

Sullivan County 2014 Hazard Mitigation Plan

Sullivan County 2014 Hazard Mitigation Plan

Certification of Annual Review Meetings

YEAR	DATE OF MEETING	PUBLIC OUTREACH ADDRESSED?*	SIGNATURE

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

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1. Introduction

1.1. Background

The Sullivan County Board of Commissioners, in response to the Disaster Mitigation Act of 2000 (DMA 2000), spearheaded a county-wide hazard mitigation planning effort to prepare, adopt, and implement a multi-jurisdictional Hazard Mitigation Plan (HMP) for Sullivan County and all of its 13 municipalities from 2007 to 2008. The Sullivan County Emergency Management Agency was charged by the County Board of Commissioners to prepare the 2008 plan.

The 2008 HMP has been utilized and maintained during the 5 year life cycle. In the fall of 2011, Sullivan County experienced severe flooding throughout the county. The Sullivan County 2008 HMP was a foundation for the application and management of individual assistance and public assistance after the issuance of a Presidential Declaration of Disaster by President Obama.

In January of 2013, the Sullivan County Commissioners were successful in securing hazard mitigation grant funding to update the county hazard mitigation plan. The funding was available due to federal response and mitigation from the severe flooding of 2011. The Sullivan County Commissioners again assigned the emergency management agency staff with the primary responsibility to update the hazard mitigation plan. MCM Consulting Group, Inc. was selected and hired to complete the update of the HMP. A local hazard mitigation planning team was developed. The team was comprised of government leaders and citizens from Sullivan County to update the HMP with assistance and input from Sullivan County municipal elected officials and the public. This updated HMP will provide another solid foundation for the Sullivan County Hazard Mitigation Program.

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

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

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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 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 Sullivan County Multi-Jurisdictional Hazard Mitigation Plan (HMP) serves as a framework for saving lives, protecting assets, and preserving the economic viability of Sullivan County and the 13 municipalities located in Sullivan County. The HMP outlines actions designed to address and reduce the impact of a full range of natural hazards facing Sullivan County, including flooding, tornados, hurricanes/tropical storms, and severe winter weather. Human-caused hazards are also addressed. These include, for example, transportation accidents, hazardous materials spills, and civil disorder. A multi-jurisdictional planning approach was utilized for the Sullivan County HMP update, thereby eliminating the need for each municipality to craft 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. Each municipality that elected to be part of the multi-jurisdictional planning effort adopted the HMP by resolution.

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:

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- 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 Stormwater 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

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*. February 10, 2012

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*. 2007

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2. Community Profile

2.1. Geography and the Environment

Sullivan County was established from a section of northwestern Lycoming County. Formed March 15, 1847 and incorporated as a county in 1850; Sullivan County was named for Senator Charles C. Sullivan of the Butler District and leader of the Pennsylvania Senate. Senator Sullivan had taken an active role in passing legislation to create the county.

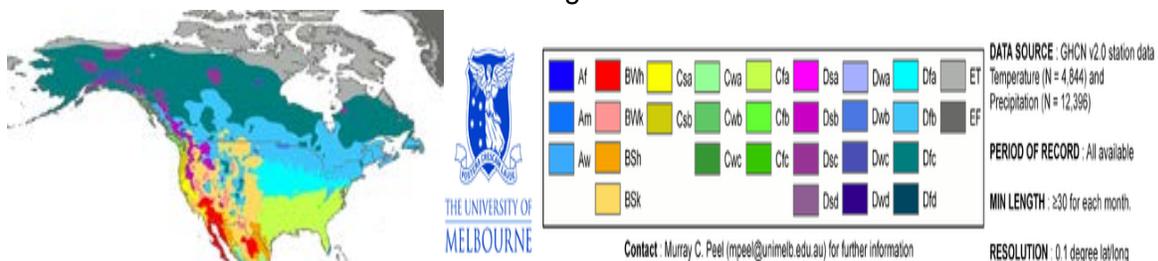
Nestled in the Eastern Appalachian Plateau of northeastern Pennsylvania, Sullivan County remains a pristine rural area of forests, valleys and streams. Counties bordering are Bradford County to the north, Wyoming County and Luzerne County to the east, and on the west and south by Lycoming County and Columbia County. Elevations in the county run from a low of 900 feet above sea level to 2,640 feet on the high end of North Mountain. The Appalachian Plateau High Section is the dominate land feature in the southern region of the County. As a glaciated plateau land form it includes a unique forested habitat intermingled with scattered small lakes, bogs and marsh wetlands.

Sullivan County covers 449.94 square miles of wooded hills and valleys. The county is nicknamed “The Gem of the Endless Mountains”. Two state parks reside in Sullivan County; World’s End and Rickett’s Glen. A third (31.18%) of the acreage of the county is dedicated to state forest and game lands, open to both residents and visiting hunters. Forests cover 277 square miles (58%) of the county; agriculture uses approximately 67.6 square miles (14%); and, approximately 28% being privately owned land. The privately owned acres have been developed at an ever increasing rate with a profusion of seasonal recreation homes and hunting camps.

The county is in the sub-basin of the west branch and north branch of the Susquehanna River. The Loyalsock Creek and Muncy Creek flow into the West Branch of the Susquehanna. Fishing Creek and Mehoopany Creek flow into the North Branch of the Susquehanna.

The Koppen-Geiger Climate Areas map classifies Sullivan County, and the rest of Pennsylvania, as Humid Continental. While counties of Pennsylvania share many weather similarities, there are also a few unique characteristics to certain regions. See 2.1-1

Figure 2.1-1



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Source: Koppen-Geiger Climate

Sullivan County falls into the northeast region of Pennsylvania. The weather patterns and climatic conditions of Sullivan County are a major risk factor.

The County's weather extremes are the primary contributors to many of the County's natural hazard events, including flash floods, hurricanes and tropical depressions, blizzards, tornados, drought, severe cold and heat, high wind, hailstorms, and lightning.

2.2. Community Facts

Manufacturing, timber industry, and agriculture are the largest employers in the county followed by selected service in state and county government.

Sullivan county ranks second in the state in timberland percentage; while Pennsylvania leads the nation in hardwood growing stock. The highest quality hardwood species indigenous to Sullivan County include: ash, soft maple, hard maple, red oak and most significantly black cherry.

Sullivan County has over 2,500 people in the workforce. A significant percentage of the skilled workforce is employed in surrounding areas at large manufacturing operations such as DuPont, Craftmaster, Proctor & Gamble, Osram/Sylvania and the natural gas industry.

Company	Industry
Adams Associates	Educational and Social Assistance
Commonwealth of Pennsylvania	Public Administration
Darway Elder Care Rehabilitation	Health Care and Social Assistance
Dwight Lewis Lumber Co. Inc.	Manufacturing
Eagles Mere Country Club	Arts, Entertainment and Recreation
Hoffman/New Yorker INC	Manufacturing
Meridien	Natural Gas Industry
O-TEX	Natural Gas Industry
Sullivan County	Public Administration
Sullivan County School District	Education Services

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Table 2.2-1: Sullivan County Top Employers	
Company	Industry
The Highlands Care Center	Health Care and Social Assistance

Source: Sullivan County Comprehensive Plan and Sullivan County Local Planning Team

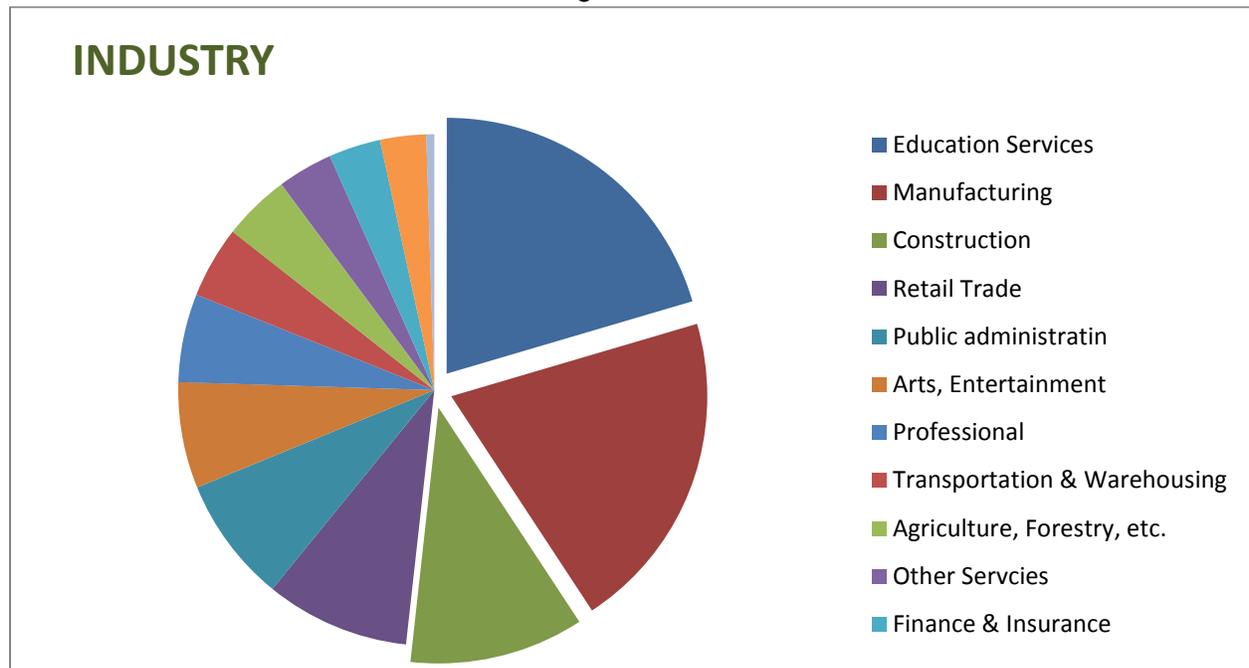
Occupation within Sullivan County is classified under the following categories with the associated percentage of civilians employed at 16 years of age and over:

- Management, business, science, and arts occupations 23.1%
- Production, transportation, and material moving occupations 22.5%
- Service occupations 19.2%
- Sales and office occupations 17.7 %
- Natural resources, construction, and maintenance occupations 17.4%

Source: US 2010 Census

Industry was classified with education services, manufacturing and construction as the largest employers during the 2010 Census; encompassing approximately half of the workers.

Figure 2.2-2



Source: 2010 US Census Information – Sullivan County, Pennsylvania.

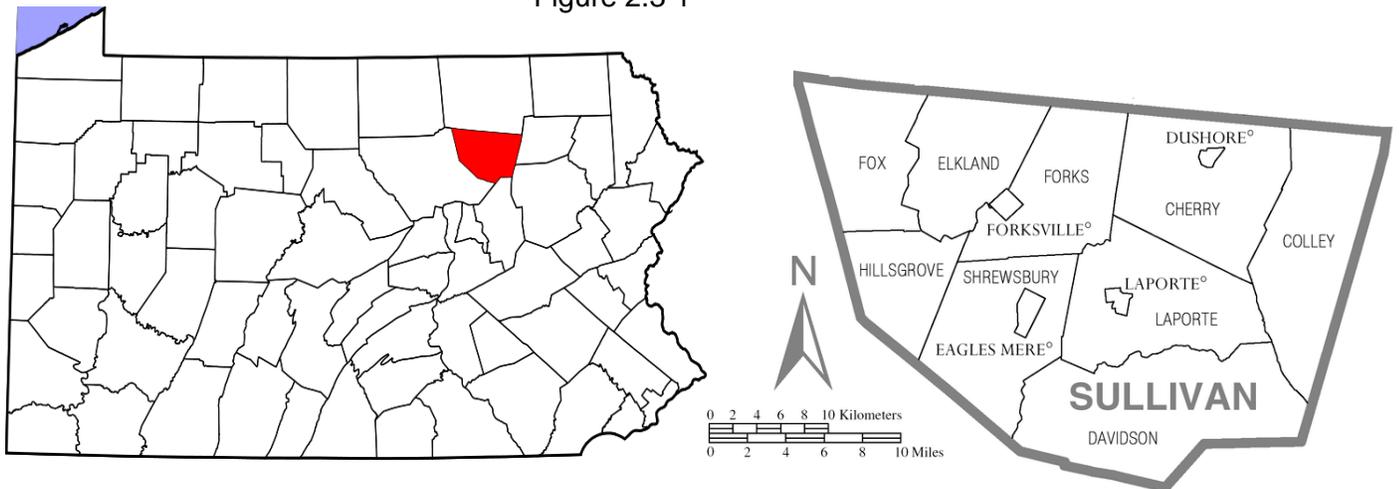
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2.3. Population and Demographics

The population of Sullivan County in the 2010 Census was recorded at 6428, with a total of 5,991 housing units. These residents live predominantly in the valleys and east central part of the county. The median age is 49.9 within the county. The average household size is 2.16 with the average family size of 2.70.

Sullivan County is classified politically as an eighth class county. There are four boroughs: Dushore, Eagles Mere, Forksville, and Laporte; and nine townships: Cherry, Colley, Davidson, Elkland, Forks, Fox, Hillsgrove, Laporte, and Shrewsbury.

Figure 2.3-1



There are five major transportation routes within the county: US 220; and State Routes 87, 154, 42, and 487. Although it is off the Interstate network, Interstates 17/86 (NY), 80, 81, 180 and 476 are all accessible within 50 miles. Sullivan County is within 500 miles of 60 percent of the U.S. population. This is due to US Route 220 that bisects Sullivan County, a major North-South transportation route running from South Carolina to New York.

Sullivan County has over 244 miles of State maintained highways, plus over 298 miles of township and borough maintained roads. This includes approximately 48 miles that are being maintained by townships under the PennDOT Turn Back Program.

Troop P Laporte Station of the Pennsylvania State Police provides coverage to Sullivan County as there are no municipal police agencies within the county. There are seven fire companies with ambulance services and two fire stations without ambulance services.

Even though there are no hospitals within Sullivan County, residents are provided medical services at three medical clinics. There are numerous hospitals in close proximity to the county.

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2.4. Land Use and Development

The Commonwealth of Pennsylvania owns 38% of the land; to include Ricketts Glen and Worlds End State Parks, state forests, fish and boat commission acreage and game lands. There are more than 60,000 acres of state game lands and nearly 42,000 acres of state forest in the County.

According to information provided by the Sullivan County Assessment Department, Sullivan County has a total of 5,991 housing units. Of the available housing units only 38.7% are occupied. The majority of these housing units were built in 1939 or earlier, with a 14.9% increase between 1970 and 1979. From 2011 or later there was only an increase of 0.01% of housing units built. It is unknown if any of the housing units were built in the special flood hazard areas.

Table 2.4-1



Source: Sullivan County Assessment Department

Sullivan County has a median household income of \$38,732.00 with a median per capita income of \$21,703.00.

The total number of farms has been reduced from 376 to 165, a 56% reduction since 1959. Between 1997 and 2002 the number of farms actually increased by 47. The amount of land in farms has been reduced from approximately 62,000 to 28,000 acres, a reduction of 55% since 1959. The amount of harvested cropland has dropped by 29% since 1959, from 16,465 acres then to 11,750 acres in 2007.

The Marcellus Shale brings economic opportunity and a concern for potential environmental impacts to Sullivan County. The chief effects will be to water resources, impacts on the county's roads and changes to the scenic landscape. With this goes the potential secondary effect to include economic development and population growth.

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2.5. Data Sources and Limitations

The county relied heavily on existing data sources developed by other Sullivan County departments, including:

- Sullivan County Hazard Vulnerability Analysis.
- Sullivan County Comprehensive Plan.
- Sullivan County Assessment Department data.
- Sullivan County Resource Directory
- Sullivan County Subdivision and Land Development Ordinance.
- Sullivan County Open Space Management Plan.
- Sullivan County digital tax assessment data

The following are additional data sources used during the update process:

- U.S. Census Bureau.
- National Climatic Data Center (NCDC).
- National Oceanic and Atmospheric Administration (NOAA).
- Pennsylvania Department of Conservation and Natural Resources.
- Pennsylvania Groundwater Information System.
- Pennsylvania Emergency Incident Reporting System.
- Pennsylvania Emergency Management Agency.

The countywide Digital Flood Insurance Rate Maps (DFIRM), were used for all flood risk analysis and estimation of loss. The DFIRM database provides flood frequency and elevation information used in the flood hazard risk assessment. Other Sullivan County GIS datasets including road centerlines, parcels, and structures were utilized in conjunction with the DFIRM. In addition to the county's existing spatial datasets, the Sullivan County EMA developed a GIS database and maps of the county's critical facilities, special needs populations, transportation systems, and hazardous materials facilities. Potential losses were then analyzed by using existing county tax assessment data and 100-year floodplain data.

Geographic Information Systems (GIS) Data

GIS data was utilized in risk assessment, estimation of loss and the development of map products for the hazard mitigation plan update. A core foundation of data was available from the Sullivan County Planning Department and Sullivan County Department of Public Safety. Some data was downloaded from the Pennsylvania Spatial Data Access (PASDA) and utilized. The following is a list of existing GIS data that was utilized in the plan update process and a list of new GIS data that was developed to complete the mitigation plan update. All new and existing data was utilized to complete the update of the Sullivan County Hazard Mitigation Plan.

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Existing Sullivan County GIS Data Used:

- Structures
- Road Centerlines
- Driveways
- Marc 1 Centerline
- CHK Pipelines
- Tax Parcels
- Municipality Boundaries
- Digital Flood Insurance Rate Maps
- Watershed and Sub-sheds
- Lakes and Streams

New GIS Data Developed and Used:

- Critical Infrastructure
- Civil Disturbance Locations
- Dams
- Full-time Mobile Homes
- Manure Storage
- Repetitive Loss Structures
- Utility Locations
- Tornado Paths
- Structure Fire Locations
- Elevations of the county

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3. Planning Process

3.1. Update Process and Participation Summary

The Sullivan County Hazard Mitigation Plan update began in January 2013. The Sullivan County Commissioners were able to secure a hazard mitigation grant to start the process. The Sullivan County Emergency Management Agency was identified as the lead agency for the Sullivan County Hazard Mitigation Plan Update. The planning process involved a variety of key decision makers and stakeholders within Sullivan County. Sullivan 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 Sullivan County officials from the Commissioners' Office, Sullivan County Emergency Management Agency, and MCM Consulting Group, Inc.

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. (MCM) assisted the Sullivan County Emergency Management Agency in coordinating and leading public involvement meetings, Local Planning Team meetings, analysis, and the writing of the Hazard Mitigation Plan (HMP) Update. The Sullivan 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.

Several public meetings with local elected officials were held, as well as work sessions and in-progress review meetings with the Sullivan 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. Sullivan 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.

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- 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 Sullivan County Board of Commissioners.
- Plan submission to FEMA and PEMA.

MCM Consulting Group, Inc. assisted Sullivan County through the HMP update process. The 2014 Sullivan County HMP was completed in December 2013. The 2014 plan follows an outline developed by PEMA in 2009 which provides a standardized format for all local HMPs in the Commonwealth of Pennsylvania. As a result, the format of the 2014 Sullivan County HMP contrasts with the 2008 HMP, but all information that was still current was carried over into the new plan. These changes are summarized in Table 3.1-1. Additional update summaries are provided in each section of the plan.

Table 3.1-1: Summary of changes to the format of the 2008 and 2014 versions of the Sullivan County HMP.

