazard risks, preparedness, and mitigation.*	The steering committee and local planning team reviewed this objective. It was suggested to add human caused to the objective.
Objective 6.2	*Target owners of properties within identified hazard areas for additional outreach regarding mitigation and disaster preparedness.*	The steering committee and local planning team reviewed this goal. Update the wording to reflect human caused disasters.

Table 53 – 2012 Mitigation Actions Review

2012 Indiana County Mitigation Actions Review						
Existing Mitigation Actions	***Status***					***Review Comments***
	No Progress / Unknown	**In Progress / Not Yet Com-**	**Continuous**	**Completed**	**Discontinued**	
ACTION NO: 1 Encourage and assist municipal officials to steer new development from high hazard areas in their jurisdiction.			**X**			Floodplain area is the most common item identified by all municipalities. White Township does not have zoning, so it uses its SALDO and Stormwater ordinances to reduce the threat of new development in high hazard areas. Action 1.1.1
ACTION NO: 2 Expand capabilities of GIS database of at-risk buildings and public infrastructure.			**X**			Indiana Boro and White Twp doing large amount of GIS updates for hazard mitigation. Indiana University also utilizes GIS to identify at risk locations. This action has been identified as continuous and will be further enhanced in the next planning period. Action 2.1.1
ACTION NO: 3 Hold public meetings with owners of repetitive loss properties in high-risk areas to consider and implement property protection or relocation projects.		**X**				Indiana Boro has completed meetings. Additional meetings in other communities will be completed to attempt to engage more property owners during the next planning period. No public meetings have been held with these property owners to date. WT is working with PEMA and IB to apply for HMGP funds to implement new or improved stormwater features that will potentially eliminate the need for relocation projects. Action 1.5.1
ACTION NO: 4 Work with municipal officials to increase awareness among property owners with identified at-risk structures.		**X**				This action will be carried forward to the 2018 plan. Outreach will be conducted to municipalities during the 2018 planning period. These meetings have a good chance to occur as part of the HMGP application process for White Township. Action 6.2.1

2012 Indiana County Mitigation Actions Review						
Existing Mitigation Actions	***Status***					***Review Comments***
	No Progress / Unknown	**In Progress / Not Yet Com-**	**Continuous**	**Completed**	**Discontinued**	
ACTION NO: 5 Municipal officials to continue review and enforcement of the Uniform Construction Code.			**X**			The following municipalities use the Indiana County Planning Department for enforcement of the UCC. North Mahoning Twp, Armaugh Boro, Blacklick Twp, Center Twp, Cherry Hill Twp, East Mahoning Twp, Montgomery Twp, Ernest Boro Creekside Boro and East Wheatfield Twp, Saltsburg Boro, Plumville Boro, Pine Twp, West Wheatfield Twp Greene Twp, Rayne Township, Brush Valley Twp, Armstrong and Canoe subcontracts a 3rd party vendor. Action 2.2.1
ACTION NO: 6 Applicable municipalities to review and update their floodplain ordinances to be sure that they are in full compliance with the NFIP.			**X**			All ordinances are currently up to date with the most recent versions of flood maps. Additional work will be completed during the next. White Twp adopted the NFIP recommended floodplain ordinance on 3/14/12, Ordinance 1046. WT will also update their stormwater management ordinance in 2018. Action 1.3.1
ACTION NO: 7 Arrange NFIP training sessions for municipalities and insurers.	**X**					No action. Spell out NFIP. Municipalities all feel this would be great information and training for them. Action 1.2.1
ACTION NO: 8 Track and monitor truck traffic and commodity information to identify priority corridors to target truck safety measures.			**X**			Both PENNDOT and Southwestern Planning Commission monitor the safety of local roads in White Township. White Township can request and review information as needed. Action 2.1.2

2012 Indiana County Mitigation Actions Review						
Existing Mitigation Actions	***Status***					***Review Comments***
	No Progress / Unknown	**In Progress / Not Yet Com-**	**Continuous**	**Completed**	**Discontinued**	
ACTION NO: 9 Increase awareness of and participation in FEMA's Community Rating System (CRS) Program.		**X**				White Township staff have attended CRS trainings and are evaluating the pros and cons of participating in the program. None completed by other municipalities. Need to add education program to this strategy. Action 6.1.1
ACTION NO: 10 Conduct qualitative evaluation process to assess the ready state of existing shelters and needs for new shelters.			**X**			Action 3.1.1
ACTION NO: 11 Collect information on the location, type, and threats to natural resource areas throughout the county.			**X**			Indiana County Natural Heritage Inventory – 2011. Action 5.1.1
ACTION NO: 12 Ensure that all critical facilities in Indiana County have backup power and emergency operations plans to deal with power outages.	**X**					Most municipalities have a generator at their facility but are unsure of the critical facilities in their jurisdiction. White Township maintains and services several generators at their facilities, including their municipal building, S&T Arena, and several WTMA pump stations (sewer). Action 4.1.1
ACTION NO: 13 Support the coordination of interagency debris removal.			**X**			White Township is coordinated internally with equipment and disposal locations. Interagency cooperation occurs as needed. Action 4.1.2
ACTION NO: 14 Develop a county-wide stormwater management plan.		**X**				White Township is working toward similar studies and management program for stormwater. Action 5.2.1

2012 Indiana County Mitigation Actions Review						
Existing Mitigation Actions	***Status***					***Review Comments***
	No Progress / Unknown	**In Progress / Not Yet Com-**	**Continuous**	**Completed**	**Discontinued**	
ACTION NO: 15 Continue upgrade of Indiana County's Emergency radio system.			**X**			Change to maintain the radio system. Action 3.5.1
ACTION NO: 16 Evaluate alternative methods to minimize risk from breaches and spills of outdoor impoundment of liquid hazardous materials.	**X**					Cherryhill Township, Rayne Township and White Township Rayne Twp. has no recollection to this issue. Possible related to pesticides at farms. Cherryhill Twp has 7 Marcellus wells and farms that have impoundments of liquid hazmat. East Mahoning Twp has a large facility with hydrocarbons. Action 2.3.1
ACTION NO: 17 Support a stream maintenance program.			**X**			Blairsville Boro, Buffington Township and Conemaugh Township. White Township maintains stream banks at culvert crossings and where applicable on WT property (Kitty Hawk, Wida Rd.) Action 4.1.3
ACTION NO: 18 Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during wind and winter storm events.			**X**			Dead trees cut down or push away. A lot of dead ash trees in the municipal right of ways. East Mahoning does this annually. White Township continues to evaluate trees on Township properties – parks, recreation space. Action 4.1.4
ACTION NO: 19 Provide model ordinances to municipalities that can be used to limit development in hazard-prone areas.			**X**			Action 1.1.2