2008 HMP SECTION	2014 HMP SECTION
Forward	Section 1
Preface County Profile	Section 2
Planning Process	Section 3
Mitigation Plan Purpose	Section 1
Goals	Section 6
Method of Analysis	Section 4
Natural Hazards	Section 4
Floods	Section 4.3.4
Winter Storms	Section 4.3.13
Tornadoes, Hurricanes and Windstorms	Section 4.3.5 and 4.3.12
Drought and Water Supply Deficiencies	Section 4.3.1
Subsidence	Section 4.3.11
Earthquakes	Section 4.3.2
Urban Fire Hazard	Section 4.3.22
Wild Fires	Section 4.3.24
Radon	Section 4.3.10
Appendix A: Mitigation Actions	Section 6
Appendix B: Mitigation Opportunities / Priorities	Section 6

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3.2. The Planning Team

The 2014 Sullivan County Hazard Mitigation Plan Update was led by the Sullivan County Project Team. The Sullivan County Project Team provided guidance and leadership for the overall project. The project team assisted MCM Consulting Group, Inc. with dissemination of information and administrative tasks. Table 3.2-1 outlines the individuals that comprised this team.

Name	Organization	Position
Bob Getz	Sullivan County	Commissioner
Wylie Norton	Sullivan County	Commissioner
Sean Thibodeault	Sullivan County Department of Emergency Services	Director
Jason Dickinson	Sullivan County Department of Emergency Services	Operations and Training Officer
Joe Carpenter	Sullivan County Department of Emergency Services	9-1-1 Coordinator
Michael T. Rearick	MCM Consulting Group, Inc.	Senior Consultant

In order to represent the county, the Sullivan County Project Team developed a diversified list of potential Local Planning Team (LPT) members. Members that participated in the 2008 hazard mitigation plan were highly encouraged to participate. The project team then provided invitations to the prospective members and provided a description of duties to serve on the LPT. The LPT worked throughout the process to plan and hold meetings, collect information, and conduct public outreach.

The stakeholders listed in Table 3.2-2 served on the 2014 Sullivan County Hazard Mitigation Local Planning Team, demonstrating their commitment to actively participate in the planning process by attending meetings, completing assessments, surveys, and worksheets, and/or submitting comments.

Name	Organization	Position
Bob Getz	Sullivan County	Commissioner
Wylie Norton	Sullivan County	Commissioner
Sean Thibodeault	Sullivan County Department of Emergency Services	Director
Jason Dickinson	Sullivan County Department of Emergency Services	Operations and Training Officer
Joe Carpenter	Sullivan County Department of Emergency Services	9-1-1 Coordinator
Kristin Montgomery	Sullivan County Assessment Department	Chief Assessor
Brian Hoffman	Sullivan County Assessment Department	Field Representative

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Table 3.2-2: Sullivan County Hazard Mitigation Plan Update Local Planning Team		
Name	Organization	Position
Jon Poler	Sullivan County Planning Department	Assistant Planner
Diane Fitzgerald	Cherry Township	Supervisor
Henry Dvorshock	Pennsylvania State Police-LaPorte	Corporal
Matt Morgan	Pennsylvania Department of Transportation	Maintenance Supervisor
Nathan Fice	Pennsylvania Department of Conservation and Natural Resources-District 20	Manager
Jacquelyn Rouse	Sullivan County Conservation District	District Manager
Corey Richmond	Sullivan County Conservation District	Watershed Specialist
Randy Reibson	Sullivan County Conservation District	E&S Technician
Betty Reibson		Private Citizen
Rick Smith		Private Citizen
Joe Stabryla	Dushore Borough	Borough Council
Craig Skaluba	Sullivan County School District	Superintendent

3.3. Meetings and Documentation

Several 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 3.3-1 lists the meetings held during the HMP planning process, which organizations and municipalities attended and what was discussed at each meeting. All meeting agendas, sign-in sheets, presentation slides, any other documentation is located in **Appendix C**.

Table 3.3-1: Sullivan County HMP Process - Timeline			
Date	Meeting	Attendees	Description
01/31/13	Sullivan County Hazard Mitigation Plan (HMP) Kick-Off Meeting	Sullivan County Commissioners Sullivan County Emergency Management Agency MCM Consulting Group, Inc.	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.
03/01/13	Local Planning Team Initial Meeting	Sullivan County Commissioners Sullivan County Emergency Management Agency Sullivan County GIS Department Sullivan County Assessment Department MCM Consulting Group, Inc.	Completed a review of the Capabilities Assessment and Risk Assessment Sections.

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Table 3.3-1: Sullivan County HMP Process - Timeline			
Date	Meeting	Attendees	Description
04/30/13	Municipality Capability Assessment Meeting	Sullivan County Commissioners Sullivan County Department of Emergency Services Sullivan County Council of Governments Cherry Township Colley Township Davidson Township Dushore Borough Eagles Mere Borough Elkland Township Forksville Borough Laporte Township Shrewsbury Township MCM Consulting Group, Inc.	Provided an overview of hazard mitigation planning and the municipal requirements. Discussed the 2014 plan update process. Completed a review of the capabilities assessment section and the municipal capability assessment survey. Reviewed the risk assessment section and the municipal hazard identification and risk evaluation worksheet
08/15/13	Public Meeting	Sullivan County Commissioners Sullivan County Department of Public Safety MCM Consulting Group, Inc. No participation by the public	Conducted a public meeting to review the draft risk assessment section of the Sullivan County Hazard Mitigation Plan update.
09/11/13 To 09/12/13	Meeting with Municipal Officials	Sullivan County Department of Emergency Services Cherry Township Colley Township Davidson Township Dushore Borough Eagles Mere Borough Elkland Township Forksville Borough Hillsgrove Township Laporte Borough Laporte Township Shrewsbury Township MCM Consulting Group, Inc.	Educated county and local officials, members of the Sullivan County Council of Government, and the public 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.
10/10/13	Public Meeting	Sullivan County Department of Public Safety Davidson Township Laporte Township Shrewsbury Township MCM Consulting Group, Inc. No participation by the public	Conducted a public meeting to review the draft mitigation strategy section of the Sullivan County Hazard Mitigation Plan update.
12/05/13	Sullivan County Hazard Mitigation Plan – Draft Plan Review Meeting	Sullivan County Department of Public Safety Sullivan County Commissioners Office Forksville Borough Forks Township No participation by the public	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.

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3.4. Public and Stakeholder Participation

Sullivan 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 Sullivan 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 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 included in specific appendices at the end of the hazard mitigation plan update.

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, political and resiliency capabilities that can be included in the countywide mitigation strategy. Located in **Appendix F**.
3. **Municipal Project Opportunity Forms and Mitigation Actions:** Copies of the previous mitigation opportunity forms that were included in the current HMP were provided to the municipalities for review and amendment. The previous mitigation actions were provided and reviewed at update meetings. New municipal project opportunity forms are included as well. Located in **Appendix I**.

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.

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3.5. Multi-Jurisdictional Planning

Sullivan County used an open, public process to prepare this HMP. Meetings and letters to municipal officials were conducted to inform and educate them about DMA 2000 and its requirements for local hazard mitigation plans. In turn, 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. Please refer to Appendix C for documentation of the public participation in the planning process. Table 3.5-1 reflects the municipality participation in meetings during the update process. Table 3.5-2 reflects municipality participation by completing worksheets, surveys and forms.

Table 3.5-1: Municipality Participation in Hazard Mitigation Update Meetings					
Municipality	Capability and Risk Assessment Municipal Meeting 04/30/2013	Risk Assessment Public Meeting 08/15/2013	Mitigation Strategy Section 09/11/2013 and 09/12/2013	Mitigation Strategy Public Meeting 10/10/2013	Draft Mitigation Plan Public Meeting 12/05/2013
Cherry Township	X		X		
Colley Township	X		X		
Davidson Township	X		X	X	
Dushore Borough	X		X		
Eagles Mere Borough	X		X		
Elkland Township	X		X		
Forks Township					X
Forksville Borough	X		X		X
Fox Township					
Hillsgrove Township			X		
Laporte Borough			X		
Laporte Township	X		X	X	
Shrewsbury Township	X		X	X	

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Table 3.5-2: 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
Cherry Township	X	X	X
Colley Township	X	X	X
Davidson Township	X	X	X
Dushore Borough	X	X	X
Eagles Mere Borough			X
Elkland Township	X	X	X
Forks Township	X	X	
Forksville Borough	X	X	X
Fox Township	X	X	
Hillsgrove Township			X
Laporte Borough	X	X	X
Laporte Township	X	X	X
Shrewsbury Township	X	X	X

All municipalities within Sullivan County have adopted the 2008 Sullivan County Hazard Mitigation Plan as the municipal hazard mitigation plan. It is anticipated that all municipalities will adopt the 2014 Sullivan County Hazard Mitigation Plan Update.

3.6. Existing Planning Mechanisms

There are numerous existing regulatory and planning mechanisms in place at the state, county, and municipal level of government which support hazard mitigation planning efforts. These tools include the Commonwealth of Pennsylvania Standard All-Hazard Mitigation Plan, local floodplain management ordinances, the Sullivan County Comprehensive Plan, Sullivan County Emergency Operations Plan, local emergency operation plans, local zoning ordinances, local subdivision and land development ordinances, local comprehensive plans, and watershed and other environmental plans.

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 Sullivan County Comprehensive Plan so that vulnerability pertaining to future development could be established. The county HVA provided extensive information on past occurrences, vulnerability, and risk in the last five years, including anecdotal information. Floodplain management ordinance information was used to aid in the establishment of local capabilities in addition to participation in the NFIP.

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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 hazard vulnerability analysis (HVA) 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 HVA identifies the effects of both natural and manmade hazards and describes each hazard in terms of its frequency, severity, and county impact. Numerous hazards were identified as part of the HVA process.

A Hazard Vulnerability Analysis (HVA) evaluates risk associated with a specific hazard and is defined by probability and frequency of occurrence, magnitude, severity, exposure, and consequences. The Sullivan County HVA provides in-depth knowledge of the hazards and vulnerabilities that affect Sullivan 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 HVA provides the basic information necessary to develop effective hazard mitigation/prevention strategies. Moreover, this document provides the foundation for the Sullivan County Emergency Operations Plan (EOP), local EOPs, and other public and private emergency management plans.

The Sullivan County HVA 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 HVA to past events is myopic and inadequate.

The Sullivan County Hazard Mitigation Local Planning Team reviewed and assessed the change in risk for all natural and man-made hazards identified in the 2008 hazard mitigation plan. The mitigation planning team then identified hazards that were outlined within the Pennsylvania Hazard Mitigation Plan but not included in the 2008 Sullivan County Mitigation Plan that could impact Sullivan County. The team utilized the Hazard Identification and Risk Evaluation Document that was provided by the Pennsylvania Emergency Management Agency.

Once the natural and man-made 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 other available resources. The team used the most recent Sullivan County assessment data to estimate loss to particular hazards. Risk Factor was then assessed to each profiled hazard utilizing the Hazard Prioritization Matrix. This

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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. Table of Presidential Disaster Declarations

Table 4.2.1-1 lists the Sullivan County Municipal Disaster Declarations that are currently on file with the Sullivan County Emergency Management Agency. This is not a comprehensive list. Table 4.2.1-2 presents a list of all Presidential and Gubernatorial Disaster Declarations that have affected Sullivan County from 1954 through 2013, according to the Pennsylvania Emergency Management Agency.

Municipality	Disaster Event	Date
Hillsgrove Township	Flooding	10/26/2012
Laporte Township and Hillsgrove Township	Flooding from Tropical Storm Lee	09/07/2011
Hillsgrove Township	Flooding	01/25/2010

Source: Sullivan County Emergency Management Agency

Date	Hazard Event	Action
09/2011	Tropical Storm Lee	Presidential Disaster Declaration for Public and Individual Assistance
02/2007	Severe Winter Storm	Presidential Disaster Declaration for Public Assistance
09/2004	Tropical Depression Ivan	Presidential Disaster Declaration for Public and Individual Assistance
09/2003	Hurricane Isabel/Henri	Presidential Disaster Declaration for Public and Individual Assistance
09/1999	Hurricane Floyd	Presidential Disaster Declaration for Public and Individual Assistance
01/1996	Severe Winter Storms	Presidential Disaster Declaration for Individual Assistance
10/1976	Severe Storms and Flooding	Presidential Disaster Declaration
09/1975	Severe Storms, Heavy Rains and Flooding	Presidential Disaster Declaration
06/1972	Tropical Storm Agnes	Presidential Disaster Declaration

Source: Pennsylvania Emergency Management Agency

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4.2.2. Summary of Hazards

The Sullivan County Local Planning Team (LPT) was provided the Pennsylvania Standard List of Hazards to be considered for evaluation in the 2014 Hazard Mitigation Plan (HMP) Update. Following a review of the hazards considered in the 2008 HMP and the Standard List of Hazards, the Local Planning Team decided that the 2014 plan should identify, profile, and analyze twenty four (24) hazards. These hazards include all hazards profiled in the 2008 hazard mitigation plan. Table 4.2.2-1 contains a complete list of the natural hazards and table 4.2.2-2 contains a complete list of the man-made hazards that have the potential to impact Sullivan County as identified through previous risk assessments and input from those that participated in the 2014 HMP update. Hazard profiles are included in Section 4.3 for each of these hazards.

Table 4.2.2-1 Identified Natural Hazards for the Sullivan County HMP Update	
Natural Hazard	Hazard Description
<i>Drought</i>	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).
<i>Earthquake</i>	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).
<i>Extreme Temperature</i>	Extreme cold temperatures drop well below what is considered normal for an area during the winter months and often accompany winter storm events. Combined with increases in wind speed, such temperatures in Pennsylvania can be life threatening to those exposed for extended periods of time. Extreme heat can be described as temperatures that hover 10°F or more above the average high temperature for a region during the summer months. Extreme heat is responsible for more deaths in Pennsylvania than all other natural disasters combined (Lawrence County, PA HMP, 2004).

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Table 4.2.2-1 Identified Natural Hazards for the Sullivan County HMP Update

Natural Hazard	Hazard Description
<i>Flooding</i>	<p>Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period of time. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiography, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas. (NOAA, 2009). Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. All forms of flooding can damage infrastructure (USACE, 2007).</p>
<i>Hurricanes, Tropical Storms</i>	<p>Hurricanes, tropical storms, and nor'easters are classified as cyclones and are any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise (in the Northern Hemisphere) and whose diameter averages 10-30 miles across. While most of Pennsylvania is not directly affected by the devastating impacts cyclonic systems can have on coastal regions, many areas in the state are subject to the primary damaging forces associated with these storms including high-level sustained winds, heavy precipitation, and tornadoes. Areas in southeastern Pennsylvania could be susceptible to storm surge and tidal flooding. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season (June through November). (FEMA, 1997).</p>
<i>Invasive Species</i>	<p>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).</p>
<i>Landslides</i>	<p>A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation reacting to the force of gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, and changes in groundwater levels. Mudflows, mudslides, rockfalls, rockslides, and rock topples are all forms of a landslide. Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, developed hillsides, and areas recently burned by forest and brush fires. (Delano & Wilshusen, 2001).</p>
<i>Lightning Strikes</i>	<p>Lightning is a discharge of electrical energy resulting from the build-up of positive and negative charges within a thunderstorm. The flash or "bolt" of light usually occurs within clouds or between clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000°F. On average, 89 people are killed each year by lightning strikes in the United States. Within Pennsylvania, the annual average number of thunder and lightning events a given area can expect ranges between 40-70 events per year (FEMA, 1997).</p>

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Table 4.2.2-1 Identified Natural Hazards for the Sullivan County HMP Update

Natural Hazard	Hazard Description
<i>Pandemic</i>	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).
<i>Radon</i>	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).
<i>Subsidence/ Sinkholes</i>	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).
<i>Tornadoes/ Windstorms</i>	A wind storm can occur during severe thunderstorms, winter storms, coastal storms, or tornadoes. Straight-line winds such as a downburst have the potential to cause wind gusts that exceed 100 miles per hour. Based on 40 years of tornado history and over 100 years of hurricane history, FEMA identifies western and central Pennsylvania as being more susceptible to higher winds than eastern Pennsylvania. (FEMA, 1997). A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes or tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and wind-blown debris. According to the National Weather Service, tornado wind speeds can range between 30 to more than 300 miles per hour. They are more likely to occur during the spring and early summer months of March through June and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small, short-lived tornadoes can inflict tremendous damage. Destruction ranges from minor to catastrophic depending on the intensity, size, and duration of the storm. Structures made of light materials such as mobile homes are most susceptible to damage. Waterspouts are weak tornadoes that form over warm water and are relatively uncommon in Pennsylvania. Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries (NOAA, 2002). Based on NOAA Storm Prediction Center Statistics, the number of recorded F3, F4, & F5 tornadoes between 1950-1998 ranges from <1 to 15 per 3,700 square mile area across Pennsylvania (FEMA, 2009). A water spout is a tornado over a body of water (American Meteorological Society, 2009).

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Table 4.2.2-1 Identified Natural Hazards for the Sullivan County HMP Update	
Natural Hazard	Hazard Description
Wild Fire	A wildfire is a raging, uncontrolled fire that spreads rapidly through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that can be seen for miles. Wildfires can occur at any time of the year, but mostly occur during long, dry hot spells. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in fields, grass, brush, and forests. 98% of wildfires in Pennsylvania are a direct result of people, often caused by debris burns (PA DCNR, 1999).
Winter Storms	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).

Table 4.2.2-2 Identified Man-Made Hazards for the Sullivan County HMP Update	
Man-Made Hazards	Hazard Description
Civil Disturbance	<p>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:</p> <ul style="list-style-type: none"> 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).

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Table 4.2.2-2 Identified Man-Made Hazards for the Sullivan County HMP Update	
Man-Made Hazards	Hazard Description
Dam/Levee Failure	A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Dams provide benefits such as flood protection, power generation, drinking water, irrigation, and recreation. Failure of these structures results in an uncontrolled release of impounded water. Failures are relatively rare, but immense damage and loss of life is possible in downstream communities when such events occur. Aging infrastructure, hydrologic, hydraulic and geologic characteristics, population growth, and design and maintenance practices should be considered when assessing dam failure hazards. The failure of the South Fork Dam, located in Johnstown, PA, was the deadliest dam failure ever experienced in the United States. It took place in 1889 and resulted in the Johnstown Flood which claimed 2,209 lives (FEMA, 1997). Today there are approximately 3,200 dams and reservoirs throughout Pennsylvania (Pennsylvania Department of Environmental Protection, 2009).
Disorientation	Large numbers of people are attracted to Pennsylvania's rural areas for recreational purposes such as hiking, camping, hunting, and fishing. As a result, people can become lost or trapped in remote and rugged wilderness areas. Search and rescue may be required for people who suffer from medical problems or injuries and those who become accidentally or intentionally disoriented. Search and rescue efforts are focused in and around state forest and state park lands (DCNR, 2009).
Drowning	Drowning is death from suffocation, typically associated with swimming, fishing, boating or bridge accidents, or suicide. It can be a significant hazard in communities with numerous residential pools or water bodies (e.g. ponds, lakes, rivers, etc...) and extensive outdoor recreational activity. Drowning rates are particularly high for children ages 1-14. The Centers for Disease Control and Prevention estimates that drowning is the second leading cause of injury death (after motor vehicle crashes) among children ages 1-14. (CDC, 2008).
Environmental Hazards/Natural Gas Exploration/Manure Spills	<p>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:</p> <ul style="list-style-type: none"> Hazardous material releases; at fixed facilities or as such materials are in transit and including toxic chemicals, infectious substances, bio hazardous 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). <p>Product Defect or Contamination; highly flammable or otherwise unsafe consumer products and dangerous foods (Consumer Product Safety Commission, 2003).</p>

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Table 4.2.2-2 Identified Man-Made Hazards for the Sullivan County HMP Update

Man-Made Hazards	Hazard Description
<i>Structure/Building Collapse</i>	The loss of structural integrity of a building or structure that results in significant personal injury, death or imposing major economic loss.
<i>Terrorism</i>	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).
<i>Transportation Accidents</i>	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).
<i>Urban Fires/Explosions</i>	An urban fire involves a structure or property within an urban or developed area. For hazard mitigation purposes, major urban fires involving large buildings and/or multiple properties are of primary concern. The effects of a major urban fire include minor to significant property damage, loss of life, and residential or business displacement. Explosions are extremely rapid releases of energy that usually generate high temperatures and often lead to fires. The risk of severe explosions can be reduced through careful management of flammable and explosive hazardous materials. (FEMA, 1997).

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Table 4.2.2-2 Identified Man-Made Hazards for the Sullivan County HMP Update

Man-Made Hazards	Hazard Description
<p>Utility Interruptions</p>	<p>Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works, and information network sectors. Utility interruption hazards include the following:</p> <ul style="list-style-type: none"> Geomagnetic Storms; including temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation, and satellite systems (National Research Council et al., 1986). Fuel or Resource Shortage; resulting from supply chain breaks or secondary to other hazard events, for example (Mercer County, PA, 2005). Electromagnetic Pulse; originating from an explosion or fluctuating magnetic field and causing damaging current surges in electrical and electronic systems (Institute for Telecommunications Sciences, 1996). Information Technology Failure; due to software bugs, viruses, or improper use (Rainer Jr., et al, 1991). Ancillary Support Equipment; electrical generating, transmission, system-control, and distribution-system equipment for the energy industry (Hirst & Kirby, 1996). Public Works Failure; damage to or failure of highways, flood control systems, 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) <p>Major Energy, Power, Utility Failure; interruptions of generation and distribution, power outages, for example (United States Department of Energy, 2000).</p>

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4.3. Hazard Profiles

4.3.1 Drought

4.3.1.1 Location and Extent

Droughts are regional climatic events. When these events occur in Sullivan County, impacts are felt across the county and across the commonwealth. The partial extent for areas of impact can range from localized areas of Pennsylvania to the entire Mid-Atlantic region.

There are three different types of droughts that can be broadly defined as a period of time of prolonged dryness that contributes to the depletion of ground and surface water. A meteorological drought is a deficiency in moisture in the atmosphere. This will have very little effect on the crops and water supply depending on the conditions beforehand. An agricultural drought inhibits the growth of crops because of a moisture deficiency in the soil. This type of drought, if persistent, can lead to the third type of drought, which is a hydrologic drought. A hydrologic drought is basically a prolonged period of time without rainfall. This type of drought can have adverse effects on agriculture, streams, lakes, and groundwater levels. Leaving areas with little moisture, droughts are often one of the leading contributing factors to wildfires.

Sullivan County has glaciated plateau topography which is featured with extensive forest lands and scattered lakes, bogs and marsh wetlands. Table 4.3.1-1 identifies lakes, ponds, swamps and watershed inventories for Sullivan County.

Table 4.3.1-1: Lakes, Ponds, Swamps and Watershed Inventories	
Lakes, Ponds and Swamps	Watersheds
Bearwallow Pond	Fishing Creek
Celestia Lake	Loyalsock Creek
Connell Pond	Lycoming Creek
Dutchman Swamp	Mehoopany Creek
Eagles Mere Lake	Muncy Creek
Elk Lake	Towanda Creek
Ganoga Lake	
Hunters Lake	
Lake Akela	
Lake Jean	
Lopez Pond	
Maple Lake	
Mokoma Lake	
Painter Den Pond	
Pine Marsh	
Rainbow Lake	
Rouse Pond	
Splashdam Pond	

Source: Sept. 2010 Comprehensive Plan for Sullivan County

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4.3.1.2 Range of Magnitude

The rural farming areas of Sullivan County are most at risk when a drought occurs. Even with only 6% (approximately) of the county land use devoted to crop cultivation a drought can prove to be a financial burden. Table 4.3.1-3 outlines the existing land use in Sullivan County.

Wildfires are the most severe secondary effect associated with drought. Wildfires can devastate wooded and agriculture areas, threatening natural resources and farm production facilities. Prolonged drought conditions can have a lasting impact on the economy and can cause major ecological changes, such as increases in scrub growth, flash flooding, and soil erosion.

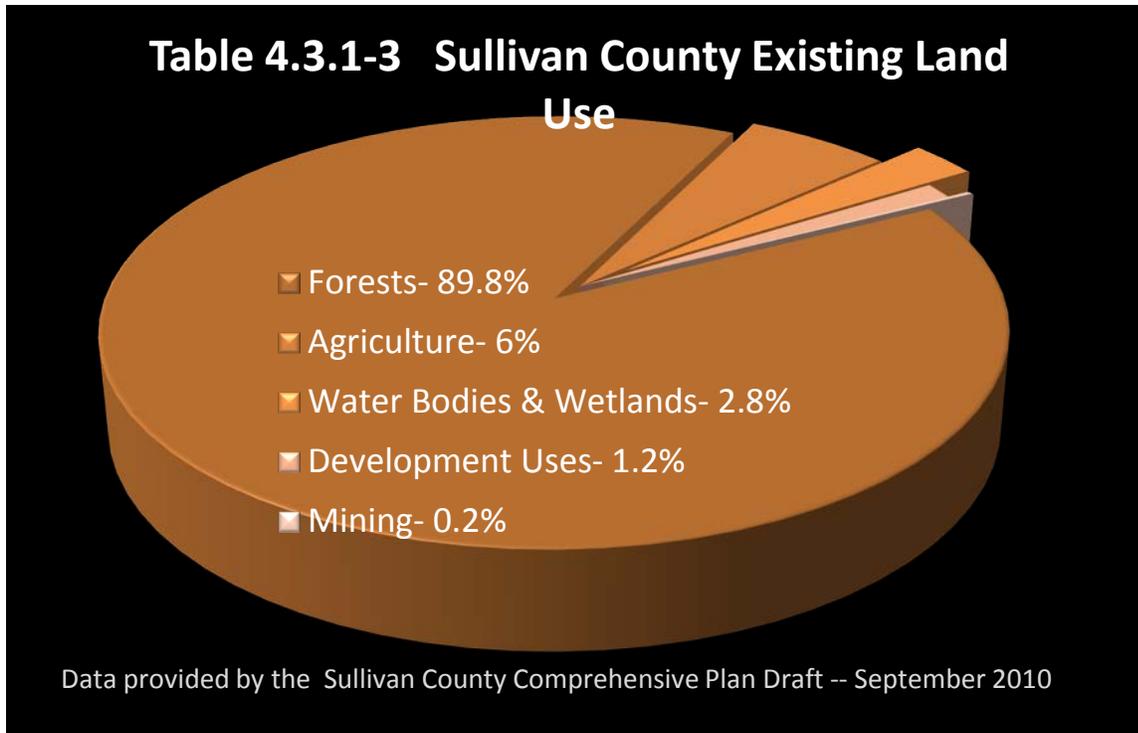
Long-term water shortages during severe drought conditions can have a significant impact on agribusiness, public utilities, and other industries reliant on water for production services. Drought can cause municipalities to enforce water rationing and distribution. Local water rationing, although not a drought phase; is characterized as local municipalities may, with the approval of the PA Emergency Management Council, implement local water rationing to share a rapidly dwindling or severely depleted water supply in the designated water supply service areas. This strains the availability of consumable water for the community. It also increases the county’s vulnerability to other hazards, such as severe weather, extreme heat, and public health emergencies. The special needs population of the county also must be considered during drought conditions.

Phases of drought preparedness in Pennsylvania in order of increasing severity are listed in Table 4.3.1-2.

	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%

Source: PA Department of Environmental Protection

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Environmental impacts of drought include:

- Increased desertification – damage to animal species
- Reduction and degradation of fish and wildlife habitat
- Lack of feed and drinking water
- Disease
- Increased predation
- Loss of wildlife in some areas and too many in others
- Increased stress to endangered species
- Damage to plant species
- Increased number and severity of fires
- Wind and water erosion of soil.

Source: ORACLE' Think Quest Education Foundation

Economic impacts of drought include:

- Loss of national economic growth, slowing down of economic development
- Damage to crop quality, less food production
- Increase in food prices
- Increased importation of food (higher costs)
- Insect infestation
- Plant disease
- Loss from dairy and livestock production
- Unavailability of water and feed for livestock which leads to high livestock mortality rates

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- Disruption of reproduction cycles (breeding delays or unfilled pregnancies)
- Increased predation
- Range fires and wildland fires
- Damage to fish habitat, loss from fishery production
- Income loss for farmers and others affected
- Unemployment from production declines
- Loss to recreational and tourism industry
- Loss of hydroelectric power
- Loss of navigability of rivers and canals.

Source: ORACLE' Think Quest Education Foundation

Social impacts of drought include:

- Food shortages
- Loss of human life from food shortages, heat, suicides, violence
- Mental and physical stress
- Water use conflicts
- Political conflicts
- Social unrest
- Public dissatisfaction with government regarding drought response
- Inequity in the distribution of drought relief
- Loss of cultural sites
- Reduced quality of life which leads to changes in lifestyle
- Increased poverty
- Population migrations

Source: ORACLE' Think Quest Education Foundation

4.3.1.3 Past Occurrence

Sullivan County has experienced drought events. Although the county did not incur the worst effects of drought in the past 25 years, inadequate rainfall has caused significant agricultural damage. These losses were not documented.

Water companies in Dushore and Laporte have asked their patrons to adjust their water usage during these times of drought with no major shortages of water reported. However, individual well owners were severely impacted.

Table 4.3.1-4: Sullivan County Drought Event History 1980 – 2013

Region	Date	Type
Sullivan County	11/18/1980 – 04/20/1982	Drought Emergency
Sullivan County	07/24/1991 – 10/21/1991	Drought Emergency
Sullivan County	10/21/1991 – 04/20/1992	Drought Warning
Sullivan County	12/05/2001 – 02/12/2002	Drought Watch

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Region	Date	Type
Sullivan County	02/12/2002 – 05/13/2002	Drought Watch
Sullivan County	05/13/2002 – 06/14/2002	Drought Watch
Sullivan County	09/05/2002 – 11/07/2002	Drought Watch
Sullivan County	04/11/2006 – 06/30/2006	Drought Watch
Sullivan County	08/06/2007 – 09/05/2007	Drought Watch
Sullivan County	09/05/2007 – 10/05/2007	Drought Watch
Sullivan County	10/05/2007 – 01/11/2008	Drought Watch
Sullivan County	09/16/2010 – 11/10/2010	Drought Watch
Sullivan County	08/05/2011 – 09/02/2011	Drought Watch

Sources: Pennsylvania Department of Environmental Protection

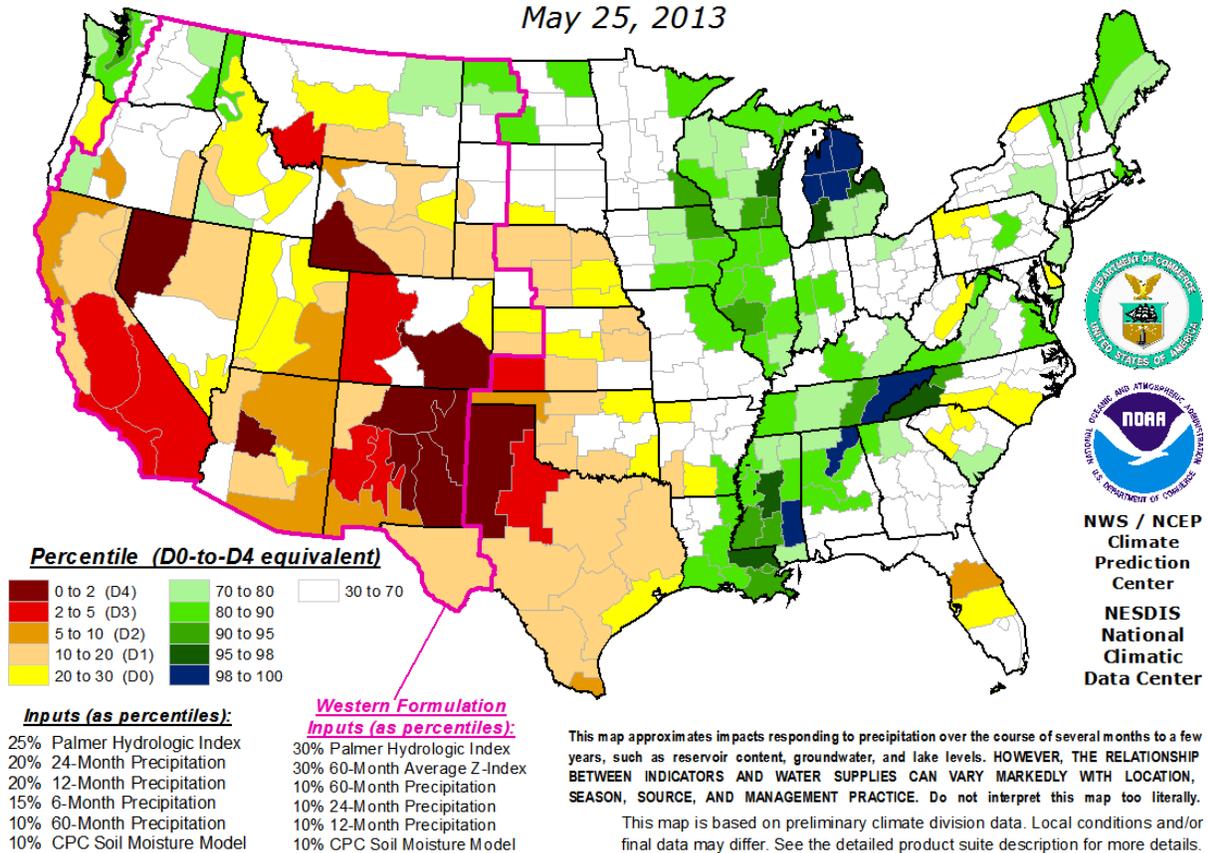
4.3.1.4 Future Occurrence

The probability of a drought event occurring in Sullivan County is possible. History suggests that drought events tend to affect the county every five years or less. A risk factor of 2.2 was assigned to drought. Figure 4.3.1-5 is a map that is a long term indicator for drought.

Figure 4.3.1-5

Objective Long-Term Drought Indicator Blend Percentiles

May 25, 2013



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4.3.1.5 Vulnerability Assessment

Drought vulnerability is dependent upon the duration and area of impact. However, other factors contribute to the severity of a drought. Unseasonably high temperatures, prolonged winds, and low humidity can heighten the impact of a drought. Droughts are not uncommon in this area.

The effects of a drought are:

- a depletion of consumable water supply;
- a depletion of agricultural water supply;
- a depletion of forest water and water used to fight forest fires;
- a depletion of water for recreational purposes;
- a depletion of water for natural irrigation (besides crops and forests); and
- poor water quality.

Droughts can have adverse effects on farms and other water-dependent industries. This can result in a local economic loss. In Sullivan County, there are 9,200 crop acres that are vulnerable to drought. In the event of a moderate to severe drought, these crop acres would be greatly impacted and farmers would be impacted financially. In addition to crop acres, there are approximately 3,005 head of cattle, 118 horses, and numerous other farm animals that would be impacted by a drought in the highly agricultural county.

From a citizen perspective, public safety is an issue in terms of consumable water not being available, as well as water for fire protection and emergency services. There are very limited fire hydrant capabilities in the county. Most fire protection water is gathered from dry hydrants or drafted from the numerous bodies of water in the county.

Public or municipal water service is available in two (2) municipalities in Sullivan County. Dushore Borough and Laporte Borough are the only municipalities that have public or municipal water service. Both of these water service providers rely on wells to supply some or all of the water that is produced for customers. This is a concern in drought situations and is considered vulnerable due to this issue.

Public water service is not available to all residents of the county. Most areas rely on private domestic wells. Residents or water authorities that use private domestic wells are more vulnerable to droughts because their drinking water can literally dry up. Table 4.3.1-6 shows the number of domestic wells per municipality; there are a total of 1,005 domestic wells in the county. It is important to note that the well data was obtained from the Pennsylvania Groundwater Information System (PaGWIS). PaGWIS relies on voluntary submissions of well record data by well drillers; as a result, it is not a complete database of all domestic wells in the county. This is the most complete dataset of domestic wells available.

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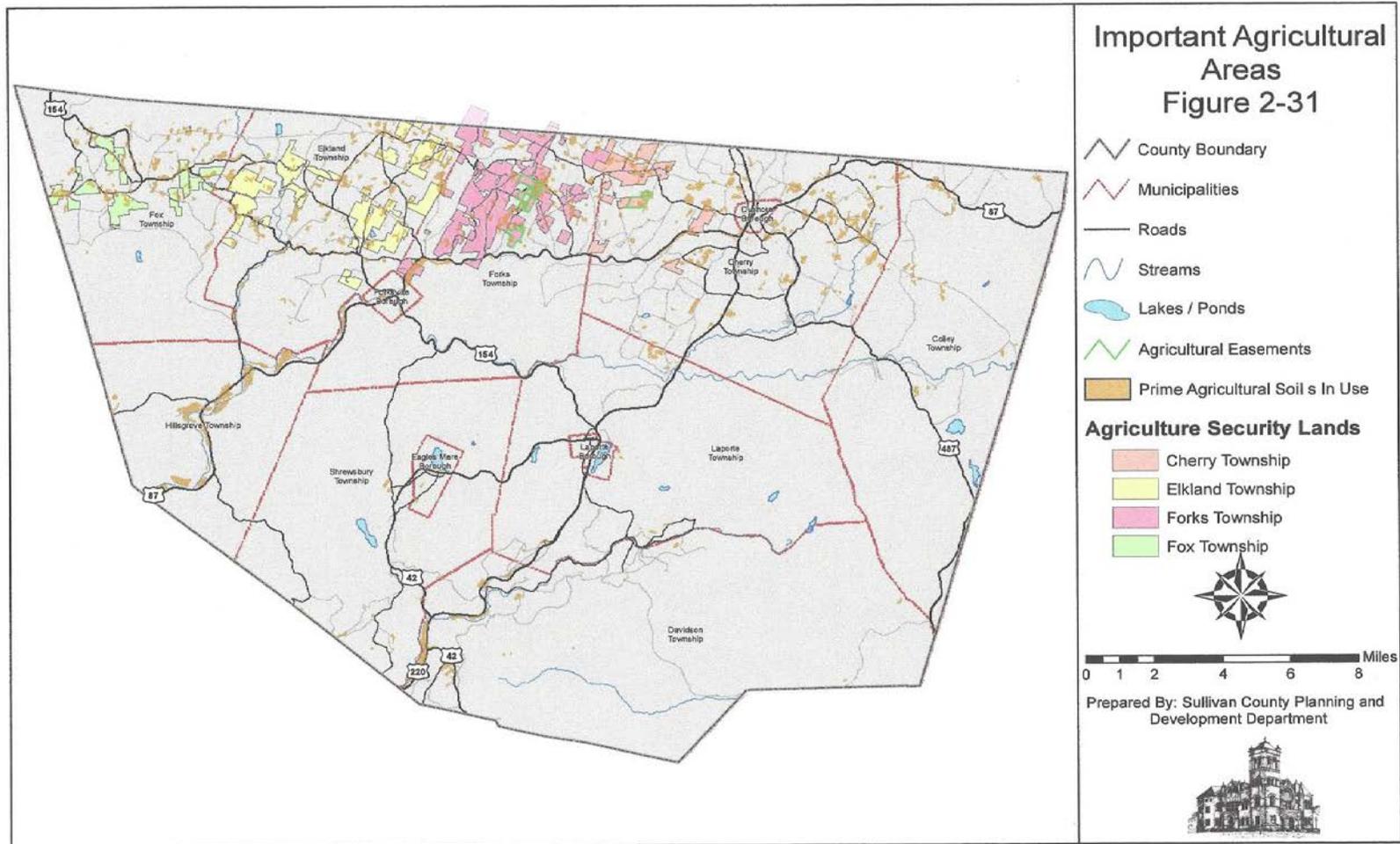
Table 4.3.1-6: Domestic wells per municipality in Sullivan County

MUNICIPALITY	DOMESTIC WELLS
Cherry Township	203
Colley Township	91
Davidson Township	64
Dushore Borough	13
Eagles Mere Borough	84
Elkland Township	97
Forks Township	92
Forksville Borough	5
Fox Township	91
Hillsgrove Township	75
Laporte Borough	9
Laporte Township	122
Shrewsbury Township	43
Unknown	16
TOTAL	1,005

Source: Pennsylvania Groundwater Information System

The following is a map of Sullivan County with agriculture land designations across the county from the Sullivan County Comprehensive Plan. Agriculture is vulnerable to drought in Sullivan County.