2012 Indiana County Mitigation Actions Review						
Existing Mitigation Actions	***Status***					***Review Comments***
	No Progress / Unknown	**In Progress / Not Yet Com-**	**Continuous**	**Completed**	**Discontinued**	
ACTION NO: 20 Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures.			**X**			Primarily County EMA function. White Township will cooperate and coordinate as needed during emergencies. Action 6.1.2
ACTION NO: 21 Identify point of dispersing sites.	**X**					Primarily County EMA function. White Township will cooperate and coordinate as needed during emergencies. Action 3.3.1
ACTION NO: 22 Improve accidents reporting to identify patterns for improvement of traffic markings, signals and identify educational efforts needed to reduce accidents.						White Township works with traffic engineers, LTAP, PENNDOT, and Southwestern Planning Commission to reduce accidents on township roads. Action 3.3.2
ACTION NO: 23 Install, repair or replace culverts or storm sewers in areas of the municipality to address highway erosion.			**X**			Add flash flooding to this action. Completed annually. Rayne Twp completes hydrology studies and then installs pipe. Action 4.1.5
ACTION NO: 24 Explore opportunities and create stormwater infiltration areas in new developments.	**X**					Nothing for North Mahoning. Sharps Development, Hunter Creek, has implemented appropriate storm water management plans for the development in Armstrong. Center Twp has issues from White Twp and Indiana Borough. White Twp is exploring opportunities to retrofit and create stormwater infiltration areas. New stormwater ordinance will strongly encourage these practices. Action 4.1.6
ACTION NO: 25 Create local drought task force.	**X**					Action 3.3.3

2012 Indiana County Mitigation Actions Review						
Existing Mitigation Actions	***Status***					***Review Comments***
	No Progress / Unknown	**In Progress / Not Yet Com-**	**Continuous**	**Completed**	**Discontinued**	
ACTION NO: 26 Clean up debris in streams and along stream banks and bridges in municipality.	**X**					Nothing for North Mahoning. East Wheatfield cleans culverts as needed. Rayne contract with state prison for maintenance work and remove of debris.Action 4.1.7
ACTION NO: 27 Purchase signs and temporary barricades to use in highway incident response or during flooding events on the highway.	**X**					Nothing for North Mahoning. Rayne, Cherryhill and Armstrong and Saltsburg Boro has portable and permanent ones. Action 3.3.4
ACTION NO: 28 Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.	**X**					Action 3.2.1
ACTION NO: 29 Develop/update interface between dam owners' inundation mapping and the Indiana County's GIS tools.	**X**					Action 3.4.1
ACTION NO: 30 Participate a County Task Force to coordinate issues on deep gas drilling, economics, and water quality.		**X**				There is planning that takes place on a regular basis. Large pipeline installations occurring now. Action 3.4.2
ACTION NO: 31 Initiate a process to mitigate the impact of non-native plant and insect species.		**X**				Work with the conservation district and DCNR on this issue. Action 5.1.2
ACTION NO: 32 Participate in winter storm exercises.	**X**					EMA will continue to conduct exercises with various scenarios. Action 3.2.2
ACTION NO: 33 Participate in the NOAA StormReady Program.			**X**			Continue this program. Action 3.3.5

2012 Indiana County Mitigation Actions Review						
Existing Mitigation Actions	***Status***					***Review Comments***
	No Progress / Unknown	**In Progress / Not Yet Com-**	**Continuous**	**Completed**	**Discontinued**	
ACTION NO: 34 Distribution of NOAA Weather Radios to Indiana County municipalities, schools, hospitals, nursing homes, day care centers, and SARA facilities.	**X**					Action 3.3.6
ACTION NO: 35 Continue the mission and membership of the Indiana County Terrorism Task Force.			**X**			This is continuously being conducted and will in the future. Action 3.4.3
ACTION NO: 36 Coordinate access to training opportunities for, and thereby increasing the number of, citizens assisting first responders.			**X**			Indiana County EMA coordinates with various emergency response agencies to assist with this task. Action 3.2.2
ACTION NO: 37 Research the possibility of installing Emergency Alert Warning Sirens and equipment to reach all populated areas throughout the County.	**X**					Ernest Borough is submitted a project opportunity for a new weather and civil alerting siren for their borough, Glen Campbell Borough and Montgomery Township. Action 3.5.2
ACTION NO: 38 Research avenues for restoring degraded natural resources and open space to improve their flood control functions.		**X**				White Twp is currently looking into locations where these projects could occur. Pursuing FEMA HMGP funds in 2018.Action 4.1.8

2012 Indiana County Mitigation Actions Review						
Existing Mitigation Actions	***Status***					***Review Comments***
	No Progress / Unknown	**In Progress / Not Yet Com-**	**Continuous**	**Completed**	**Discontinued**	
ACTION NO: 39 Develop a variety of displays for public events to provide information to citizens on preparedness, animal sheltering, business continuity, and children's awareness.	**X**					Action 6.1.3
ACTION NO: 40 Conduct annual tabletop and functional disaster exercises with local law enforcement, emergency managers, county and local officials, and other disaster response agencies.			**X**			EMA will continue to conduct exercises with various scenarios. Action 3.2.4
ACTION NO: 41 Review the existing Indiana County Emergency Operations Plan (EOP) and update where necessary based on any new information contained in the 2011 HMPU.			**X**			Change the date to 2018. Action 3.3.7
ACTION NO: 42 Review existing ordinances and other regulatory or planning mechanisms for consistency with the 2011 HMP.			**X**			Change the date to 2018. White Twp updated floodplain ordinance in 2012, currently updating stormwater ordinance with anticipated 2018 adoption. WT also reviews land developments for consistency with the SALDO. Action 3.3.8
ACTION NO: 43 Continue to solicit and review Hazard Mitigation Questionnaires and post-disaster reviews submitted by municipalities.			**X**			This has been and will continue in the next planning period. Action 3.3.9

2012 Indiana County Mitigation Actions Review						
Existing Mitigation Actions	***Status***					***Review Comments***
	No Progress / Unknown	**In Progress / Not Yet Com-**	**Continuous**	**Completed**	**Discontinued**	
ACTION NO: 44 Continue to target, prioritize, and perform acquisitions, relocations, and elevations for at-risk structures countywide, completing Hazard Mitigation Opportunity Forms when applicable, and meet with homeowners on the benefits of mitigation.		**X**				Armstrong Township had a repetitive flood property that was demolished on Creek Road but not through the NFIP program. WT collected forms from several summer 2017 flood events. Township has also submitted multiple project opportunity forms for inclusion in 2018 HMP update. Outreach to specific homeowners likely to occur in 2018 also. Action 1.5.2
ACTION NO: 45 Convene regular meetings of the HMPSC to discuss issues and progress related to the implementation of the plan.		**X**				This will occur in the next planning period. Action 3.4.4

6.2. Mitigation Goals and Objectives

Based on results of the goals and objectives evaluation exercise and input from the local planning team, a list of six goals and twenty corresponding objectives was developed. *Table 54 - 2018 Goals and Objectives* details the mitigation goals and objectives established for the 2018 Indiana County Hazard Mitigation Plan.

Table 54 - 2018 Goals and Objectives

Indiana County 2018 Goals and Objectives	
GOAL 1	**Attempt to reduce the current and future risk of flood damage in Indiana County.**
Objective 1.1	Direct new development away from high hazard areas by reviewing comprehensive plans, capital improvement plans, etc. and enforcing existing regulations to ensure adequacy in reducing the amount of future development proposed for identified flood hazard areas.
Objective 1.2	Encourage municipal participation in the National Flood Insurance Program (NFIP).
Objective 1.3	Evaluate and update existing floodplain ordinances to meet or exceed the NFIP standards.