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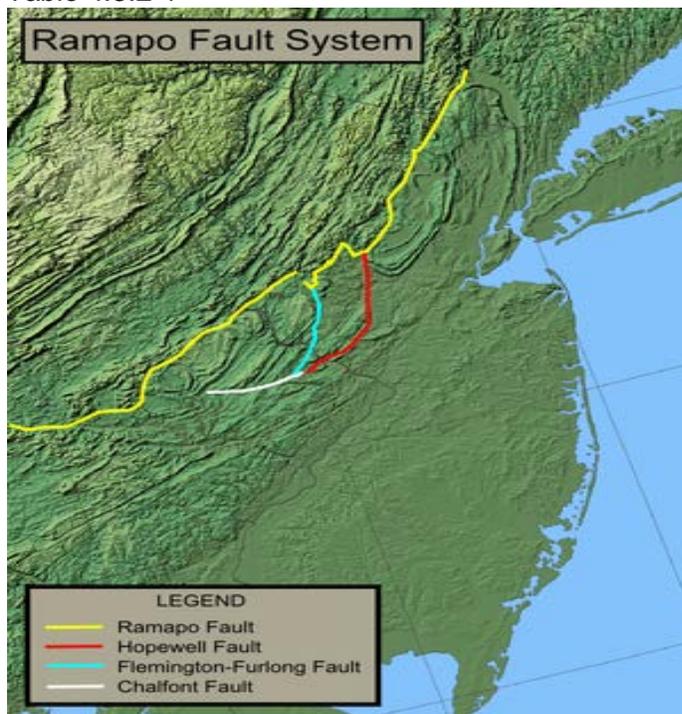
4.3.2 Earthquake

4.3.2.1 Location and Extent

Earthquake rates in the northeastern United States are 100 times lower than in California. Those that do occur are typically felt over a much broader region than earthquakes of the same magnitude in the western United States; and as such, the area of damage could be larger in the northeast from an earthquake of the same magnitude in the west. A magnitude 4.0 eastern U.S. earthquake typically can be felt as far as 60 miles from its epicenter, but it infrequently causes damage near its source. A magnitude 5.5 eastern U.S. earthquake, although uncommon, can be felt as far as 300 miles from its epicenter, and cause damage as far away as 25 miles from its epicenter.

Historically, earthquakes in Pennsylvania rarely occur, and have caused very little damage and no reported injuries or casualties. Since the Commonwealth does not reside on an active fault, many of the earthquakes that do occur are from deep within the earth's crust. In most cases, these are non-measurable events. The Ramapo Fault System (Table 4.3.2-1) spans more than 185 miles in New York, New Jersey, and eastern Pennsylvania. This fault zone has experienced some small earthquakes.

Table 4.3.2-1



However, earthquake standards are still a valuable consideration when determining building codes.

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4.3.2.2 Range of Magnitude

Because Sullivan County does not rest on a major fault, no one area is at a great threat to experience an earthquake. Secondary effects of earthquakes can be very serious concerns. Even minor quakes can cause power outages, as well as hazardous material spills, dam failures, and landslides.

The Richter Scale describes the magnitude of an earthquake and can be seen below in table 4.3.2-2.

Table 4.3.2-2: Richter scale magnitudes and associated earthquake size effects.

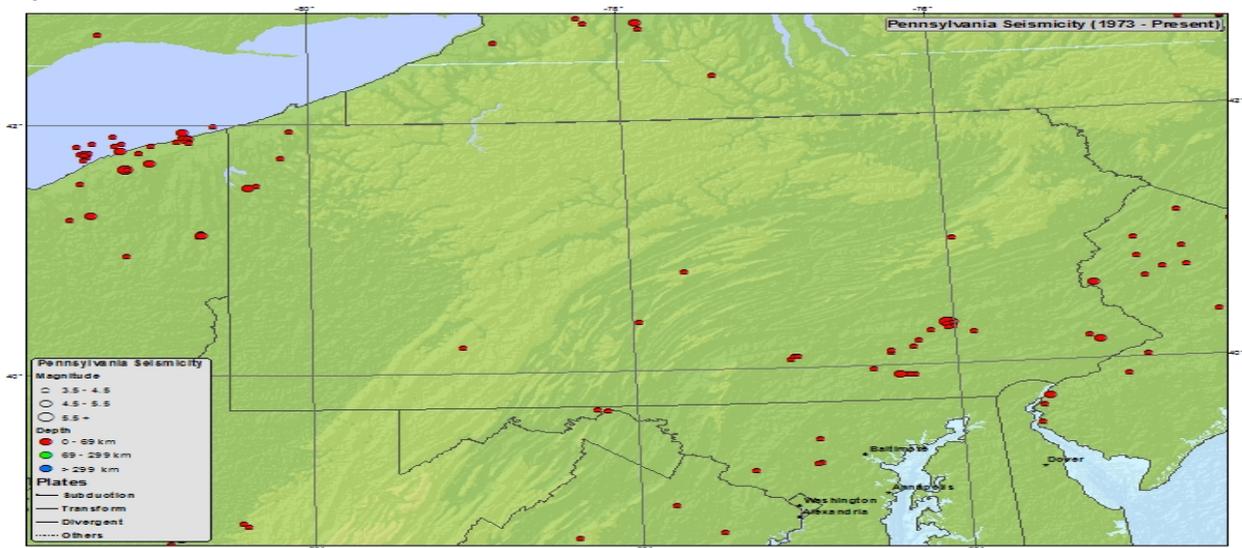
RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
Less than 3.5	Generally not felt, but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
Under 6.0	At most, slight damage to well-designed buildings; can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in 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.

4.3.2.3 Past Occurrence

Sullivan County has experienced one earthquake, on October 28, 1946. This was a 3.6 on the Richter Scale and was located in the Huntly Mountain formation near Little Loyalsock Creek. Earthquakes in the northeastern U.S. can be felt a long distance away from the epicenter, and secondary effects could occur. Figure 4.3.2-3 is a seismicity map of Pennsylvania from 1973 to present from the United States Geological Survey website.

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Figure 4.3.2-3



4.3.2.4 Future Occurrence

The probability of an earthquake striking Sullivan County is unlikely; as Sullivan County does not lie on a major fault line. A risk factor of 1.7 has been determined.

4.3.2.5 Vulnerability Assessment

Sullivan County is at low risk to experience an earthquake. However, no significant earthquakes have been documented in county history. If an earthquake of significant magnitude were to strike Sullivan County, some secondary effects could be utilities failure, dam failures, fire, landslides, subsidence, and transportation accidents (especially pipeline breaks). The local planning team voiced concerns over pipeline breaks due to the amount of pipelines that transport natural gas from the natural gas exploration activities.

The northeastern U.S. has many known faults, but numerous smaller or deeply buried faults possibly remain undetected. Essentially all of the known faults have not been active for perhaps 90 million years or more. Also, the locations of the known faults are not well determined at earthquake depths. Given the current geological and seismological data, it is difficult to determine if a known fault is still active today and could produce a modern earthquake. The best guide to earthquake hazard in the northeastern U.S. is probably the locations of past earthquakes themselves.

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4.3.3 Extreme Temperature

4.3.3.1 Location and Extent

Extreme temperatures can be devastating to any area. Extreme heat can cause sunburn, heat cramps, heat exhaustion, heat stroke, and dehydration. Likewise, extreme cold can cause hypothermia and frostbite. Sullivan County is located in the northern portion of Pennsylvania. July is the warmest month and temperatures range from the upper 70s to mid 80s. January is the coldest month of the year. Temperatures range from the teens to 30s. Temperatures can vary across Sullivan County due to the vast elevation changes in topography.

4.3.3.2 Range of Magnitude

Extreme temperature is usually a county-wide hazard. Extreme temperatures affect all of Sullivan County. Extreme cold temperatures drop well below what is considered normal for an area during the winter months and often accompany winter storm events. Combined with increases in wind speed, such temperatures in Pennsylvania can be life threatening to those exposed for extended periods of time. Extreme heat can be described as temperatures that hover 10°F or more above the average high temperature for a region during the summer months. Extreme heat is responsible for more deaths in Pennsylvania than all other natural disasters combined.

Created by the National Weather Service, the Heat Index (HI), is a chart which accurately measures apparent temperature of the air as it increases with the relative humidity. The Heat Index can be used to determine what effects the temperature and humidity can have on the population.

NOAA's National Weather Service

Heat Index

Temperature (°F)

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

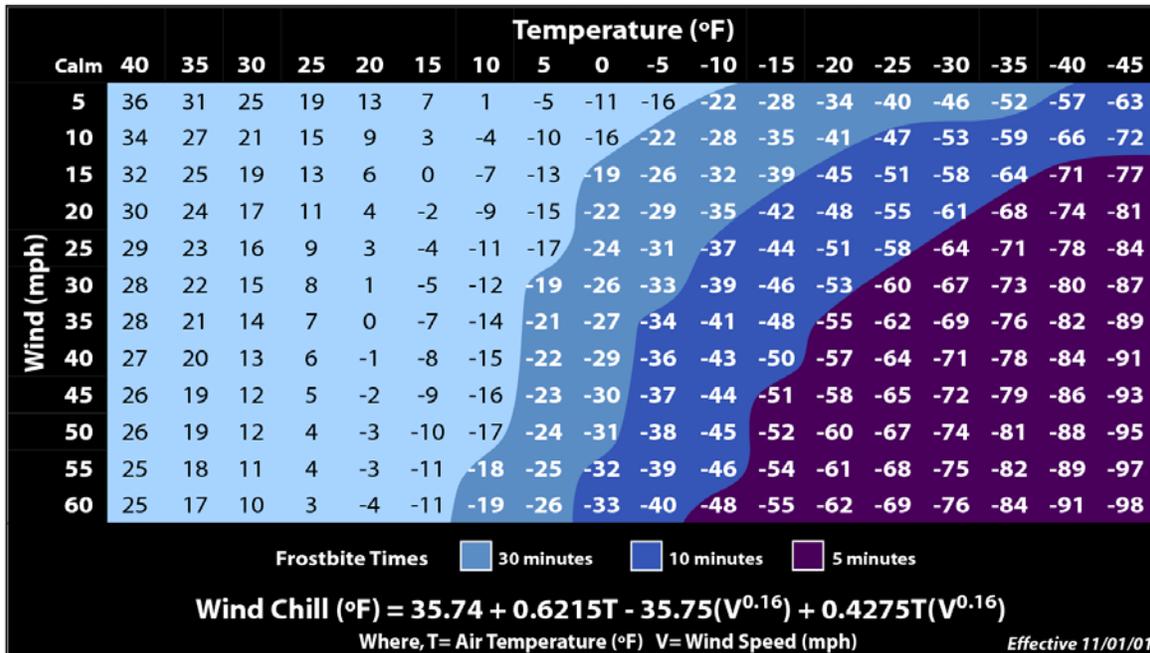
- Caution
- Extreme Caution
- Danger
- Extreme Danger

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The National Weather Service Wind Chill Temperature index uses advances in science, technology, and computer modeling to provide the dangers from winter winds and freezing temperatures.



Wind Chill Chart



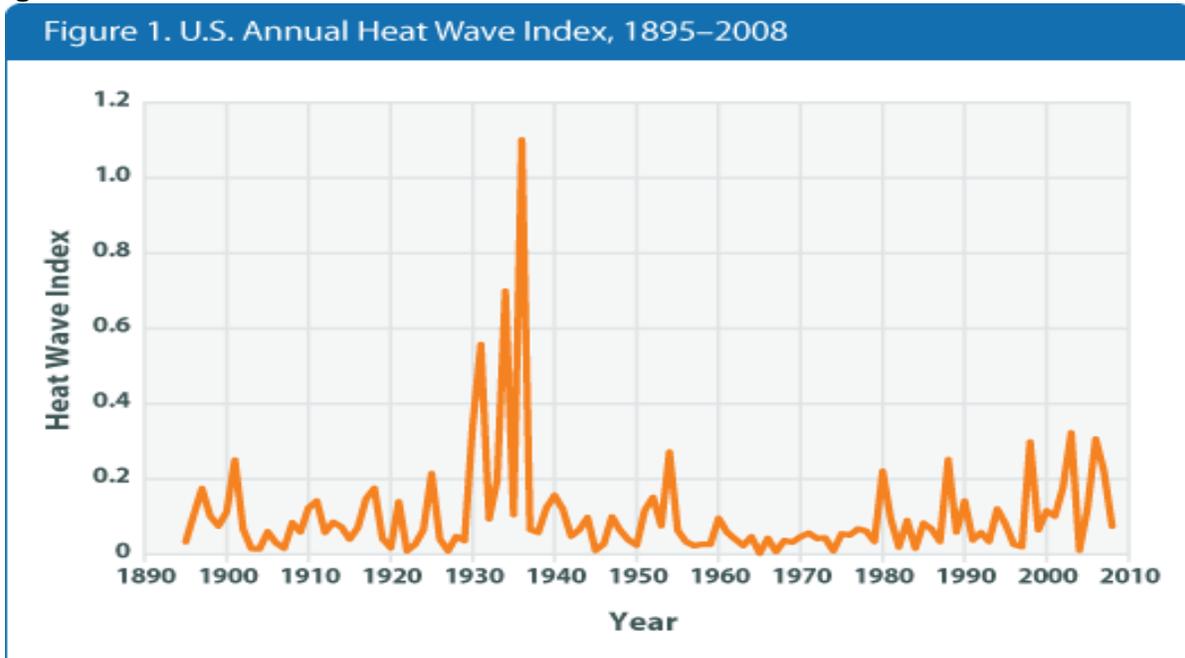
4.3.3.3 Past Occurrence

Sullivan County has had more occurrences of extreme cold incidents than extreme heat. This is due to the geographic location of the county. Although exact data for Sullivan County is limited below, it is the assumption that the county experienced the effects of extreme temperatures more in the past.

Figure 4.3.3-1 (Figure 1) shows the annual heat wave index in the United States between the years of 1895 to 2008.

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Figure 4.3.3-1



* Bing Images

Figure 4.3.3-2 shows the heat wave temperatures from the July 9-10, 1936 heat wave.

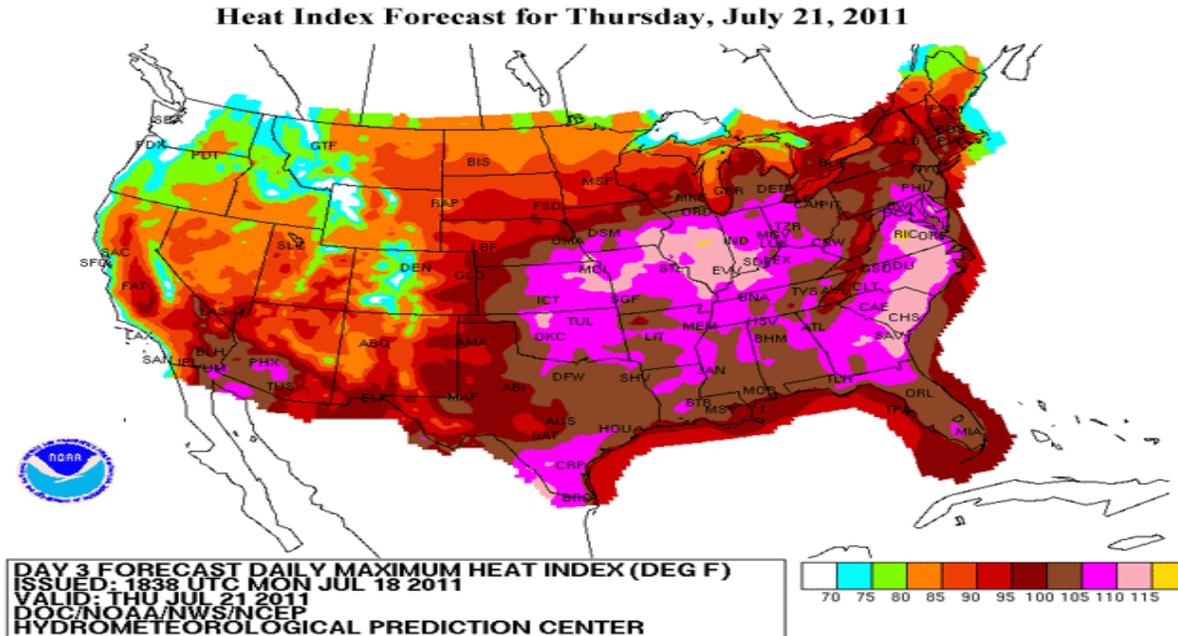
Figure 4.3.3-2 (*Bing Images)



In 2011, Pennsylvania experienced record-breaking heat in 19 counties and a total of 45 broken heat records. Figure 4.3.3-3 shows the temperatures for July 21, 2011.

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Figure 4.3.3-3



The extreme temperatures hazard is generally a regional problem, and not necessarily confined to only Sullivan County. Table 4.3.3-4 reflects extreme temperatures for Sullivan County in the past.

Table 4.3.3-4: Sullivan County Extreme Temperatures				
Location or County	Date	Type	Deaths	Injuries
Sullivan County	12/20/2004	Cold/Wind Chill	0	0
Sullivan County	02/03/2007	Extreme Cold/Wind Chill	0	0
Sullivan County	02/16/2007	Extreme Cold/Wind Chill	0	0
Sullivan County	03/06/2007	Extreme Cold/Wind Chill	0	0
Sullivan County	02/10/2008	Extreme Cold/Wind Chill	0	0
Sullivan County	12/21/2008	Extreme Cold/Wind Chill	0	0
Sullivan County	01/15/2009	Extreme Cold/Wind Chill	0	0
Sullivan County	03/02/2009	Extreme Cold/Wind Chill	0	0
Sullivan County	07/21/2011	Record Breaking Heat	0	0

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4.3.3.4 Future Occurrence

There is a possible probability of extreme temperature occurring in Sullivan County. A risk factor of 1.5 has been assigned to this hazard utilizing the Risk Factor methodology probability criteria.

Extreme temperatures will occur in the future. Prediction of these events will continue to be enhanced with new technology and better recording of previous data and events.

4.3.3.5 Vulnerability Assessment

As stated in the history section of this profile, extreme temperatures are usually a regional problem. This can be the result of excessive heat or unseasonably cold conditions.

The elderly and youth populations are most vulnerable to extreme temperatures due to their mobility challenges, disabilities, fixed income, etc., and susceptibility and reliance on the adult population, respectively.

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4.3.4 Flooding

4.3.4.1 Location and Extent

With its ability to roll boulders the size of cars, tear out trees, and destroy buildings and bridges, flooding is the leading cause of death among all types of natural disasters throughout the United States. Typically the result of heavy precipitation, snowmelts, and ice jams, major flood events can last several days or even weeks. Unfortunately, many homeowners fail to realize that the average insurance policy does not cover flooding. For this reason, floods are a costly and dangerous hazard.

A property's vulnerability to a flood is dependent upon its location in the floodplain. The properties that reside 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 10-year flood zone is the area that has a 10 percent chance of being flooded every year. However, this label does not mean that this area cannot flood more than once every 10 years. It just designates the probability of a flood of this magnitude every year. Further away from this area is the 50-year floodplain. This area includes all of the 10-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 4.3.4-1.

Flood Probability Summary	
Flood Recurrence Intervals	Chance of Occurrence
10-year	10.00%
50-year	2.00%
100-year	1.00%
500-year	0.20%

Source: Federal Emergency Management Agency

In the past, heavy rains have caused most of Sullivan County's flood problems. Heavy rains cause small creeks and streams to overflow their banks, which leads to road closures. Flooding poses the biggest threat to those who reside or conduct business in the floodplain. The most significant hazard exists for businesses in the floodplain that process, use, and/or store hazardous materials. A flood could potentially allow for hazardous materials to leak out of these areas. As the water recedes it would spread the hazardous materials throughout the area. Also threatened are the agricultural areas in the floodplain. 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.

Sullivan County is prone to two types of floods:

- Riverine Flood – Occurs in the floodplain of a stream when the amount of water and the rate at which it is moving increases.
- Flash Flood – A type of riverine flood, this flood will occur after a heavy storm when the ground cannot absorb the high amount of precipitation. This can occur when heavy precipitation falls on frozen or already saturated soil.

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4.3.4.2 Range of Magnitude

Potential flooding impacts range from very low to catastrophic depending on the type and location of flooding. The maximum threat of flooding in Sullivan 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.

A repetitive loss property is defined by FEMA as any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling 10-year period, since 1978. Sullivan County has 17 properties that are considered repetitive loss properties. These consist of 2 multi-family residential units and 15 single family residential units. Hillsgrove Township has the most repetitive loss properties within Sullivan County. A flooding event in Sullivan County could cause great monetary damage, as it has in the past.

Dushore Borough has the highest estimated potential loss due to flooding among all Sullivan County municipalities at \$13,627,771 in market value. Hillsgrove Township has the second highest estimated potential loss due to flooding at approximately \$6,696,111 in market value. Davidson Township ranks third with \$4,618,757 in market value.

The potential for loss of life and injuries to occur in these areas is high. Additionally, the long-term impact severe flooding could have on the health and safety of the citizens is high. Depending on the scope and magnitude of the flooding, the likelihood of long-term economic disruption is possible. Flooding may have a moderate impact on property, facilities, and infrastructure with varying levels of damage to structures in the affected area. Mobile homes are especially threatened by high water levels. Basic services may experience moderate impacts, as disruptions for short periods of time could occur. Government operations are expected to continue without disruption. The environmental impact should be minimal, unless hazardous materials are released as a result of the flooding.

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. Disruption in traffic flow may cause a transportation accident. Flooding also has the potential to cause other hazards, such as landslides, hazardous material spills, and dam failures.

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 tracked and identified in flooding situations, as they are often home-bound.

Severe flooding can have long-term secondary effects on the population, economy, and infrastructure of Sullivan County. Escalating costs of damage to private structures and the

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frequency of flooding can cause permanent population displacement. Small businesses that contribute to the local economy may close if they are unable to recover from the disaster. Disruption to the commerce and/or transportation modes can have an adverse effect on municipal economies in affected areas. Critical infrastructure, such as sewage and water treatment facilities, can be severely damaged. This can have a significant effect on public health. High flood waters can cause sewage systems to fail, overflow, and contaminate groundwater and drinking water.

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

4.3.4.3 Past Occurrence

Sullivan County has experienced 24 flood events since 1969. The flooding and flash flooding was caused by a variety of storms, tropical storms and other issues. The most significant occurrence of flooding is due to heavy storms with rain. A summary of the flood history of Sullivan County since 1969 is noted below in Table 4.3.4-2. Flooding data from 1969 to 1996 has limited information available.

Date	Location	Type	Deaths
1972	Sullivan County, Countywide	Flooding	
1974	Sullivan County	Flooding	
1975	Sullivan County	Flooding	
1976	Sullivan County	Flooding	
1993	Sullivan County	Flooding	
01/19/1996	Sullivan County, Countywide	Flooding and Flash Flooding	0
12/01/1996	Sullivan County, Countywide	Flash Flooding	0
12/13/1996	Sullivan County, Countywide	Flash Flooding	0
01/08/1998	Sullivan County, Countywide	Flash Flooding	0
12/17/2000	Sullivan County, Countywide	Flash Flooding	0
09/24/2001	Sullivan County, Hillsgrove	Flash Flooding	0
05/13/2002	Sullivan County, Dushore	Flash Flooding	0
07/31/2004	Sullivan County, Laporte	Flash Flooding	0
09/17/2004	Sullivan County, Countywide	Flooding	0

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Date	Location	Type	Deaths
03/29/2005	Sullivan County, Countywide	Flooding	0
06/27/2006	Sullivan County, Countywide	Flash Flooding	0
06/28/2006	Sullivan County, Countywide	Flooding	0
03/05/2008	Sullivan County, Shunk	Flooding	0
01/25/2010	Sullivan County, Shunk	Flooding	0
03/06/2011	Sullivan County, Thorndale	Flooding	0
03/10/2011	Sullivan County, Sonestown	Flooding	0
04/26/2011	Sullivan County, Dushore	Flash Flooding	0
08/28/2011	Sullivan County, Colley	Flash Flooding	0
09/07/2011	Sullivan County, Colley and Dushore	Flooding and Flash Flooding	0

The most recent flood event was recorded from September 4, 2011 through September 10, 2011 in Sullivan County. Heavy rainfall from the remnants of Tropical Storm Lee produced widespread flooding, flash flooding and river flooding. Tropical Storm Lee formed over the Gulf of Mexico on September 1, 2011 and moved up the eastern coast of the United States. The five-day storm rainfall totals for September 5 to September 9 were generally 5-8 inches of rain over the mid-section of central Pennsylvania and 8-12 inches of rain in the Susquehanna Valley region.

Major flooding from the remnants of Tropical Storm Lee occurred in Sullivan County. Sonestown, Dushore and Hillsgrove all reported significant flooding. Approximately 10 roads were closed in the county due to flooding from creeks and streams. A preliminary total of 24 buildings were destroyed, 64 suffered major damage and 114 suffered minor damage with a total of 248 structures affected. Pennsylvania Governor Corbett requested a presidential declaration from President Obama on September 12, 2011 due to the large amount of damage throughout the Commonwealth of Pennsylvania. A presidential declaration was received for individual assistance and public assistance on September 13, 2011.

In addition to the aforementioned past flood events, 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. 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 June 6, 2013, there are 17 repetitive loss properties in Sullivan County. Table 4.3.4-3 shows the number of NFIP policies and repetitive loss properties by municipality and whether the properties are non-residential, 2-4 family residences or single family residences. A map of Sullivan County repetitive loss properties is located in **Appendix D**.

There are no severe repetitive loss properties in Sullivan County.

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Table 4.3.4-3: Summary of NFIP policies and Repetitive Loss (RL) properties by municipality (FEMA, 2013).

MUNICIPALITY	NFIP POLICIES	TYPE			SUM OF REPETITIVE LOSS PROPERTIES
		NON-RESIDENTIAL	2-4 FAMILY	SINGLE FAMILY	
Cherry Township	3	0	0	0	0
Colley Township	9	0	0	0	0
Davidson Township	38	0	0	4	4
Dushore Borough	6	0	0	0	0
Eagles Mere Borough	0	0	0	0	0
Elkland Township	6	0	0	0	0
Forks Township	9	0	0	0	0
Forksville Borough	11	0	2	1	3
Fox Township	5	0	0	0	0
Hillsgrove Township	23	0	0	10	10
Laporte Borough	0	0	0	0	0
Laporte Township	6	0	0	0	0
Shrewsbury Township	1	0	0	0	0
TOTAL	117	0	2	15	17

4.3.4.4 Future Occurrence

Flooding is a frequent problem throughout Pennsylvania. The probability of a flooding event impacting Sullivan County is likely. Sullivan County 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*, 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. The DFIRMs are used to identify areas subject to the 1- and 0.2%-annual-chance flooding. Areas subject to 2% and 10% annual chance events are not shown on maps; however, water surface elevations associated with these events are included in the flood source profiles contained in the Flood Insurance Study Report. Table 4.3.4-4 shows a range of flood recurrence intervals and associated probabilities of occurrence.

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

4.3.4.5 Vulnerability Assessment

Sullivan County is highly 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. High floodwaters can devastate homeowners with both property damage and property loss. Sullivan County’s population is also vulnerable to the secondary effects of flooding. Power loss can leave citizens without heat for extended periods of time. The transportation infrastructure of the county can be severely crippled by flooding events which can endanger citizens attempting to travel or evacuate the area, as well as leave those remaining without goods and services.

Sullivan County’s economy is highly vulnerable to flooding events. The potential impacts on the economy presented by this hazard can lead to long-term economic disruption, especially among small businesses. Flooding can destroy the physical structures, merchandise, and equipment essential for business operation. Secondary effects of flooding include power outages and transportation accidents. Power outages can stop a business from operating while transportation accidents can hinder the supply of essential goods, services, and supplies.

Minor flooding events in Sullivan County present a moderate vulnerability to the environment. For the most part, flooding is a natural occurrence and, alone, cannot do much harm to the environment. However, the environment is vulnerable to the secondary effects of flooding such as hazardous material spills. For example, flooding can result in contamination when raw sewage, animal waste, chemicals, pesticides, or other hazardous materials are suspended and transported through flood waters to sensitive habitats, neighborhoods, or business settings. Events such as these require major clean-up and remediation efforts.

Table 4.3.4-5 identifies the critical facilities within Sullivan County that are located within the 100 year floodplain. These facilities were identified using county GIS data. Maps of critical facilities in each municipality are located in **Appendix E**. Critical facilities are defined as facilities that, if damaged, would present an immediate threat to life, public health and safety.

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Table 4.3.4-5 Sullivan County Critical Facilities in the SFHA

Name	Facility Type	Location	Estimated Loss
Cherry Township Sewage	Sewage Treatment	Cherry Township	\$41,500.00
Dushore Borough Building	Municipal Government	Dushore Borough	\$57,800.00
Dushore Fire and EMS	Public Safety	Dushore Borough	\$38,000.00
Guthrie Clinic	Medical Facility	Dushore Borough	164,300.00
Pump and Pantry	Gas Station	Dushore Borough	\$214,000.00
Sullivan County Fairgrounds	Municipal Government	Forksville Borough	\$347,130.00
Hunters Lake Dam	Dam	Shrewsbury Township	No Value
<i>Source: Sullivan County GIS</i>			

Sullivan County is vulnerable to flooding that causes loss of lives, property damage, and road closures. For purposes of assessing vulnerability, the county focused on community assets that are located in the 1%-annual-chance floodplain. While greater and smaller floods are possible, information about the extent and depths for this floodplain is available for all municipalities countywide, thus providing a consistent basis for analysis. Flood vulnerability maps for each applicable local municipality, showing the 1%-annual-chance flood hazard area and addressable structures, water sheds, hydrology and transportation routes within it, are included in **Appendix D**. These maps were created using FEMA countywide preliminary digital data. Table 4.3.4-6 identifies the types of structures and the quantity per municipality in Sullivan County.

Table 4.3.4-6: Structures in the Special Flood Hazard Area

MUNICIPALITY	COMMERCIAL or GOVERNMENT	RESIDENTIAL	Building Assessed Values
Cherry Township	2	14	\$512,700.00
Colley Township	0	10	\$196,100.00
Davidson Township	6	121	\$4,190,860.00
Dushore Borough	51	15	\$6,684,710.00
Eagles Mere Borough	0	0	\$0.00
Elkland Township	2	13	\$946,200.00
Forks Township	0	34	\$1,280,600.00
Forksville Borough	2	10	\$1,205,020.00
Fox Township	1	57	\$434,260.00
Hillsgrove Township	4	89	\$3,101,895.00

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Table 4.3.4-6: Structures in the Special Flood Hazard Area

MUNICIPALITY	COMMERCIAL or GOVERNMENT	RESIDENTIAL	Building Assessed Values
Laporte Borough	1	6	\$529,900.00
Laporte Township	1	20	\$1,003,200.00
Shrewsbury Township	0	4	\$156,300.00
TOTALS	70	393	\$20,241,745.00

A risk factor was determined for each municipality in Sullivan County utilizing the summary of risk factor approach document for flooding. Table 4.3.4-7 outlines the risk assessment categories. With each category a level, criteria and index was applied along with a weight value. The results for each municipality are identified in Table 4.3.4-8. Risk Factors identified as high risk have risk factors greater than or equal to 2.5. Risk Factors ranging from 2.0 to 2.4 are considered moderate risk hazards. Hazards with Risk Factors less than 2.0 are considered low risk. According to the default weighting scheme applied, the highest possible risk factor value is 4.0.

Table 4.3.4-7: Summary of Risk Factor (RF) Approach

Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY <i>What is the likelihood of a hazard event occurring in a given year?</i>	UNLIKELY	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1% & 49.9% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 50% & 90% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	GREATER THAN 90% ANNUAL PROBABILITY	4	
IMPACT <i>In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</i>	MINOR	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL	4	

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Table 4.3.4-7: Summary of Risk Factor (RF) Approach

Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
		FACILITIES FOR 30 DAYS OR MORE.		
SPATIAL EXTENT <i>How large of an area could be impacted by a hazard event? Are impacts localized or regional?</i>	NEGLIGIBLE	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10.9% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 11 & 25% OF AREA AFFECTED	3	
	LARGE	GREATER THAN 25% OF AREA AFFECTED	4	
WARNING TIME <i>Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</i>	MORE THAN 24 HRS	SELF-DEFINED	1	10%
	12 TO 24 HRS	SELF-DEFINED	2	
	6 TO 12 HRS	SELF-DEFINED	3	
	LESS THAN 6 HRS	SELF-DEFINED	4	
DURATION <i>How long does the hazard event usually last?</i>	LESS THAN 6 HRS	SELF-DEFINED	1	10%
	LESS THAN 24 HRS	SELF-DEFINED	2	
	LESS THAN 1 WEEK	SELF-DEFINED	3	
	MORE THAN 1 WEEK	SELF-DEFINED	4	

Table 4.3.4-8 Flooding Risk Factor per Sullivan County Municipality

HAZARD NATURAL (N) or HUMAN-MADE (M)	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
Cherry Township	2	1	2	3	2	1.8
Colley Township	2	1	2	3	2	1.8

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Table 4.3.4-8 Flooding Risk Factor per Sullivan County Municipality

HAZARD NATURAL (N) or HUMAN-MADE (M)	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
	PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
Davidson Township	3	2	3	3	2	2.6
Dushore Borough	3	2	3	3	2	2.6
Eagles Mere Borough	1	1	1	3	2	1.3
Elkland Township	2	1	1	3	2	1.6
Forks Township	2	1	1	3	2	1.6
Forksville Borough	3	2	3	3	2	2.6
Fox Township	1	1	1	3	2	1.3
Hillsgrove Township	4	2	2	3	2	2.7
Laporte Borough	1	1	1	3	2	1.3
Laporte Township	2	1	1	3	2	1.6
Shrewsbury Township	1	1	1	3	2	1.3

4.3.5 Hurricanes/Tropical Storms

4.3.5.1 Location and Extent

Hurricanes, tropical storms, and windstorms will occur in the county in the spring and summer months. Most hurricanes that approach Sullivan County have been downgraded to tropical storms or tropical depressions by the time they reach central Pennsylvania. Heavy rain and flooding produced by a hurricane, tropical storm, or tropical depression will have the greatest impact on the county. Impacts of these events are normally county wide in nature.

Nor'easter is a macro-scale storm along the upper East Coast of the United States; it gets its name from the direction from which the wind is coming. Nor'easters can cause severe coastal flooding, coastal erosion, hurricane force winds or blizzard conditions; these conditions are usually accompanied with very heavy rain or snow, depending on when the storm occurs.

4.3.5.2 Range of Magnitude

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Hurricanes and tropical storms affect all of Sullivan County. These hazards usually have a regional impact as opposed to only affecting Sullivan County. Flooding and power outages are major secondary effects of hurricanes and tropical storms. Heavy rain can lead to large amounts of ground water that cannot be contained by streams and creeks. Power outages can be caused by high continuous winds that cause power lines to fail. Tropical Storm Lee in September of 2011 caused the most significant flooding damage in Sullivan County to date. The Saffir-Simpson Hurricane Scale is the most common tool used to classify tropical storms and hurricanes. Table 4.3.5-1 outlines the categorization of these events.

Table 4.3.5-1

Saffir-Simpson Hurricane Scale		
Category	Wind Speed	
	mph	knots
5	≥156	≥135
4	131-155	114-134
3	111-130	96-113
2	96-110	84-95
1	74-95	65-83
Non-Hurricane Classifications		
Tropical Storm	39-73	34-64
Tropical Depression	0-38	0-33

4.3.5.3 Past Occurrence

Table 4.3.5-2 lists all of the hurricanes and tropical storms that have affected Pennsylvania from 1876 to 2012.

Table 4.3.5-2 Past occurrence of Hurricane and Tropical Storms in Pennsylvania			
	Date	Classification of Storm in PA or Name	Damages
Pre- 1900	9-18-1876	Tropical	50 knot sustained winds
	9-13-1878	Extra-tropical	70 km/h winds
	10-24-1878	Extra-tropical The Gale of 1878	700 buildings were destroyed, \$2 million in damages. 10 deaths/ more injured
	10-13-1885	Extra-tropical	70 km/h winds
	8-22-1888	Tropical	75 km/h winds
	8-29-1893	Tropical	100 km/h winds
	10-25-1893	Tropical	65 km/h winds
	9-30-1896	Extra-tropical	95-100 km/h winds

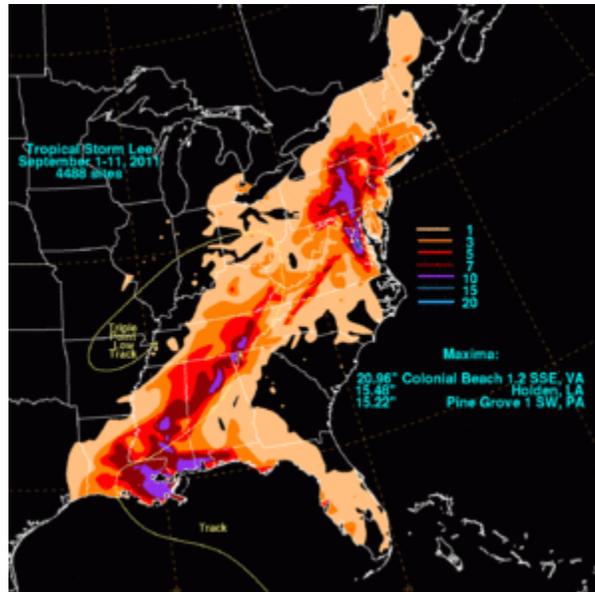
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Year	Date	Storm Name	Impact
1900-1950	11-1-1899	Extra-tropical	95 km/h winds
	6-29-1902	Extra-tropical	120 km/h winds
	9-16-1903	Tropical <i>The Vagabond</i>	50-65 km/h winds
	8-4-1915	Tropical depression	45 km/h winds
	10-1-1915	Extra-tropical	65 km/h winds
	10-24-1923	Extra-tropical	75 km/h winds
	9-20-1928	Extra-tropical	75 km/h winds
	10-3-1929	Extra-tropical	55 km/h winds
	9-21-1932	Tropical depression	30 km/h winds
	8-24-1933	Tropical	85 km/h winds
	8-19-1939	Tropical depression	45 km/h winds
	9-19-1945	Extra-tropical	45 km/h winds
	8-29-1949	Tropical	65 km/h winds
1951-2000	9-1-1952	<i>Tropical Storm Able</i>	
	10-15-1954	<i>Hurricane Hazel</i>	Tropical force winds, 6+ inches of rain in some areas.
	8-1955	<i>Hurricanes Connie & Diane</i>	Tropical force winds, 10 inches of rain
	6-21-1972	<i>Hurricane Agnes</i>	Widespread rains of 6-12 inches with local amounts up to 19 inches
	9-6-1979	<i>Tropical Storm David</i>	Tropical force winds, 5 inches of rain
	9-1987	<i>Tropical Depression Nine</i>	5 inches to part of the state
	9-26-1992	<i>Tropical Storm Danielle</i>	Tropical force winds
	8-18-1994	<i>T.D. Beryl</i>	
	8-29/31-1999	Tropical Depression <i>Hurricane Dennis</i>	Tropical depression winds, 5 inches of rain
	9-16-1999	<i>Tropical Storm Floyd</i>	6 deaths in PA, 10 inches of rain in the eastern part of the state. Storm surge of 2.8 feet in Philadelphia
2000- present	6-16-2001	<i>Tropical Storm Allison</i>	10 inches of rain in parts of Philadelphia. 241 homes destroyed and 7 died in Philadelphia.
	9-2003	Remnants <i>Tropical Storm Henri</i>	Rain and \$3.5 million in damages. 12 homes destroyed 380 majorly damaged power outages for PECO customers
	9-17-2003	<i>Hurricane Isabel</i>	1 death in Lancaster Co. and strong winds to parts of the state
	9-1/2-2006	<i>Tropical Depression Ernesto</i>	Caused 2.5 to 3 inches of rain in parts of the south-western portion of the state
	6-4-2007	<i>Tropical Depression Barry</i>	Caused 1.66 inches of rain in the Philadelphia area
	9-6-2008	<i>Tropical Storm Hanna</i>	An EF1 tornado was confirmed that touched down in Allentown
	9-14-2008	<i>Hurricane Ike</i>	Caused 180,000 Western PA customers to be without power, wind gusts over 70 mph. One person killed in Oil City.
	8-28-2011	<i>Hurricane Irene</i>	Left 706,000 people without power in Eastern PA, Killed 5 across the state. Flood waters raised the Schuylkill River. Winds were nearly 70 mph along the coast and 40-60 mph inland.
	9-5-2011	<i>Tropical Storm Lee</i>	6-10 inches of rain with some areas receiving over 14 inches.
	10-29/30-2012	<i>Hurricane Sandy</i>	\$65 billion in damages to the United States.