Indiana County 2018 Goals and Objectives	
Objective 1.4	Promote the use of flood insurance by property owners, recommending that flood insurance policies remain affordable through county and municipal government programs.
Objective 1.5	Identify and evaluate strategies for repetitive-loss properties.
Objective 1.6	Improve the enforcement of existing floodplain regulations.
GOAL 2	**Reduce the potential impact and losses stemming from natural and human-caused disasters on public and private property.**
Objective 2.1	Identify by municipality the most vulnerable residents and critical existing structures and infrastructure due to the hazards identified in this plan.
Objective 2.2	Encourage municipal enforcement of statewide Uniform Construction Code (UCC).
Objective 2.3	Protect Indiana County's most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation projects.
GOAL 3	**Improve upon the protection of the citizens of Indiana County from all natural and human-caused hazards before, during, and after events.**
Objective 3.1	Evaluate existing shelters to determine adequacy for current and future populations.
Objective 3.2	Ensure adequate training and resources for emergency organizations and personnel.
Objective 3.3	Improve emergency preparedness in Indiana County and its municipalities.
Objective 3.4	Improve coordination and communication among disaster response organizations, local, and county governments.
Objective 3.5	Evaluate cost-effective ways of augmenting existing broadcast and communication systems to enable better response, monitor warning information continuously and to disseminate the appropriate warnings.
GOAL 4	**Reduce or redirect the impact of natural disasters away from at-risk population areas.**
Objective 4.1	Research and implement possible mitigation projects to reduce impacts of natural and human-caused disasters like generator installations, dead tree removals, reservoirs, levees, floodwalls, diversions, channel modification, and storm sewers.
GOAL 5	**Protect existing natural resources and open space, including parks and wetlands, to help prevent natural and human-caused disasters.**
Objective 5.1	Protect Indiana County's natural resources through the implementation of cost-effective and technically feasible mitigation projects.
Objective 5.2	Protect Indiana County's natural resources through the implementation and, where appropriate, enforcement, of recreation planning and stormwater management planning.
Objective 5.3	Protect and ensure survivability of the recreation areas and parks in Indiana County from encroachment by private industry development and the impact from the development areas.
GOAL 6	**Protect existing natural resources and open space, including parks and wetlands, to help prevent natural and human-caused disasters. Protect public health, safety, and welfare by increasing the public awareness of existing hazards and by fostering both individual and public responsibility in mitigating risks due to those hazards.**
Objective 6.1	Distribute public awareness materials about natural hazard and human-caused risks, preparedness, and mitigation.
Objective 6.2	Target owners of properties within identified hazard areas for additional outreach regarding mitigation and disaster preparedness.

6.3. Identification and Analysis of Mitigation Techniques

This section includes an overview of alternative mitigation actions based on the goals and objectives identified in Section 6.2. There are four general mitigation strategy techniques to reducing hazard risks:

- Local plans and regulations
- Structure and infrastructure
- Natural systems protection
- Education and awareness

Local Plans and Regulations: These actions include government authorities, policies or codes that influence the way land and buildings are developed and built. The following are some examples:

- Comprehensive plans
- Land use ordinances
- Subdivision regulations
- Development review
- Building codes and enforcement
- National Flood Insurance Program and Community Rating System
- Capital improvement programs
- Open space preservation
- Stormwater management regulations and master plans

The local plans and regulations technique will protect and reduce the impact of specific hazards on new and existing buildings by improving building code standards and regulating new and renovation construction. The improved building codes will decrease the impact of risk hazards. Subdivision and land development enhancements will also augment this process. Ensuring that municipalities participate in the National Flood Insurance Program and encourage participation in the Community Rating System will decrease the impact as well.

Structure and infrastructure implementation: These actions involve modifying existing structures and infrastructure or constructing new structures to reduce hazard vulnerability. The following are examples:

- Acquisitions and elevations of structures in flood prone areas
- Utility undergrounding
- Structural retrofits
- Floodwalls and retaining walls

- Detention and retention structures
- Culverts
- Safe rooms

Structure and infrastructure implementation is a technique that removes or diverts the hazard from structures or protects the structure from a specific hazard. The new or renovated structures are therefore protected or have a reduced impact of hazards.

Natural Resource Protection: These are actions that minimize damage and losses and also preserve or restore the functions of natural systems. They include the following:

- Erosion and sediment control
- Stream corridor restoration
- Forest management
- Conservation easements
- Wetland restoration and preservation

Natural resource protection techniques allow for the natural resource to be used to protect or lessen the impact on new or renovated structures through the management of these resources. Utilization and implementation of the examples above will protect new and existing buildings and infrastructure.

Education and Awareness: These are actions to inform and educate citizens, elected officials and property owners about hazards and potential ways to mitigate them and may also include participation in national programs. Examples of these techniques include the following:

- Radio and television spots
- Websites with maps and information
- Real estate disclosure
- Provide information and training
- NFIP outreach
- StormReady
- Firewise Communities

The education and awareness technique will protect and reduce the impact of specific hazards on new and existing buildings through education of citizens and property owners on the impacts that specific hazards could have on new or renovated structures. This information will allow the owner to make appropriate changes or enhancements that will lessen or eliminate the impact of hazards.

Table *55 - Mitigation Strategy Technique Matrix* provides a matrix identifying the mitigation techniques used for all low, moderate and high-risk hazards in the county. The

specific actions associated with these techniques are included in *Table 56 - 2018 Mitigation Action Plan.*

Table 55 - Mitigation Strategy Technique Matrix

Indiana County Mitigation Strategy Technique Matrix				
HAZARD	**MITIGATION TECHNIQUE**			
	Local Plans and Regulations	**Structural and Infra-structure**	**Natural Systems Protection**	**Education and Awareness**
Drought			X	X
Earthquake	X			X
Flood, Flash Flood, Ice Jam Flooding	X	X	X	X
Invasive Species	X		X	X
Pandemic and Infectious Disease	X		X	X
Radon	X	X		X
Subsidence & Landslides		X	X	X
Tornados and Wind Storms	X	X		X
Winter Storms	X	X		X
Civil Disturbance	X	X		X
Dam Failure	X	X		X
Environmental Hazard	X	X		X
Levee Failure	X	X	X	X
Opioid Epidemic	X			X
Terrorism	X			X
Transportation Accidents	X	X		X
Utility Interruptions	X	X		X

6.4. Mitigation Action Plan

The Indiana County Hazard Mitigation Local Planning Team (LPT) immediately began work on the mitigation strategy section of the 2018 hazard mitigation plan (HMP) update after the risk assessment section was completed. The LPT started this section by reviewing the 2012 HMP mitigation strategy section. A review of the previous goals, objectives, actions and project opportunities documented in the 2012 HMP was conducted. The next step the LPT completed was the brainstorming of possible new actions based on new identified risks. The LPT compiled all this information for presentations to the municipalities.