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In Sullivan County the village of Sonestown was almost completely destroyed by Tropical Storm Lee. A dam on Birch Creek in the village of Mildred collapsed, causing a large swath of damage along US Route 220.

Figure 4.3.5-3



Rainfall totals from T.S. Lee across the Eastern and Southeastern United States

Hurricane Sandy was the deadliest and most destructive hurricane of the 2012 Atlantic hurricane season, as well as the second-costliest hurricane in US history. Sandy was a Category 3 storm at its peak intensity when it made landfall in Cuba. It was classified as a Category 2 storm off the coast of the Northeastern United States. Because of the unusual merge with a frontal system this hurricane was nicknamed by the media and several organizations of the U.S. Government as “Superstorm Sandy”.

Figure 4.3.5-4



Storm path

At least 285 people were killed along the path of the storm in seven countries. In the United States there were 72 people killed with an additional 87 people killed as an indirect result of the storm.

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It caused an estimated \$65 billion in damages in the United States alone, according to the National Climatic Data Center.

4.3.5.4 Future Occurrence

There is a likely probability of hurricanes and tropical storms affecting Sullivan County, with expected annual events. A risk factor of 3.1 has been determined for this hazard based on the risk factor assessment tool. Hurricanes and tropical storms occur with relatively high frequency with 12.1 tropical storms and 6.4 hurricanes predicted annually for the North Atlantic basin, according to the National Climatic Data Center.

4.3.5.5 Vulnerability Assessment

The county's society is also highly vulnerable to hurricanes and tropical storms. These powerful storms have the ability to cause numerous secondary effects such as flooding, power loss, and transportation accidents which put the citizens of Sullivan County in danger. The effects of hurricanes and tropical storms can also cause an extensive amount of property damage and property loss. Power outages can suspend business and leave homes without heat and electricity or communications. Flooding, as previously discussed, can be a very destructive secondary effect of hurricanes and tropical storms in Sullivan County.

The economy of Sullivan County is highly vulnerable to hurricanes and tropical storms. These storms can halt business temporarily, and, if extensive damage is incurred, long-term business stoppages can occur. Secondary effects such as power outages, transportation accidents, and flooding can also have negative effects on the continuity of business. Flooding can destroy the physical structures, merchandise, and equipment essential for business operation. Power outages can stop a business from operating; while transportation accidents can hinder the supply of essential goods, services, and supplies.

There is a low environmental vulnerability to hurricanes and tropical storms in Sullivan County. The storms themselves are natural events and present little to no threat to the environment. However, with flooding as one of the major secondary effects of hurricanes and tropical storms, they can have an indirect negative effect on Sullivan County. With high winds and heavy rain produced by these storms, some level of hazardous material spills may occur as a result of flooding or traffic accidents. The severity of the environmental damage depends on the storm's strength and duration.

Sullivan County's critical facilities are moderately vulnerable to hurricanes and tropical storms. These strong weather storms can cause great physical damage to property while making it difficult for County personnel to travel to the critical facilities, if necessary. Further, secondary effects such as flooding, power outages, and disruption or closings of transportation routes can also affect critical facility operations.

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4.3.6 Invasive Species

4.3.6.1 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, is likely to cause economic or environmental harm, or pose a hazard to human health. The Commonwealth of Pennsylvania, including Sullivan County, plays host to a number of invasive pathogens, insects, plants, invertebrates, fish, and higher mammals. Sullivan County is in the PADCNR #20 Loyalsock District.

These species have largely been introduced by the actions of humans. Common pathways for invasive species threats include the unintentional release of species, the movement of goods and equipment that may unknowingly harbor species, smuggling, ship ballast, hull fouling, and escape from cultivation (Governor's Invasive Species Council, 2010). Invasive species threats are generally divided into two main subsets:

Aquatic invasive species (AIS) are a subset that impact aquatic ecosystems. Aquatic invasive species are defined in this document as non-native species that threaten the diversity or abundance of native species, the ecological stability of infested waters, human health and safety, or commercial, agriculture, aquaculture, or recreational activities dependent on such waters. The Commonwealth's varied geology and topography contribute to the large variety of aquatic and estuarine habitats. Pennsylvania encompasses six different landforms, ranging from coastal plain to the Appalachian Mountains. The Commonwealth hosts more than 84,000 miles of streams and shares five major watersheds with other states and Canada. According to the National Wetland Inventory, there are a total of 729,535 wetland acres found in more than 160,000 wetlands across the state.

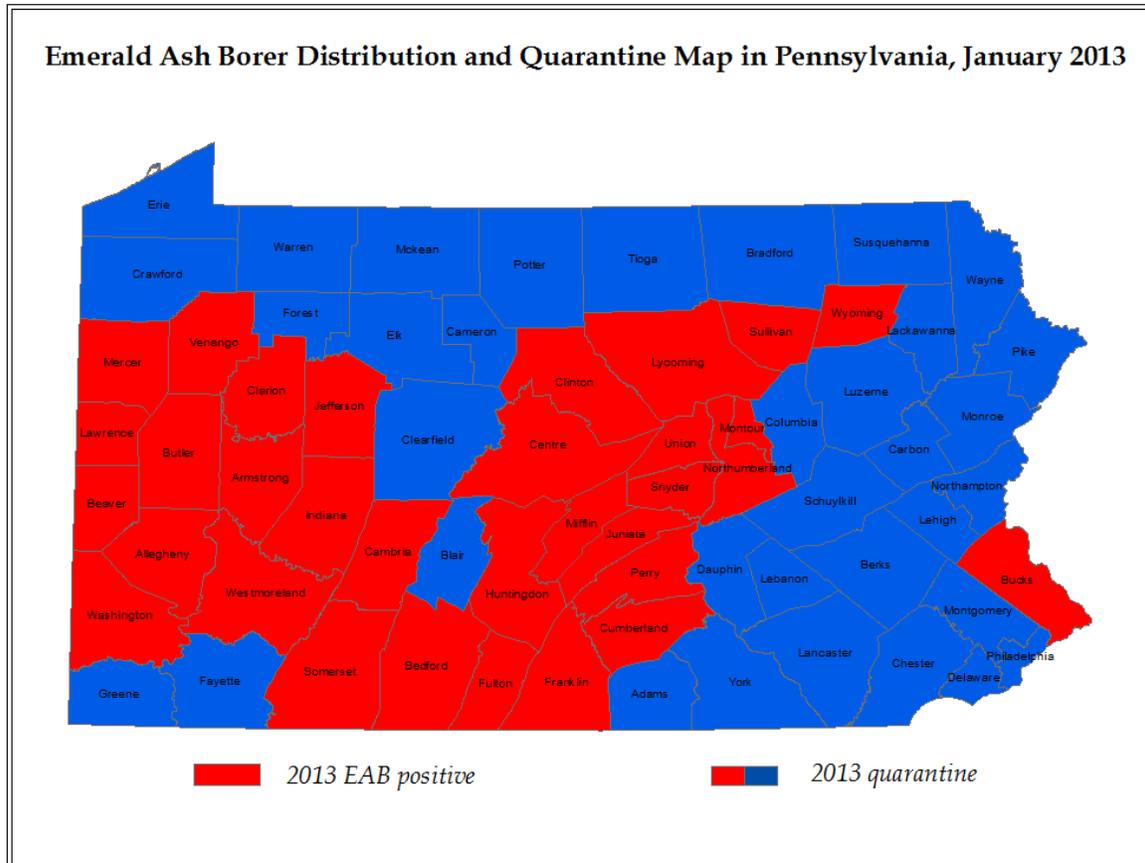
Terrestrial invasive species (TIS) are a subset that impact primarily terrestrial ecosystems. Estimates of the number of non-native species that have been introduced into the United States vary widely (from 5,000 to as many as 50,000). Terrestrial ecosystems in Pennsylvania include a rich variety of community types and cover a range extending from nearly aquatic wetlands along our coasts and myriad rivers, lakes, and streams, to mountain tops. Terrestrial species are those species that complete their lifecycle on land versus in an aquatic environment. Three groups of organisms have been successful in adapting to dry, terrestrial environments: vascular plants, arthropods and higher vertebrates.

The Governor's Invasive Species Council of Pennsylvania (PISC), the lead organization for invasive species threats, has identified over 100 species threats that are or could potentially become significant in Pennsylvania. Of these threats, county and municipal leaders believe that the most significant are invasive forest pests like the Emerald Ash Borer, Eurasian Wood Wasp, Exotic Bark Beetle, Asian Long horned Beetle, Sudden Oak Death, Hemlock Woolly Adelgid, the Gypsy Moth, and vascular plants, especially Goats'-Rue.

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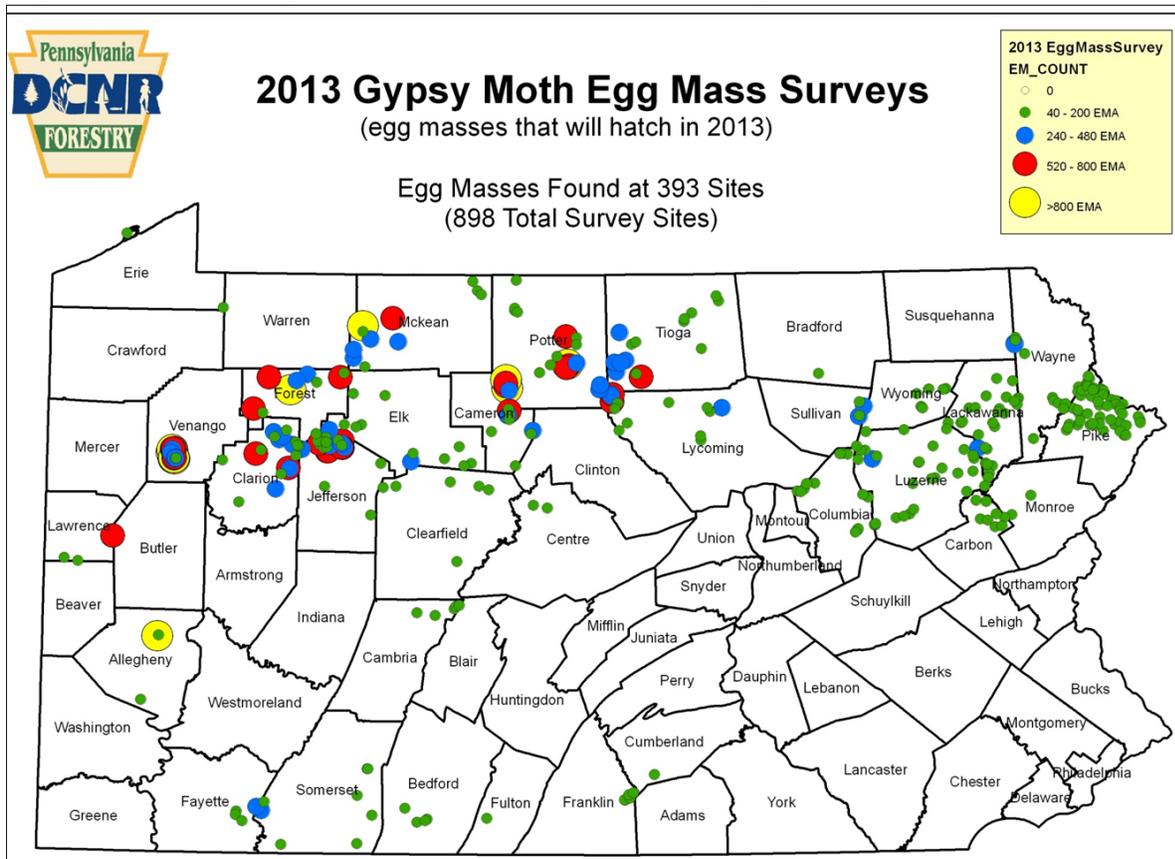
The location and extent of these invasive threats depends on the preferred habitat of the species as well as the species' ease of movement and establishment. For example in 2011 the Emerald Ash Borer was found in Sullivan, Lycoming and Wyoming Counties.

<http://www.invasivespeciescouncil.com/HomeHistory.aspx>



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<http://www.dcnr.state.pa.us/conservationscience/invasivespecies/>



<http://www.dcnr.state.pa.us/conservationscience/invasivespecies/>

4.3.6.2 Range of Magnitude

The magnitude of invasive species threats ranges from nuisance to widespread killer. Some invasive species are not considered agricultural pests and do not harm humans. Other invasive species can cause significant changes in the composition of Pennsylvania's ecosystems. For example, the Emerald Ash Borer has a 99 percent mortality rate for any ash tree it infects. This and other forest-feeding invasive species could have a significant economic impact in the county, since it hosts a large base of logging and forest-based tourism. Still, more invasive species can cause widespread illness or death in humans.

There is a wide range of environmental impacts caused by invasive species. 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. Beyond causing human, animal, and plant harm, there are secondary impacts of invasive species that go beyond harm to host species and ecosystems, particularly in the case of invasive species that attack forests. Forests prevent soil

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degradation and erosion, protect watersheds, stabilize slopes, and absorb carbon dioxide emissions. The key role of forests in the hydrologic system means that if forest land is wiped out, the effects of erosion and flooding will be amplified. There would also be an impact on agricultural harvests.

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. An example of a possible worst-case scenario for invasive species is if the Emerald Ash Borer would break through the quarantine in Pennsylvania and would invade the county's ash trees. With the high mortality rate associated with the Emerald Ash Borer, the forests would be devastated, causing logging establishments to shut down and a potential drop in forest-based tourism, which could, in turn, result in the loss of jobs and valuable income to the county.

4.3.6.3 Past Occurrence

Invasive species have been entering Pennsylvania since the arrival of early European settlers. A 2010 Forest Health Report shows the presence of Emerald Ash Borer and Hemlock Woolly Adelgid in Sullivan County. The 2011 survey visually confirmed the presence of Emerald Ash Borer in Sullivan County. Sullivan County is part of the 2010 Emerald Ash Borer quarantine zone, along with 43 other western counties. Additionally, Hemlock Woolly Adelgid has been present in Sullivan County since 1967. DCNR continues to monitor the westerly progression of the invasive species and has detected a general movement west in the 2010 survey.

4.3.6.4 Future Occurrence

According to the PISC, the probability of future occurrence for invasive species threats is on the rise because of the growing volume of transported goods, increasing technology, 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 countries and regions. Furthermore, 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. This may shift the dominance of ecosystems in the favor of nonnative species.

In order to combat the increase in future occurrences, the PISC, which is a collaboration of state agencies, public organizations, and federal agencies, released the Invasive Species Management Plan in April 2010. This plan outlines the Commonwealth's goals for the management of the spread of nonnative invasive species, as well as creates a framework for responding to threats through research, action, and public outreach and communication. More information on the Species Management Plan can be found online at

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www.invasivespeciescouncil.com. It is reasonable to assume that both Emerald Ash Borer and Hemlock Woolly Adelgid will continue to have a presence in Sullivan County.

4.3.6.5 Vulnerability Assessment

Sullivan County's exact vulnerability will depend on the invasive species in question. In general, though, the National Invasive Species Information Center has identified the following characteristics of areas that are more likely to be invaded:

- Lack of natural predators or diseases that kept the species under control in its native environment
- Present vacant ecological niches that can be exploited by non-native species
- Generally lacking in species diversity
- Lack of a multi-tiered canopy (in the case of invasive plants)

Due to the current presence of invasive species in the county, it is clear that the county is vulnerable to invasive species. Sullivan County is in the middle of an active zone in the Commonwealth that is vulnerable to invasive species. Due to the instances and extent of the current infestation, it is reasonable to project that the county's vulnerability will increase.

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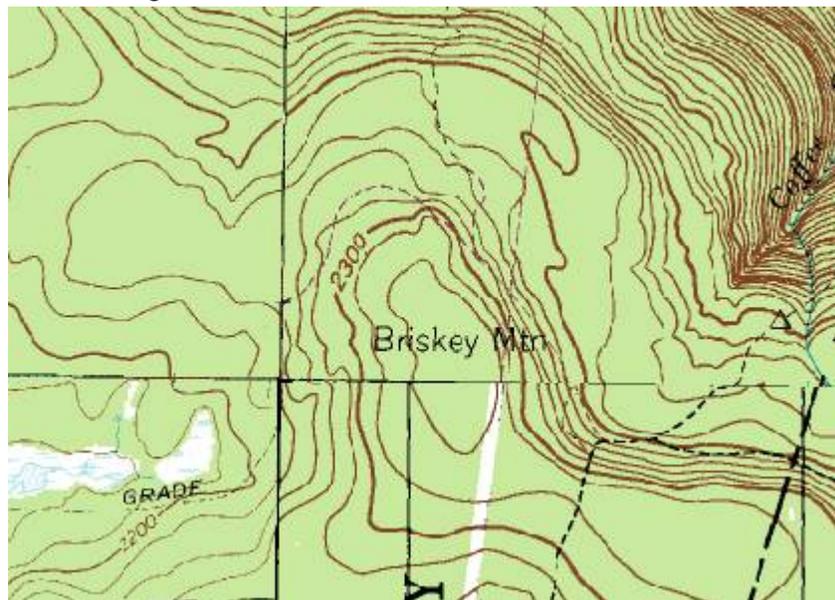
4.3.7 Landslide

4.3.7.1 Location and Extent

Landslides are a natural movement of earth down a slope. Deaths and injuries from landslides have not been a problem in the past; however this does not mean that they will not occur. The worst damage by a landslide is usually done to utilities (pipelines, power lines/poles), roadways, and buildings. The elevation ranges from 2,593 feet at North Mountain in Davidson Township to 770 feet on Loyalsock Creek at the Lycoming County line. These elevations are characterized as gently folded and faulted sedimentary rocks.