The Indiana County Emergency management Agency has been conducting numerous infrastructure enhancement projects over the past five years. Administrative staff has been committed to these infrastructure projects. With this commitment by the Indiana County EMA Staff, there have been challenges with the completion of actions or projects outlined in the 2012 hazard mitigation plan. The Indiana County Emergency Management Agency is committed to making progress during the 2018-2022 planning period.

During this period, annual reviews will be completed and reports of all actions and projects will be developed to determine the status.

MCM Consulting Group, Inc. completed municipality meetings at various time periods at the Indiana County Emergency Management Agency. During all these meetings, an overview of mitigation strategy was presented and the municipalities were informed that they needed to have at least one hazard-related mitigation action for their municipality. All municipalities were invited to attend these meetings.

The municipalities were notified of draft mitigation actions and encouraged to provide new mitigation actions that could be incorporated into the plan. Municipalities were provided copies of their previously submitted mitigation opportunity forms and asked to determine if the projects were still valid. Municipalities were solicited for new project opportunities as well. All agendas, sign in sheets and other support information from these meetings is included in Appendix C.

Mitigation measures for the 2018 Indiana County HMP are listed in the mitigation action plan. *Table 56 - 2018 Mitigation Action Plan* is the 2018 Indiana County Mitigation Action Plan. This plan outlines mitigation actions and projects that comprise a strategy for Indiana County. The action plan includes actions, a benefit and cost prioritization, a schedule for implementation, any funding sources to complete the action, a responsible agency or department and an estimated cost. All benefit and cost analysis was completed using the Pennsylvania Emergency Management Agency recommended analysis tool. The completed analysis is located in Appendix H. *Table 57 - 2018 Mitigation Action Plan Checklist* is a matrix that identifies the county and / or municipalities responsible for mitigation actions. More than one municipality may be responsible for some actions and some actions may be shared by all municipalities.

Table 56 - 2018 Mitigation Action Plan

Indiana County 2018 Mitigation Action Plan									
Action Number	Mitigation Actions			Prioritization			Implementation		
	Category	Description/ Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
1.1.1	Local Plans and Regulations	Encourage and assist municipal officials to steer new development from high hazard areas in their jurisdiction.	All Hazards	X			2018-2022	Local	Indiana County and Municipalities

Indiana County 2018 Mitigation Action Plan									
Action Number	Mitigation Actions			Prioritization			Implementation		
	Category	Description/ Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
1.1.2	Local Plans and Regulations	Provide model ordinances to municipalities that can be used to limit development in hazard-prone areas.	All Hazards	**X**			2018-2022	Local, PDM, FMA	Indiana County and Municipalities
1.2.1	Education and Awareness	Arrange NFIP training sessions for municipalities and insurers.	Flooding, Flash Flooding and Ice Jam Flooding	**X**			2018-2022	Local, FMA	Indiana County and Municipalities
1.3.1	Local Plans and Regulations	Applicable municipalities to review and update their floodplain ordinances to be sure that they are in full compliance with the NFIP.	Flooding, Flash Flooding and Ice Jam Flooding	**X**			2018-2022	Local, FMA	Indiana County and Municipalities
1.5.1	Education and Awareness	Hold public meetings with owners of repetitive loss properties in high-risk areas to consider and implement property protection or relocation projects.	Flooding, Flash Flooding and Ice Jam Flooding		**X**		2018-2022	Local	Indiana County and Municipalities
1.5.2	Structural and Infrastructure	Continue to target, prioritize, and perform acquisitions, relocations, elevations and demolition/reconstruction projects for at-risk structures countywide, completing Hazard Mitigation Opportunity Forms when applicable, and meet with homeowners on the benefits of mitigation.	All Hazards		**X**		2018-2022	Local	Indiana County and Municipalities
2.1.1	Local Plans and Regulations	Expand capabilities of GIS database of at-risk buildings and public infrastructure.	All Hazards		**X**		2018-2022	Local	Indiana County and Municipalities

Indiana County 2018 Mitigation Action Plan									
Action Number	Mitigation Actions			Prioritization			Implementation		
	Category	Description/ Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
2.1.2	Local Plans and Regulations	Track and monitor truck traffic and commodity information to identify priority corridors to target truck safety measures.	Environmental Hazards	**X**			2018-2022	Local, Act 165, HMEP	Indiana County and Municipalities
2.2.1	Local Plans and Regulations	Municipal officials to continue review and enforcement of the Uniform Construction Code.	All Hazards	**X**			2018-2022	Local	Municipalities
2.3.1	Local Plans and Regulations	Evaluate alternative methods to minimize risk from breaches and spills of outdoor impoundment of liquid hazardous materials.	Environmental Hazards	**X**			2018-2022	Local, Act 165	Indiana County and Municipalities
3.1.1	Local Plans and Regulations	Conduct qualitative evaluation process to assess the ready state of existing shelters and needs for new shelters.	All Hazards	**X**			2018-2022	Local	Red Cross, Indiana County and Municipalities
3.2.1	Education and Awareness	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.	Dam Failure		**X**		2018-2022	Local	Indiana County and Municipalities
3.2.2	Education and Awareness	Participate in winter storm exercises.	Winter Storms	**X**			2018-2022	Dam Owners	Indiana County and Municipalities
3.2.3	Education and Awareness	Coordinate access to training opportunities for, and thereby increasing the number of, citizens assisting first responders.	All Hazards	**X**			2018-2022	Local, AFG, EMSOF	Indiana County and Municipalities
3.2.4	Education and Awareness	Conduct annual tabletop and functional disaster exercises with local law enforcement, emergency managers, county and local officials, and other disaster response agencies.	All Hazards	**X**			2018-2022	Local, EMPG	Indiana County and Municipalities

Indiana County 2018 Mitigation Action Plan									
Action Number	Mitigation Actions			Prioritization			Implementation		
	Category	Description/ Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
3.2.5	Education and Awareness	Provide continued training to first responders on the use and administration of Naloxone to suspected overdose patients.	Opioid Epidemic		**X**		2018-2022	Local and PCCD, U.S. Dept of Health and Human Services	Indiana County Coroner
3.3.1	Structural and Infrastructure	Identify point of dispersing sites.	Pandemic, Epidemic		**X**		2018-2022	Local, DOH	Indiana County and Municipalities
3.3.2	Structural and Infrastructure	Improve accidents reporting to identify patterns for improvement of traffic markings, signals and identify educational efforts needed to reduce accidents.	Traffic Accidents			**X**	2018-2022	Local	Indiana County and Municipalities
3.3.3	Local Plans and Regulations	Create local drought task force.	Drought		**X**		2018-2022	Local	Indiana County and Municipalities
3.3.4	Structural and Infrastructure	Purchase signs and temporary barricades to use in highway incident response or during flooding events on the highway.	Flooding, Flash Flooding and Ice Jam Flooding	**X**			2018-2022	Local	Indiana County and Municipalities
3.3.5	Local Plans and Regulations	Participate in the NOAA StormReady Program.	All Natural Hazards	**X**			2018-2022	Local	Indiana County and Municipalities
3.3.6	Structural and Infrastructure	Distribution of NOAA Weather Radios to Indiana County municipalities, schools, hospitals, nursing homes, day care centers, and SARA facilities.	All Hazards	**X**			2018-2022	Local, Act 165	Indiana County and Municipalities
3.3.7	Local Plans and Regulations	Review the existing Indiana County Emergency Operations Plan (EOP) and update where necessary based on any new information contained in the 2018 HMPU.	All Hazards	**X**			2018-2022	Local, EMPG	Indiana County and Municipalities

Indiana County 2018 Mitigation Action Plan									
Action Number	Mitigation Actions			Prioritization			Implementation		
	Category	Description/ Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
3.3.8	Local Plans and Regulations	Review existing ordinances and other regulatory or planning mechanisms for consistency with the 2018 HMP.	All Hazards	**X**			2018-2022	Local	Indiana County and Municipalities
3.3.9	Local Plans and Regulations	Continue to solicit and review Hazard Mitigation Questionnaires and post-disaster reviews submitted by municipalities.	All Hazards	**X**			2018-2022	Local, PDM	Indiana County and Municipalities
3.3.10	Local Plans and Regulations	Further integrate the 2015 Indiana University of Pennsylvania Hazard Mitigation Plan into the Indiana County Hazard Mitigation Plan.	All Hazards	**X**			2018-2022	Local	Indiana County and Municipalities
3.4.1	Local Plans and Regulations	Develop/update interface between dam owners' inundation mapping and the Indiana County's GIS tools.	Dam Failure		**X**		2018-2022	Dam Owner	Indiana County and Municipalities
3.4.2	Local Plans and Regulations	Participate a County Task Force to coordinate issues on deep gas drilling, economics, and water quality.	Environmental Hazards		**X**		2018-2022	Local	Indiana County and Municipalities
3.4.3	Local Plans and Regulations	Continue the mission and membership of the Indiana County Terrorism Task Force.	All Hazards	**X**			2018-2022	Local, HSGP	Indiana County and Municipalities
3.4.4	Local Plans and Regulations	Convene regular meetings of the HMPSC to discuss issues and progress related to the implementation of the plan.	All Hazards	**X**			2018-2022	Local	Indiana County and Municipalities
3.5.1	Structural and Infrastructure	Continue maintain Indiana County's Emergency radio system.	All Hazards	**X**			2018-2022	Local, Act 12	Indiana County and Municipalities

Indiana County 2018 Mitigation Action Plan									
Action Number	Mitigation Actions			Prioritization			Implementation		
	Category	Description/ Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
3.5.2	Structural and Infrastructure	Research the possibility of installing Emergency Alert Warning Sirens and equipment to reach all populated areas throughout the County.	All Hazards	**X**			2018-2022	Local	Indiana County and Municipalities
4.1.1	Structural and Infrastructure	Ensure that all critical facilities in Indiana County have backup power and emergency operations plans to deal with power outages.	Utility Interruptions		**X**		2018-2022	Local	Indiana County and Municipalities
4.1.2	Local Plans and Regulations	Support the coordination of interagency debris removal.	All Hazards	**X**			2018-2022	Local	Indiana County and Municipalities
4.1.3	Local Plans and Regulations	Develop a countywide stormwater management plan.	Flooding, Flash Flooding and Ice Jam Flooding		**X**		2018-2022	Local	Indiana County and Municipalities
4.1.4	Local Plans and Regulations	Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during wind and winter storm events.	Invasive Species, Wind Storm, Tornado	**X**			2018-2022	Local	Indiana County and Municipalities
4.1.5	Structural and Infrastructure	Install, repair or replace culverts or storm sewers in areas of the municipality to address highway erosion.	Flooding, Flash Flooding and Ice Jam Flooding		**X**		2018-2022	Local, Dirt and Gravel Program, PDM	Indiana County and Municipalities
4.1.6	Structural and Infrastructure	Explore opportunities and create stormwater infiltration areas in new developments.	Flooding, Flash Flooding and Ice Jam Flooding		**X**		2018-2022	Local, PDM	Indiana County and Municipalities
4.1.7	Structural and Infrastructure	Clean up debris in streams and along stream banks and bridges in municipality.	Flooding, Flash Flooding and Ice Jam Flooding	**X**			2018-2022	Local, PDM	Indiana County and Municipalities

Indiana County 2018 Mitigation Action Plan									
Action Number	Mitigation Actions			Prioritization			Implementation		
	Category	Description/ Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
4.1.8	Natural Resource Protection	Research avenues for restoring degraded natural resources and open space to improve their flood control functions.	Flooding, Flash Flooding and Ice Jam Flooding	**X**			2018-2022	Local	Indiana County and Municipalities
5.1.1	Local Plans and Regulations	Collect information on the location, type, and threats to natural resource areas throughout the county.	All Hazards	**X**			2018-2022	Local	Indiana County and Municipalities
5.1.2	Natural Resource Protection	Initiate a process to mitigate the impact of non-native plant and insect species.	Invasive Species		**X**		2018-2022	Local	Indiana County and Municipalities
5.2.1	Local Plans and Regulations	Develop a county-wide storm water management plan.	Flooding, Flash Flooding and Ice Jam Flooding		**X**		2018-2022	Local	Indiana County and Municipalities
6.1.1	Local Plans and Regulations	Increase awareness of and participation in FEMA's Community Rating System (CRS) Program.	Flooding, Flash Flooding and Ice Jam Flooding	**X**			2018-2022	Local, FMA, NFIP	Indiana County and Municipalities
6.1.2	Education and Awareness	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures.	All Hazards		**X**		2018-2022	Local	Red Cross, Indiana County and Municipalities
6.1.3	Education and Awareness	Develop a variety of displays for public events to provide information to citizens on preparedness, animal sheltering, business continuity, and children's awareness.	All Hazards	**X**			2018-2022	Local	Indiana County and Municipalities

Indiana County 2018 Mitigation Action Plan									
Action Number	Mitigation Actions			Prioritization			Implementation		
	Category	Description/ Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
6.1.4	Education and Awareness	Partner with other local agencies to provide public education and outreach on the opioid epidemic and where addicts can find assistance.	Opioid Epidemic	**X**			2018-2022	Local	Indiana County, Law Enforcement and Municipalities
6.1.5	Education and Awareness	Engage the school districts to develop or continue the reality tours of opioid overdose scenarios countywide.	Opioid Epidemic		**X**		2018-2022	Local	Indiana County, Law Enforcement and School Districts
6.2.1	Local Plans and Regulations	Work with municipal officials to increase awareness among property owners with identified at-risk structures.	All Hazards	**X**			2018-2022	Local	Indiana County and Municipalities

Funding Acronym Definitions:

FMA: Flood Mitigation Assistance Grant Program, administered by the Federal Emergency Management Agency
HMGP: Hazard Mitigation Grant Program, administered by the Federal Emergency Management Agency
PDM: Pre-Disaster Mitigation Grant, administered by the Federal Emergency Management Agency
EMPG: Emergency Management Performance Grant, administered by the Federal Emergency Management Agency
HSGP: Homeland Security Grant Program, administered by the Federal Emergency Management Agency
HMEP: Hazardous Material Emergency Planning Grant, administered by the Pennsylvania Emergency Management Agency
HMRF: Hazardous Material Response Fund, administered by the Pennsylvania Emergency Management Agency