Figure 4.3.7-1 is of Briskey Mountain, and is near the town of Lopez, PA and is located at latitude – longitude of N 41.50174 and W-76.24521.

Figure 4.3.7-1



4.3.7.2 Range of Magnitude

The threat of landslides is greatest along high-volume traffic areas. Therefore, municipalities along U.S. Route 220, SR 154, SR 487, SR 2002, SR 2003, SR 3009 and the numerous county and township roads face the greatest risk associated with a severe landslide. Landslides can cause traffic disruptions and accidents. These events can lead interruptions to utilities or hazardous material spills.

4.3.7.3 Past Occurrence

Landslide history is not documented as well as other hazards. Primarily, this is because landslides are not always seen. Landslides have occurred all over Pennsylvania and have

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caused minor to major damage. The Pennsylvania Department of Transportation estimates it spends \$10 million annually on repair contracts for roadways damaged by landslides throughout the Commonwealth. Limited data exists on landslides in Sullivan County, however research on their history will continue.

4.3.7.4 Future Occurrence

There is an unlikely probability or less than 1% annual chance that a landslide will affect Sullivan County. Individual municipalities may have a higher or lower risk of future occurrence based on geographic location in the county. A risk factor of 1.3 has been assigned to this hazard.

4.3.7.5 Vulnerability Assessment

The total number of landslides and their damage in Pennsylvania is unknown. Reporting varies widely from county to county. Landslides are mostly seen in Allegheny, Armstrong, Beaver, Tioga, and Washington counties. Most landslides are a result of heavy precipitation. Also contributing to this is the removal of vegetation, changing the slope of a hillside, and earthquakes. The most vulnerable and dangerous places for landslides are along transportation routes and pipeline pathways. Roadways are often blocked with soil and rocks from recent landslides. The most likely time an injury or death from a landslide will be reported is when it happens on a roadway. Pipelines are particularly in danger from landslides because of the materials in the pipeline. Often carrying hazardous materials through rural areas, pipeline breaks from landslides can contaminate soils, waterways, and other natural habitats. Some of the secondary effects of a landslide include utilities failure, dam failure, hazardous materials spill, and transportation accidents/roadway damage. Much like earthquakes, landslides will occur several times a year and may go unnoticed.

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4.3.8 Lightning Strikes

4.3.8.1 Location and Extent

Lightning is a massive electrostatic discharge between electrically charged regions within clouds, or between a cloud and the Earth's surface. The charged regions within the atmosphere temporarily equalize themselves through a lightning flash, commonly referred to as a strike if it hits an object on the ground. There are three primary types; from a cloud to itself (intra-cloud or IC); from one cloud to another cloud (CC) and finally between a cloud and the ground (CG). Although lightning is always accompanied by the sound of thunder, distant lightning may be seen but be too far away for the thunder to be heard. Lightning occurs approximately 40–50 times a second worldwide, resulting in nearly 1.4 billion flashes per year.

Sullivan County is subject to lightning strikes and thunderstorm activity throughout the year. Overall, the most active time for lightning strikes is from early spring to early fall seasons. While the impact of flash events is highly localized, strong storms can result in numerous widespread events over a broad area. In addition, the impacts of an event can be serious or widespread if lightning strikes a particularly significant location such as a power station or large public venue.

4.3.8.2 Range of Magnitude

Severe thunderstorms can cause significant damage and can be life threatening. While thunderstorms can kill with lightning, severe thunderstorms can also produce large hail and damaging winds. Only a small percent of thunderstorms become severe. Downbursts from severe thunderstorms can have winds as high as 168 mph but most range from 60-80 mph. Sullivan County gets 25 to 32 days per year with lightning. Lightning can cause severe injury and is fatal in some cases. Deaths and injuries to livestock and other animals, thousands of forest and brush fires, as well as millions of dollars in damage to buildings, communications systems, power lines, and electrical systems are also the result of lightning.

4.3.8.3 Past Occurrence

Thunderstorms and lightning occur many times each year in Sullivan County (see Table 4.3.8-1). Lightning has been responsible for 11 deaths and 312 injuries in Pennsylvania between the years of 2003-2012. Pennsylvania is ranked 26th in the United States of Cloud-To-Ground flash densities. During 2012, the National Lightning Detection Network (NLDN) recorded 393,759 Cloud-To-Ground flashes.

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Table 4.3.8-1 Sullivan County Annual Lightning Strikes			
Year	Lightning Strikes	Year	Lightning Strikes
1995	90	2004	216
1996	101	2005	180
1997	74	2006	248
1998	123	2007	246
1999	138	2008	207
2000	192	2009	164
2001	104	2010	96
2002	100	2011	262
2003	102	2012	287

<http://www.ncdc.noaa.gov/>

On July 3, 2011, Sullivan County experienced a severe thunderstorm with numerous intense lightning strikes throughout the county. Numerous reports of damage were received by the Sullivan County Department of Emergency Services. The Sullivan County 9-1-1 emergency radio tower network was greatly impacted. The ERCC Tower, North Mountain Tower and the Laporte Tower all sustained lightning strikes and damage from this storm. The towers were inoperable after the strikes and \$290,000 dollars of damage was estimated.

4.3.8.4 Future Occurrence

Lightning strikes and thunderstorms are expected during and around the spring and summer months. These events have occurred in Sullivan County in the past and will continue to occur in the future, although multiple casualties or deaths are highly unlikely. There is a likely probability of lightning strikes occurring in Sullivan County. A risk factor of 1.7 has been determined for this hazard based on the risk factor assessment tool.

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4.3.8.5 Vulnerability Assessment

The potential for lightning strikes and thunderstorms exists in all municipalities in Sullivan County. Events being held outdoors during the summer months are particularly vulnerable to lightning strikes. High profile tower sites and buildings are also prone to strikes. Tourism and recreational activities in Sullivan County is most active from spring until fall. During these peak times, people involved in tourism and recreational activities are vulnerable to lightning strikes.

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4.3.9 Pandemic

4.3.9.1 *Location and Extent*

A pandemic is a disease that attacks or affects the population of an extensive area. This is sometimes an entire country or continent. Each year, different strains of influenza are labeled as potential pandemic threats, for example. Although recently brought under control, Severe Acute Respiratory Syndrome (SARS) has shown the potential of becoming a pandemic. Neither the World Health Organization nor the Center for Disease Control and Prevention (CDC) have classified SARS.

4.3.9.2 *Range of Magnitude*

Public health emergencies typically occur on a regional basis. Sources include infected animals, contaminated food, and improperly prepared food. While the whole county is vulnerable to a public health emergency, the likely source of a severe infection may be a farm or restaurant.

While there are limited secondary hazards related to public health emergencies, an outbreak could cause a variety of general secondary effects. Civil disorder is the most likely hazard to result from a public health emergency. Further potential secondary effects could include a shortage of medical supplies and personnel; school, business, and government closings; and low attendance at places of employment, as well as slowed productivity.

4.3.9.3 *Past Occurrence*

Sullivan County was impacted with the H1N1 virus during 2009. The Pennsylvania Department of Health with the assistance of Sullivan County EMA set up clinics throughout Sullivan County to administer vaccines. Clinics were established at the Eagles Mere Community Hall and the Muncy Valley Volunteer Fire Company. Approximately 100 doses of the vaccine were administered to the residents.

On June 25, 2009 the Pennsylvania Department of Health listed Sullivan County having 5 confirmed cases of the Novel 2009 Influenza A/H1N1, and just ten days earlier on June 15, 2009 there were no reported cases. Figure 4.3.9-1 and figure 4.3.9-2 reflect these statistics.

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Figure 4.3.9-1 June 15, 2009 reported cases of H1N1

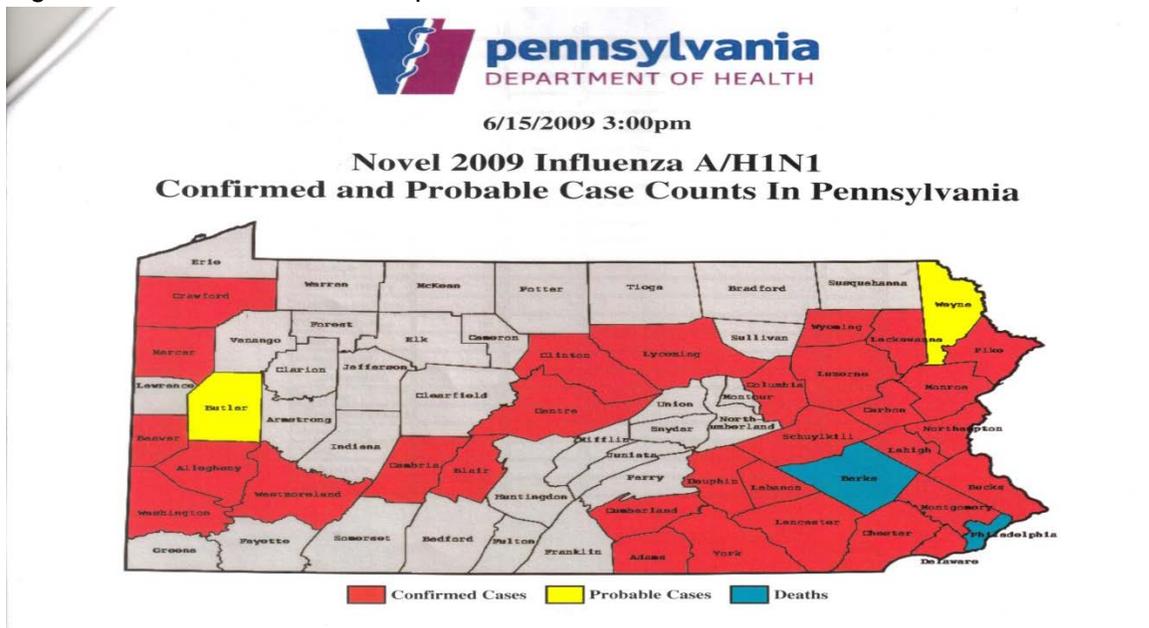
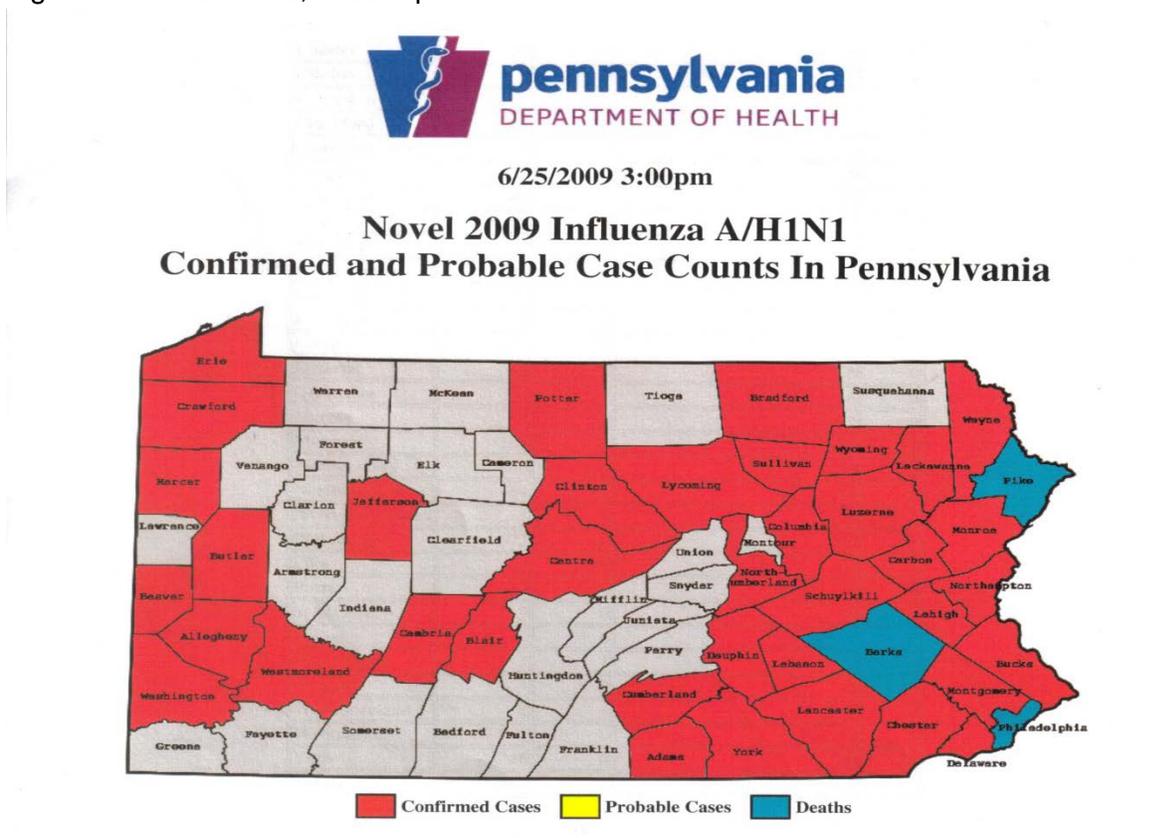


Figure 4.3.9-2 June 25, 2009 reported cases of H1N1



Although the following incident was not a pandemic; the possibility was there for a pandemic and the magnitude of individuals transported to medical centers taxed the emergency services:

It is reported that on April 13, 2008, a mass casualty incident occurred 4 miles

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North of Forksville Borough. Two ambulances were dispatched for two individuals ill. Upon arrival of an EMT, additional individuals started experiencing the same signs and symptoms. The patients stated they thought they were eating wild leaks, however it turned out to be skunk cabbage. A total of 14 patients were transported by ambulance and helicopter to Towanda Memorial, Susquehanna Health System-Williamsport Campus and Geisinger Medical Center. Notifications were made to the Department of Agriculture, Health, and Conservation and Natural Resources, and the Poison Control Center

4.3.9.4 Future Occurrence

The probability of a widespread pandemic public health emergency is every 10 years or less with varying degrees of severity. Minor outbreaks of less serious communicable disease, such as influenza, occur much more frequently. Sullivan County is vulnerable to these diseases and infections since people commute from the larger urban areas to the county for recreation and sport related activities.

In China, health officials urge health care workers to prepare for the possible re-emergence of the deadly H7N9 bird flu in the fall of 2013. This virus has killed one-third of the patients hospitalized. Researchers suggest that the H7N9 is deadlier than the 2009 H1N1 swine flu virus.

4.3.9.5 Vulnerability Assessment

The risk of a pandemic event occurring in Sullivan County is low. However, it is extremely difficult to predict a pandemic. Many scientists believe it is only a matter of time until the next influenza pandemic occurs. The severity of the next pandemic cannot be predicted, but modeling studies suggest the impact of a pandemic on the United States could be substantial. In the absence of any control measures (vaccination or drugs), it has been estimated that in the United States, a "medium-level" pandemic could cause 89,000-207,000 deaths, 314,000-734,000 hospitalizations, 18-42 million outpatient visits, and another 20-47 million sick people. Between 15 to 35 percent of the U.S. population could be affected by an influenza pandemic, and the economic impact could range between \$71.3-\$166.5 billion. Influenza pandemics are different from many of the threats for which public health and health-care systems are currently planning. A pandemic will last much longer than most public health emergencies and may include "waves" of influenza activity separated by months (in 20th Century pandemics, a second wave of influenza activity occurred 3 to 12 months after the first wave). The numbers of healthcare workers and first responders available to work will likely be reduced; they will be at high risk of illness from exposure in the community and in healthcare settings. Some may have to miss work to care for ill family members. Resources in many locations could be limited, depending on the severity and spread of an influenza pandemic.

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Because of these differences and the expected size of an influenza pandemic, it is important to plan preparedness activities that will permit a prompt and effective public health response. The U.S. Department of Health and Human Services (HHS) supports pandemic influenza activities in the areas of surveillance (detection), vaccine development and production, strategic stockpiling of antiviral medications, research, and risk communications. In May 2005, the U.S. Secretary of HHS created a multi-agency National Influenza Pandemic Preparedness and Response Task Group. This unified initiative involves CDC and many other agencies (international, national, state, local, and private) in planning for a potential pandemic. Its responsibility includes revision of a U.S. National Pandemic Influenza Response and Preparedness Plan.

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4.3.10 Radon

4.3.10.1 Location and Extent

Radon is a naturally occurring, colorless, odorless, inert, radioactive gas. It forms as a product of the natural decay of uranium. Radon and its radioactive products are dangerous to health. Alpha particles are a probable cause of lung cancer. Studies done in Pennsylvania since 1984 show that indoor radon levels are controlled by the radon-emanation properties of the soil and rock homes are built on. The table below, completed by the Pennsylvania Department of Environmental Protection, Bureau of Radon Protections, suggests guidelines to reduce radon exposure levels to .02 Working Levels (WL) or less.

If your home measures*	Suggested Action**	Time Frame for Plan
more than 5.0 WL	Residents should either promptly relocate or undertake temporary remedial action to lower levels as far below 5.0 WL as possible. Smoking in high areas discouraged.	Within 2-3 days
1.0 to 5.0 WL	Residents should undertake temporary remedial action to lower levels as far below 1.0 WL as possible. Smoking in high areas discouraged.	Within 1 week
0.5 to 1.0 WL	Residents should undertake temporary remedial action to lower levels as far below 0.5 WL as possible.	Within 2 weeks
0.1 to 0.5 WL	Residents should undertake temporary remedial action to lower levels as far below 0.1 WL as possible. Higher exposure levels require action to be taken in a shorter period of time.	3 weeks to 3 months
0.02 to 0.1 WL	Residents should undertake temporary and/or permanent remedial action to lower levels below 0.02 WL. Higher exposure levels require action to be taken in a shorter period of time.	4 to 15 months
<p>* Assumes continuous 24-hour exposure in living area.</p> <p>**Home testing should be conducted at the end of the indicated time frame to determine if remedial action has reduced the radon daughter exposure levels below the indicated value. If remedial action has not been successful, residents should be aware of the risks associated with continuous exposure at the indicated levels.</p>		

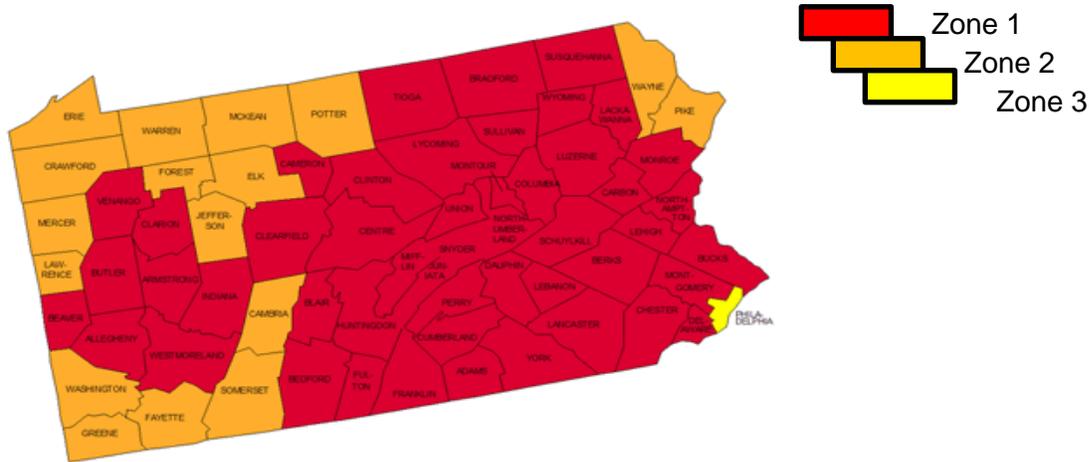
Source: Pennsylvania Department of Environmental Protection

4.3.10.2 Range of Magnitude

Sullivan County municipalities face a high level of radon gas emission. Only areas that have been tested and found safe are not susceptible to the effects of radon gas emission. The secondary effects of radon are difficult to identify. Often, radon goes undetected and unnoticed. Radon is a probable cause of lung cancer.