Table 57 - 2018 Mitigation Action Plan Checklist

Municipality	1.1.1	1.1.2	1.2.1	1.3.1	1.5.1	1.5.2	2.1.1	2.1.2	2.2.1	2.3.1
Indiana County	X	X	X	X	X	X	X	X		X
Armagh Borough	X	X	X	X	X	X	X	X	X	X
Armstrong Township	X	X	X	X	X	X	X	X	X	X
Banks Township	X	X	X	X	X	X	X	X	X	X
Black Lick Township	X	X	X	X	X	X	X	X	X	X
Blairsville Borough	X	X	X	X	X	X	X	X	X	X
Brush Valley Township	X	X	X	X	X	X	X	X	X	X
Buffington Township	X	X	X	X	X	X	X	X	X	X
Burrell Township	X	X	X	X	X	X	X	X	X	X
Canoe Township	X	X	X	X	X	X	X	X	X	X
Center Township	X	X	X	X	X	X	X	X	X	X
Cherry Tree Borough	X	X	X	X	X	X	X	X	X	X
Cherryhill Township	X	X	X	X	X	X	X	X	X	X
Clymer Borough	X	X	X	X	X	X	X	X	X	X
Conemaugh Township	X	X	X	X	X	X	X	X	X	X
Creekside Borough	X	X	X	X	X	X	X	X	X	X
East Mahoning Township	X	X	X	X	X	X	X	X	X	X
East Wheatfield Township	X	X	X	X	X	X	X	X	X	X
Ernest Borough	X	X	X	X	X	X	X	X	X	X
Glen Campbell Borough	X	X	X	X	X	X	X	X	X	X
Grant Township	X	X	X	X	X	X	X	X	X	X
Green Township	X	X	X	X	X	X	X	X	X	X
Homer City Borough	X	X	X	X	X	X	X	X	X	X
Indiana Borough	X	X	X	X	X	X	X	X	X	X
IUP	X	X	X	X	X	X	X	X	X	X
Marion Center Borough	X	X	X	X	X	X	X	X	X	X
Montgomery Township	X	X	X	X	X	X	X	X	X	X
North Mahoning Township	X	X	X	X	X	X	X	X	X	X
Pine Township	X	X	X	X	X	X	X	X	X	X
Plumville Borough	X	X	X	X	X	X	X	X	X	X
Rayne Township	X	X	X	X	X	X	X	X	X	X
Saltsburgh Borough	X	X	X	X	X	X	X	X	X	X
Shelocta Borough	X	X	X	X	X	X	X	X	X	X
Smicksburg Borough	X	X	X	X	X	X	X	X	X	X
South Mahoning Township	X	X	X	X	X	X	X	X	X	X
Washington Township	X	X	X	X	X	X	X	X	X	X
West Mahoning Township	X	X	X	X	X	X	X	X	X	X
West Wheatfield Township	X	X	X	X	X	X	X	X	X	X
White Township	X	X	X	X	X	X	X	X	X	X

Municipality	1.1.1	1.1.2	1.2.1	1.3.1	1.5.1	1.5.2	2.1.1	2.1.2	2.2.1	2.3.1
Young Township	X	X	X	X	X	X	X	X	X	X

Municipality	3.1.1	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.3.1	3.3.2	3.3.3	3.3.4
Indiana County	X	X	X	X	X	X	X	X	X	X
Armagh Borough	X	X	X	X	X		X	X	X	X
Armstrong Township	X	X	X	X	X		X	X	X	X
Banks Township	X	X	X	X	X		X	X	X	X
Black Lick Township	X	X	X	X	X		X	X	X	X
Blairsville Borough	X	X	X	X	X		X	X	X	X
Brush Valley Township	X	X	X	X	X		X	X	X	X
Buffington Township	X	X	X	X	X		X	X	X	X
Burrell Township	X	X	X	X	X		X	X	X	X
Canoe Township	X	X	X	X	X		X	X	X	X
Center Township	X	X	X	X	X		X	X	X	X
Cherry Tree Borough	X	X	X	X	X		X	X	X	X
Cherryhill Township	X	X	X	X	X		X	X	X	X
Clymer Borough	X	X	X	X	X		X	X	X	X
Conemaugh Township	X	X	X	X	X		X	X	X	X
Creekside Borough	X	X	X	X	X		X	X	X	X
East Mahoning Township	X	X	X	X	X		X	X	X	X
East Wheatfield Township	X	X	X	X	X		X	X	X	X
Ernest Borough	X	X	X	X	X		X	X	X	X
Glen Campbell Borough	X	X	X	X	X		X	X	X	X
Grant Township	X	X	X	X	X		X	X	X	X
Green Township	X	X	X	X	X		X	X	X	X
Homer City Borough	X	X	X	X	X		X	X	X	X
Indiana Borough	X	X	X	X	X		X	X	X	X
IUP	X	X	X	X	X		X	X	X	X
Marion Center Borough	X	X	X	X	X		X	X	X	X
Montgomery Township	X	X	X	X	X		X	X	X	X
North Mahoning Township	X	X	X	X	X		X	X	X	X
Pine Township	X	X	X	X	X		X	X	X	X
Plumville Borough	X	X	X	X	X		X	X	X	X
Rayne Township	X	X	X	X	X		X	X	X	X
Saltsburgh Borough	X	X	X	X	X		X	X	X	X
Shelocta Borough	X	X	X	X	X		X	X	X	X
Smicksburg Borough	X	X	X	X	X		X	X	X	X
South Mahoning Township	X	X	X	X	X		X	X	X	X
Washington Township	X	X	X	X	X		X	X	X	X

Municipality	3.1.1	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.3.1	3.3.2	3.3.3	3.3.4
West Mahoning Township	X	X	X	X	X		X	X	X	X
West Wheatfield Township	X	X	X	X	X		X	X	X	X
White Township	X	X	X	X	X		X	X	X	X
Young Township	X	X	X	X	X		X	X	X	X

Municipality	3.3.5	3.3.6	3.3.7	3.3.8	3.3.9	3.3.10	3.4.1	3.4.2	3.4.3	3.4.4
Indiana County	X	X	X	X	X	X	X	X	X	X
Armagh Borough	X	X	X	X	X	X	X	X	X	X
Armstrong Township	X	X	X	X	X	X	X	X	X	X
Banks Township	X	X	X	X	X	X	X	X	X	X
Black Lick Township	X	X	X	X	X	X	X	X	X	X
Blairsville Borough	X	X	X	X	X	X	X	X	X	X
Brush Valley Township	X	X	X	X	X	X	X	X	X	X
Buffington Township	X	X	X	X	X	X	X	X	X	X
Burrell Township	X	X	X	X	X	X	X	X	X	X
Canoe Township	X	X	X	X	X	X	X	X	X	X
Center Township	X	X	X	X	X	X	X	X	X	X
Cherry Tree Borough	X	X	X	X	X	X	X	X	X	X
Cherryhill Township	X	X	X	X	X	X	X	X	X	X
Clymer Borough	X	X	X	X	X	X	X	X	X	X
Conemaugh Township	X	X	X	X	X	X	X	X	X	X
Creekside Borough	X	X	X	X	X	X	X	X	X	X
East Mahoning Township	X	X	X	X	X	X	X	X	X	X
East Wheatfield Township	X	X	X	X	X	X	X	X	X	X
Ernest Borough	X	X	X	X	X	X	X	X	X	X
Glen Campbell Borough	X	X	X	X	X	X	X	X	X	X
Grant Township	X	X	X	X	X	X	X	X	X	X
Green Township	X	X	X	X	X	X	X	X	X	X
Homer City Borough	X	X	X	X	X	X	X	X	X	X
Indiana Borough	X	X	X	X	X	X	X	X	X	X
IUP	X	X	X	X	X	X	X	X	X	X
Marion Center Borough	X	X	X	X	X	X	X	X	X	X
Montgomery Township	X	X	X	X	X	X	X	X	X	X
North Mahoning Township	X	X	X	X	X	X	X	X	X	X
Pine Township	X	X	X	X	X	X	X	X	X	X
Plumville Borough	X	X	X	X	X	X	X	X	X	X
Rayne Township	X	X	X	X	X	X	X	X	X	X
Saltsburgh Borough	X	X	X	X	X	X	X	X	X	X

Municipality	3.3.5	3.3.6	3.3.7	3.3.8	3.3.9	3.3.10	3.4.1	3.4.2	3.4.3	3.4.4
Shelocta Borough	X	X	X	X	X	X	X	X	X	X
Smicksburg Borough	X	X	X	X	X	X	X	X	X	X
South Mahoning Township	X	X	X	X	X	X	X	X	X	X
Washington Township	X	X	X	X	X	X	X	X	X	X
West Mahoning Township	X	X	X	X	X	X	X	X	X	X
West Wheatfield Township	X	X	X	X	X	X	X	X	X	X
White Township	X	X	X	X	X	X	X	X	X	X
Young Township	X	X	X	X	X	X	X	X	X	X

Municipality	3.5.1	3.5.2	4.1.1	4.1.2	4.1.3	4.1.4	4.1.5	4.1.6	4.1.7	4.1.8
Indiana County	X	X	X	X	X	X	X	X	X	X
Armagh Borough	X	X	X	X	X	X	X	X	X	X
Armstrong Township	X	X	X	X	X	X	X	X	X	X
Banks Township	X	X	X	X	X	X	X	X	X	X
Black Lick Township	X	X	X	X	X	X	X	X	X	X
Blairsville Borough	X	X	X	X	X	X	X	X	X	X
Brush Valley Township	X	X	X	X	X	X	X	X	X	X
Buffington Township	X	X	X	X	X	X	X	X	X	X
Burrell Township	X	X	X	X	X	X	X	X	X	X
Canoe Township	X	X	X	X	X	X	X	X	X	X
Center Township	X	X	X	X	X	X	X	X	X	X
Cherry Tree Borough	X	X	X	X	X	X	X	X	X	X
Cherryhill Township	X	X	X	X	X	X	X	X	X	X
Clymer Borough	X	X	X	X	X	X	X	X	X	X
Conemaugh Township	X	X	X	X	X	X	X	X	X	X
Creekside Borough	X	X	X	X	X	X	X	X	X	X
East Mahoning Township	X	X	X	X	X	X	X	X	X	X
East Wheatfield Township	X	X	X	X	X	X	X	X	X	X
Ernest Borough	X	X	X	X	X	X	X	X	X	X
Glen Campbell Borough	X	X	X	X	X	X	X	X	X	X
Grant Township	X	X	X	X	X	X	X	X	X	X
Green Township	X	X	X	X	X	X	X	X	X	X
Homer City Borough	X	X	X	X	X	X	X	X	X	X
Indiana Borough	X	X	X	X	X	X	X	X	X	X
IUP	X	X	X	X	X	X	X	X	X	X
Marion Center Borough	X	X	X	X	X	X	X	X	X	X
Montgomery Township	X	X	X	X	X	X	X	X	X	X
North Mahoning Township	X	X	X	X	X	X	X	X	X	X

Municipality	3.5.1	3.5.2	4.1.1	4.1.2	4.1.3	4.1.4	4.1.5	4.1.6	4.1.7	4.1.8
Pine Township	X	X	X	X	X	X	X	X	X	X
Plumville Borough	X	X	X	X	X	X	X	X	X	X
Rayne Township	X	X	X	X	X	X	X	X	X	X
Saltsburgh Borough	X	X	X	X	X	X	X	X	X	X
Shelocta Borough	X	X	X	X	X	X	X	X	X	X
Smicksburg Borough	X	X	X	X	X	X	X	X	X	X
South Mahoning Township	X	X	X	X	X	X	X	X	X	X
Washington Township	X	X	X	X	X	X	X	X	X	X
West Mahoning Township	X	X	X	X	X	X	X	X	X	X
West Wheatfield Township	X	X	X	X	X	X	X	X	X	X
White Township	X	X	X	X	X	X	X	X	X	X
Young Township	X	X	X	X	X	X	X	X	X	X

Municipality	5.1.1	5.1.2	5.2.1	6.1.1	6.1.2	6.1.3	6.1.4	6.1.5	6.2.1
Indiana County	X	X	X	X	X	X	X	X	X
Armagh Borough	X	X	X	X	X	X	X		X
Armstrong Township	X	X	X	X	X	X	X		X
Banks Township	X	X	X	X	X	X	X		X
Black Lick Township	X	X	X	X	X	X	X		X
Blairsville Borough	X	X	X	X	X	X	X		X
Brush Valley Township	X	X	X	X	X	X	X		X
Buffington Township	X	X	X	X	X	X	X		X
Burrell Township	X	X	X	X	X	X	X		X
Canoe Township	X	X	X	X	X	X	X		X
Center Township	X	X	X	X	X	X	X		X
Cherry Tree Borough	X	X	X	X	X	X	X		X
Cherryhill Township	X	X	X	X	X	X	X		X
Clymer Borough	X	X	X	X	X	X	X		X
Conemaugh Township	X	X	X	X	X	X	X		X
Creekside Borough	X	X	X	X	X	X	X		X
East Mahoning Township	X	X	X	X	X	X	X		X
East Wheatfield Township	X	X	X	X	X	X	X		X
Ernest Borough	X	X	X	X	X	X	X		X
Glen Campbell Borough	X	X	X	X	X	X	X		X
Grant Township	X	X	X	X	X	X	X		X
Green Township	X	X	X	X	X	X	X		X
Homer City Borough	X	X	X	X	X	X	X		X
Indiana Borough	X	X	X	X	X	X	X		X

Municipality	5.1.1	5.1.2	5.2.1	6.1.1	6.1.2	6.1.3	6.1.4	6.1.5	6.2.1
IUP	X	X	X	X	X	X	X	X	X
Marion Center Borough	X	X	X	X	X	X	X		X
Montgomery Township	X	X	X	X	X	X	X		X
North Mahoning Township	X	X	X	X	X	X	X		X
Pine Township	X	X	X	X	X	X	X		X
Plumville Borough	X	X	X	X	X	X	X		X
Rayne Township	X	X	X	X	X	X	X		X
Saltsburgh Borough	X	X	X	X	X	X	X		X
Shelocta Borough	X	X	X	X	X	X	X		X
Smicksburg Borough	X	X	X	X	X	X	X		X
South Mahoning Township	X	X	X	X	X	X	X		X
Washington Township	X	X	X	X	X	X	X		X
West Mahoning Township	X	X	X	X	X	X	X		X
West Wheatfield Township	X	X	X	X	X	X	X		X
White Township	X	X	X	X	X	X	X		X
Young Township	X	X	X	X	X	X	X		X

National Flood Insurance Program (NFIP) Related Mitigation Actions

The Federal Emergency Management Agency (FEMA) requires that every participating jurisdiction that either participates in the NFIP or has identified Special Flood Hazard Areas (SFHAs) have at least one specific action in its mitigation action plan that relates to continued compliance with the NFIP. Action numbers 1.2.1; 1.3.1; 1.5.1 and 6.1.1 comply for Indiana County and all its municipalities.

Evaluate and Prioritize Mitigation Actions

Mitigation Action Evaluation:

Evaluating mitigation actions involves judging each action against certain criteria to determine whether or not it can be executed. The feasibility of each mitigation action is evaluated using the ten evaluation criteria set forth in the Mitigation Action Evaluation methodology as outlined in the Commonwealth of Pennsylvania's All-Hazard Mitigation Planning, Standard Operating Guide. The methodology solicits input on whether each action is highly effective or feasible and ineffective or not feasible for the criteria. These criteria are listed below and aid in determining the feasibility of implementing one action over another.

- Life Safety: Will the action be effective in promoting public safety?
- Property Protection: Will the action be effective in protecting public or private property?
- Technical: How effective will the action be in avoiding or reducing future losses?

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

To evaluate the mitigation actions, each action is identified as highly effective or feasible; ineffective or not favorable and no cost or benefit. For each criterion, the prioritization methodology assigns a "+" if the action was highly effective or feasible, a "-" if the action was ineffective or not feasible, and a "N" if no cost or benefit could be associated with the suggested action or the action was not applicable to the criteria.

Mitigation Action Prioritization:

Actions should be compared with one another to determine a ranking or priority by applying the multi-objective mitigation action prioritization criteria. Scores are assigned to each criterion using the following weighted, multi-objective mitigation action prioritization criteria:

- Effectiveness (weight: 20% of score): The extent to which an action reduces the vulnerability of people and property.
- Efficiency (weight: 30% of score): The extent to which time, effort, and cost is well used as a means of reducing vulnerability.
- Multi-Hazard Mitigation (weight: 20% of score): The action reduces vulnerability for more than one hazard.
- Addresses High Risk Hazard (weight: 15% of score): The action reduces vulnerability for people and property from a hazard(s) identified as high risk.
- Addresses Critical Communications/Critical Infrastructure (weight: 15% of score): The action pertains to the maintenance of critical functions and structures such as transportation, supply chain management, data circuits, etc.

Scores of 1, 2, or 3 are assigned for each multi-objective mitigation action prioritization criterion where 1 is a low score and 3 is a high score. Actions are prioritized using the cumulative score assigned to each. Each mitigation action is given a priority ranking (Low, Medium, and High) based on the following:

Low Priority:	1.0 – 1.8

Medium Priority: 1.9 – 2.4

High Priority: 2.5 – 3.0

The cumulative results of the prioritization of mitigation actions is identified in the mitigation action evaluation and prioritization tool. The results for the mitigation action evaluation and prioritization are located in Appendix H of this plan.

7. Plan Maintenance

7.1. Update Process Summary

Monitoring, evaluating and updating this plan, is critical to maintaining its value and success in Indiana County's hazard mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continued basis. The 2018 HMP update establishes a review of the plan within thirty to ninety days of a disaster event in addition to continuing with an annual plan evaluation. This HMP update also defines the municipalities' role in updating and evaluating the plan. Finally, the 2018 HMP update encourages continued public involvement and how this plan may be integrated into other planning mechanisms in the county.

7.2. Monitoring, Evaluating and Updating the Plan

Hazard mitigation planning in Indiana County is a responsibility of all levels of government (i.e., county and local), as well as the citizens of the county. The Indiana County Local Planning Team will be responsible for maintaining this Multi-Jurisdictional HMP. The Local Planning Team will meet annually and following each emergency declaration to review the plan. Every municipality that has adopted this plan will also be afforded the opportunity to provide updated information or information specific to hazards encountered during an emergency or disaster. Each review process will ensure that the hazard vulnerability data and risk analysis reflect current conditions of the county, that the capabilities assessment accurately reflects local circumstances and that the hazard mitigation strategies are updated based on the county's damage assessment reports and local mitigation project priorities. The HMP must be updated on a five-year cycle. An updated HMP must be completed and approved by the end of the five-year period. The monitoring, evaluating and updating of the plan every five years will rely heavily on the outcomes of the annual HMP planning team meetings.

The Indiana County Local Planning Team will complete a hazard mitigation progress report to evaluate the status and accuracy of the multi-jurisdictional HMP and record the local planning team's review process. The Indiana County Emergency Management Agency will maintain a copy of these records and place them in Appendix H of this plan. Indiana County will continue to work with all municipalities regarding hazard mitigation projects, especially those municipalities that did not submit projects for inclusion in this plan.

7.3. Continued Public Involvement

The Indiana County Emergency Management Agency will ensure that the 2018 Indiana County Hazard Mitigation Plan is posted and maintained on the Indiana County website and will continue to encourage public review and comment on the plan. The Indiana County website that the plan will be located at is as follows: www.IndianaCounty.org

The public will have access to the 2018 HMP through their local municipal office or the Indiana County Emergency Management Agency. Information on upcoming events related to the HMP or solicitation for comments will be announced via newsletters, newspapers, mailings, and the county website.

The citizens of Indiana County are encouraged to submit their comments to elected officials and/or members of the Indiana County HMP Local Planning Team. To promote public participation, the Indiana County Local Planning Team will post a public comment form as well as the Hazard Mitigation Project Opportunity Form on the county's website. These forms will offer the public various opportunities to supply their comments and observations. All comments received will be maintained and considered by the Indiana County Hazard Mitigation Planning Team.

8. Plan Adoption

8.1. Resolutions

In accordance with federal and state requirements, the governing bodies of each participating jurisdiction must review and adopt by resolution, the 2018 Indiana County Hazard Mitigation Plan. Copies of the adopting resolutions are included in this plan in Appendix L. FEMA Region III in Philadelphia is the final approval authority for the Hazard Mitigation Plan. PEMA also reviews the plan before submission to FEMA.

9. Appendices

APPENDIX A: References

APPENDIX B: FEMA Local Mitigation Review Tool

APPENDIX C: Meetings and Support Documents

APPENDIX D: Municipal Flood Maps

APPENDIX E: Critical and Special Needs Facilities

APPENDIX F: 2018 HAZUS Reports

APPENDIX G: 2018 Mitigation Project Opportunities

APPENDIX H: 2018 Mitigation Action Evaluation & Prioritization

APPENDIX I: PHMSA Incident Data - FOUO

APPENDIX J: Dam Failure Hazard Profile - FOUO

APPENDIX K: Annual Review Documentation

APPENDIX L: Indiana County & Municipal Adoption Resolutions