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Sullivan County is identified by Environmental Protection Agency as being in Radon Zone 1 – Highest Potential. Counties in this zone have a predicted average indoor radon screening level greater than 4 pCi/L (pico curies per liter).



Nuclide	Half-Life	Alpha Energy (MeV)	Maximum Beta Energy (MeV)	Principal Gamma Energies (MeV)
Radon-222	3.8 days	5.49		
Polonium-218	3.0 minutes	6.0		
Lead-214	26.8 minutes		0.65, 0.71, 0.98	0.29, 0.35
Bismuth-214	19.7 minutes		1.0, 1.51, 3.26	0.609, 1.12, 1.764
Polonium-214	1.64×10^{-4} seconds	7.69		

Source: Health Physics Society- Background Information on “Update on Perspectives and Recommendations on Indoor Radon” Revised October 2009.

4.3.10.3 Past Occurrence

In 1984 the Pennsylvania Radon Bureau responded to the highest level of Radon daughter levels (concentration of decay products of radon in the uranium chain) ever reported in the Commonwealth with a massive radon monitoring, educational, and remediation effort. As of November 1986, over 18,000 homes had been screened for radon and approximately 59 percent were found to have radon daughter levels in excess of the 0.020 Working Level guideline. Radon daughter levels ranged up to 13 Working Levels (WL) or 2600 pCi/L (pico Curies per liter) of radon gas. While individual instances of radon are not well documented, no individual location can be assumed safe unless proven so by testing.

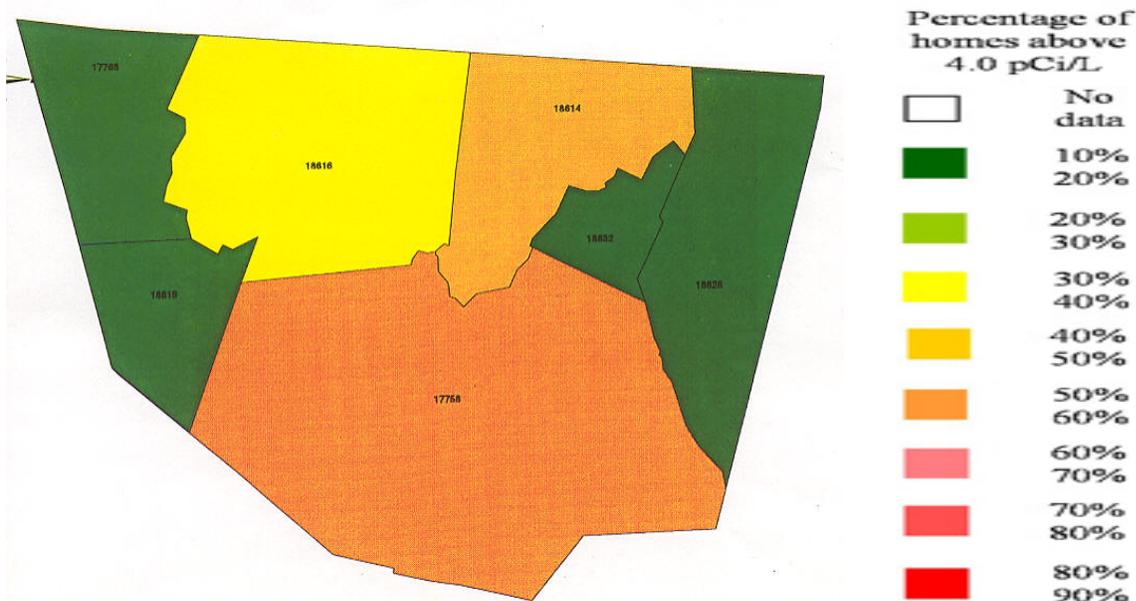
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4.3.10.4 Future Occurrence

Radon gas is emitted from underground decaying uranium. There is a likely probability for radon emission in Sullivan County. No area should be assumed safe until tests have proven so. The EPA recommends that a homeowner take action to reduce his/her home indoor radon levels if his/her test is 4pCi/L (pico Curies per liter) or higher.

4.3.10.5 Vulnerability Assessment

According to the Environmental Protection Agency (EPA), Sullivan County is among the counties in Pennsylvania with the highest potential for dangerous radon emission. It is important to remember that no individual location can be assumed to be safe unless proven so by testing. The map below illustrates the average radon levels for the zip codes of Sullivan County, measured by the Pennsylvania Department of Environmental Protection. The EPA recommends that a homeowner take action to reduce his/her home indoor radon levels if his/her radon test is 4 pCi/L (pico Curies per liter) or higher



Source: wpb-radon.com

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4.3.11 Subsidence, Sinkhole

4.3.11.1 *Location and Extent*

Subsidence is caused by the removal of ground water or other resources from the ground. The difference between subsidence and sinkholes is that subsidence is a manmade hazard. Sinkholes are natural hazards that are caused by erosion underground. The United States Geological Survey explains that sinkholes are a characteristic of karst topography. Karst topography is defined as a type of topography that results from dissolution and collapse of carbonate rocks, such as limestone and dolomite, and characterized by closed depressions or sinkholes, caves, and underground drainage.

4.3.11.2 *Range of Magnitude*

The PA DCNR has identified 22 counties within Pennsylvania with Karst-feature inventories; of which Sullivan County is not on the list. The topography of Sullivan County is made up of mostly shale and sandstone.

The impact of these sinkholes has caused damage to streets and highways necessitating closures and has caused damage to homes and businesses. Economic losses were also suffered by the municipalities, businesses and home owners. Such hazards often occur without warning and can cause disruption of traffic or accidents. However, subsidence and sinkholes most often occur in remote rural areas with little severe secondary effects.

4.3.11.3 *Past Occurrence*

Sinkholes are a problem throughout Pennsylvania. As stated by the United States Geological Survey, sinkholes have been most dangerous and frequent in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. According to the Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey, there are no sinkholes in Sullivan County

4.3.11.4 *Future Occurrence*

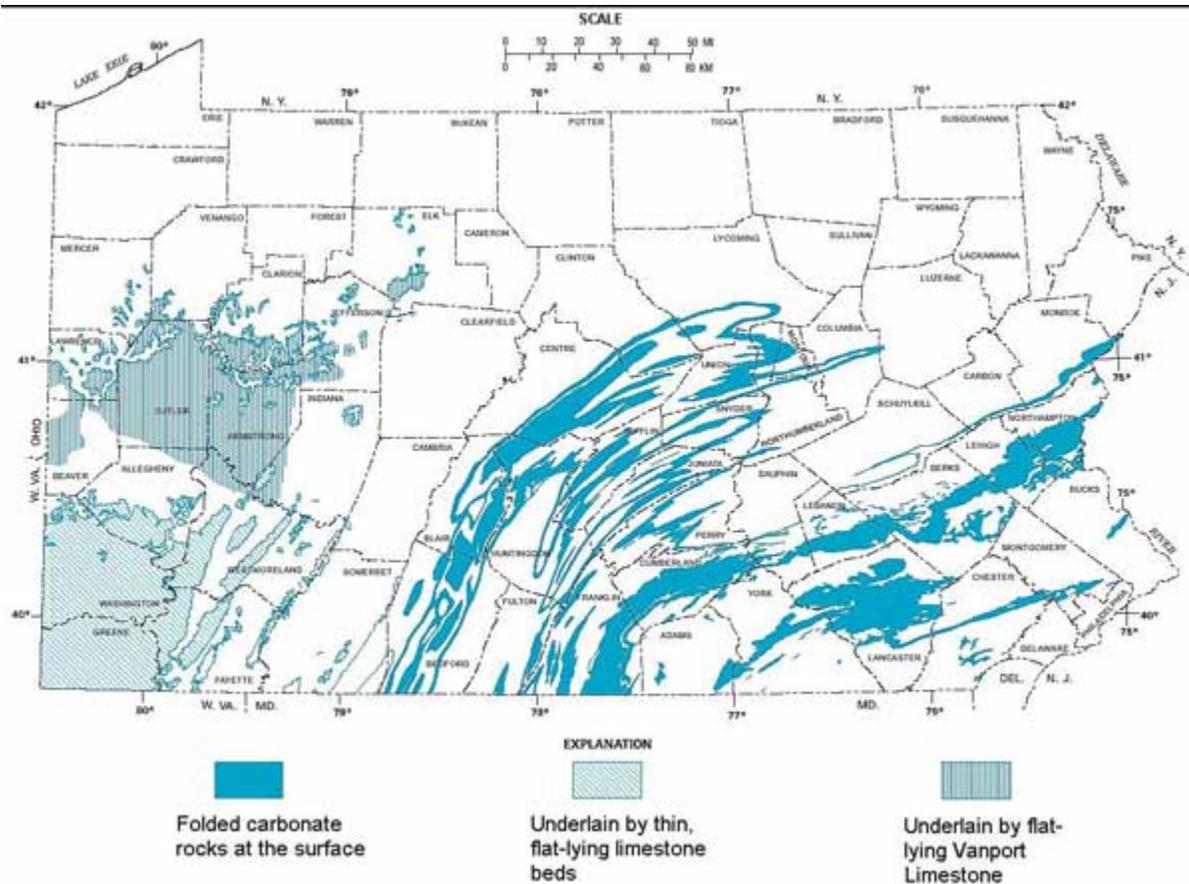
The potential for subsidence or sinkholes to occur in Sullivan County is unlikely. A risk factor of 1.6 has been assigned to this hazard.

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4.3.11.5 Vulnerability Assessment

Subsidence and sinkholes strongly correlate with the distribution of carbonic rock. However, not all areas underlain by carbonate bedrock, such as limestone, are at risk. The topography of Sullivan County is made up of mostly shale and sandstone. Figure 4.3.11-1 is a karst topography map of Pennsylvania. There is no karst topography in Sullivan County.

Figure 4.3.11-1: Pennsylvania Karst Topography



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4.3.12 Tornadoes/Windstorms

4.3.12.1 Location and Extent

Tornados may occur in the Commonwealth during the spring and summer months. In the past 125 years, records show that about 250 tornados have been reported in 58 of the 67 counties in Pennsylvania. The National Weather Service estimates the Commonwealth will experience 10 tornados annually. Tornados are measured on the Enhanced Fujita Scale by focusing on their wind speed. This scale is shown below in Table 4.3.12-1.

As stated by the National Climatic Data Center (NCDC), “wind speeds in tornados range from values below that of hurricane speeds to more than 300 miles per hour.” The NCDC continues by reporting that, “the maximum winds in tornados are often confined to extremely small areas, and vary tremendously over short distances.” This is the reason that one house will be completely demolished by a tornado, and the house next to it might be untouched. Additionally, the forward motion of tornados can range from speeds between 0 and 50 miles per hour.

Table 4.3.12-1: Enhanced Fujita Scale (EF-Scale) categories with associated wind speeds and description of damages.

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

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4.3.12.2 Range of Magnitude

While it is difficult to pinpoint the exact locations at the greatest risk of a tornado, the lower lying areas, as well as the flat agriculture fields in Sullivan County, are at greater risk. Tornadoes can have varying secondary effects. The most common is power failure. The severe wind strength can dismantle power sources. Structural damage can also be significant. Hazardous material spills can occur if a tornado comes near a holding tank, or the spill stems from a traffic accident caused by high winds.

4.3.12.3 Past Occurrence

Sullivan County has witnessed 12 tornadoes since 1892. Of these, the most significant was in 1997 when on the same day three tornadoes struck, killing one person and injuring one person. Table 4.3.12-2 provides historical data of previous tornado occurrences in Sullivan County. A map of reflecting tornado past occurrences is located in **Appendix H-1**.

Table 4.3.12-2: Sullivan County Tornado History

Date	Town	Time	Magnitude	Deaths	Injuries
06/27/1892		4:20 P.M.	F2	0	15
06/11/1922		9:30 P.M.	F3	1	7
09/19/1954		5:00 PM	F2	0	0
04/14/1974		5:30 PM	F2	0	0
04/23/1977		4:30 PM	F1	0	0
07/13/1986		1:00 P.M.	F1	0	0
08/16/1997	Nordmont	1:00 PM	F1	0	1
08/16/1997	Eagles Mere	1:05 PM	F1	0	0
08/16/1997	Eagles Mere	1:10 PM	F1	1	0
07/01/1999	Hugos Corner	5:30 PM	F1	0	0
06/16/2000	Eagles Mere	5:20 P.M.	F0	0	0
08/12/2005	Hillsgrove	2:22 PM	F1	0	0

Source: National Weather Service

4.3.12.4 Future Occurrence

In almost 60 years only twelve tornadoes have struck Sullivan County. While the probability of a disastrous tornado hitting Sullivan County may not be extremely high, there is historical evidence to support this as a critical hazard as Sullivan County witnessed three tornadoes in one

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day. Therefore, the frequency of tornado incidents in Sullivan County is comparable, with at least one tornado occurring every ten years or less.

4.3.12.5 Vulnerability Assessment

Tornadoes can occur at any time of the year, with peak months in the northern part of the United States during the summer. Tornadoes are most likely to occur between 3 and 9 p.m. but have been known to occur at all hours of the day or night.

Other factors that impact the amount of damage caused by a tornado are the strength of the tornado, the time of day, and the area of impact. Usually these distinct funnel clouds are localized phenomena impacting a small area. However, the high winds of tornados make them one of the most destructive natural hazards.

Other associated dangers that accompany thunderstorms that can produce tornadoes are:

- Flash floods – with 146 deaths annually nationwide
- Lightning – 75 to 100 deaths annually nationwide
- Damaging Straight-line winds – reaching 140 mph wind speed
- Large Hail – can reach the size of a grapefruit and causes several hundred million dollars in damages annually to property and crops.

The critical facilities of Sullivan County are highly vulnerable to tornados. While many severe storms can cause exterior damage to structures, tornados can completely destroy structures, along with surrounding infrastructure, and abruptly halt operations. Severe storms often accompany tornados and can be just as threatening to the critical facilities within the County. Many secondary effects from these disasters can jeopardize the operation of these critical facilities as well. Power outages can leave facilities functionless, which can have a crippling effect on the infrastructure supporting the population of the County.

Tornados present a high social vulnerability in Sullivan County. With a storm's ability to destroy structures, citizens' possessions are often left at the will of the storm. Numerous secondary effects can also spawn from tornados; among these, power outages, transportation accidents, hazardous material spills, and flooding can be the most frequent. The special needs population is vitally at risk when faced with tornados. Without assistance to evacuate, they may be unable to prepare themselves or their homes and other possessions to safely weather the storm.

The economy of Sullivan County is highly vulnerable to tornados. Where there may be limited impact on the financial and commercial systems of the economy, these storms and the damage they cause can disrupt business for the long term. The local economy can be crippled if buildings or supporting infrastructure are destroyed in the storm. The secondary effects of tornados can also take a toll on business. Power outages can create work stoppages while transportation accidents and road closings can limit the transportation of goods and

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services. Also, flooding cannot be discounted as it can destroy the physical structures, merchandise, and equipment essential for business operation.

Sullivan County's environment is moderately vulnerable to tornados. Like many natural disasters, tornados alone will have little impact on the local ecosystems. However, similar to other hazards, secondary effects can impact the environment. Most notably, hazardous material spills can pollute ground water systems and vegetation. These situations often require extensive clean-up and mitigation efforts.

A map reflecting mobile homes throughout the county and the vulnerable areas is located in **Appendix H-1**.

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4.3.13.2 Range of Magnitude

Winter storms are usually a county-wide hazard. Winter storms consist of cold temperatures, heavy snow or ice and sometimes strong winds. 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.

Flooding and power outages are major secondary effects of winter storms and winter weather. Melting snow can lead to large amounts of ground water that cannot be contained by streams and creeks. Power outages can be caused by large amounts of snow or ice that weighs on power lines.

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:

Table 4.3.13-2: Winter weather event definitions

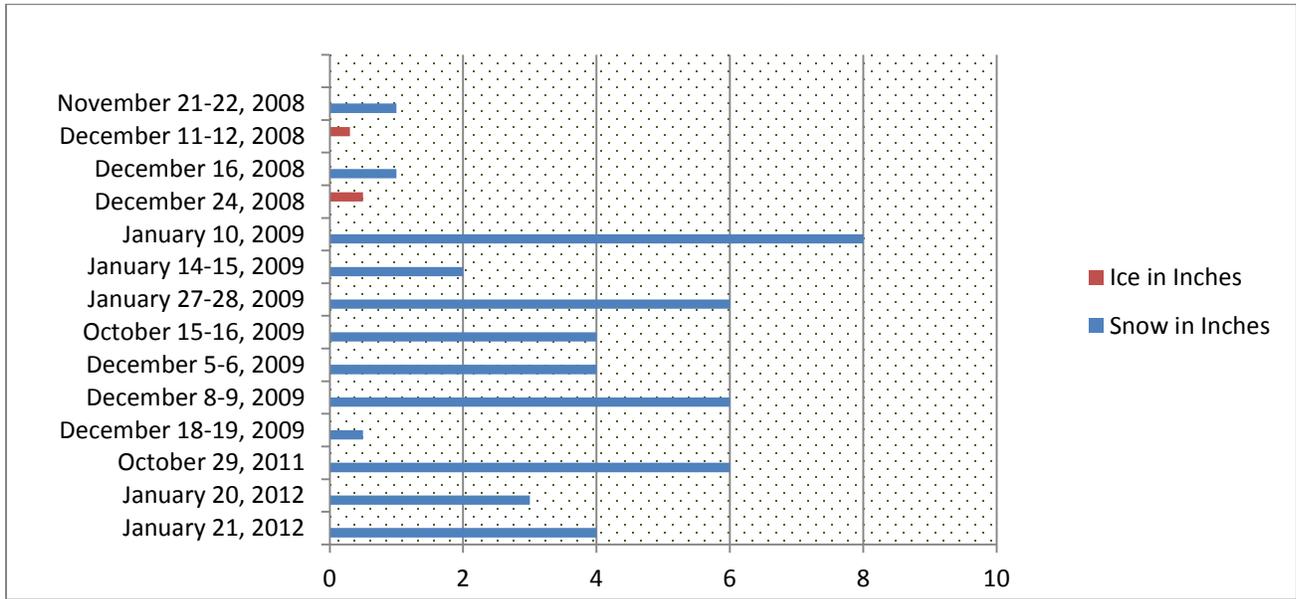
Weather Event	Classification
<u>Heavy Snowstorm</u>	Accumulations of four inches or more in a six-hour period, or six inches or more in a twelve-hour period.
<u>Sleet Storm</u>	Significant accumulations of solid pellets which form from the freezing of raindrops or partially melted snowflakes causing slippery surfaces posing hazards to pedestrians and motorists.
<u>Ice Storm</u>	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.
<u>Blizzard</u>	Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile prevailing over an extended period of time.
<u>Severe Blizzard</u>	Wind velocity of 45 miles per hour, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period time.

4.3.13.3 Past Occurrence

Sullivan County is vulnerable to an array of winter weather. This weather has the ability to close businesses, close schools, and block and damage roadways throughout the county. Sullivan County has been subjected to other strong winter storms numerous times. The average snowfall is 60-70 inches per year, with up to 100 inches as being recorded in the higher elevations. The history of major winter storms in Sullivan County is outlined in Table 4.3.13-3

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Table 4.3.13-3 Past Winter Storms from November 2008 to January 2012



*National Weather Service

These storms have resulted in the loss of electricity and telephone service. The main routes, SR/US 220, SR 87, SR 154, SR 42, and SR 487 are normally opened immediately for emergency traffic; but secondary roads could remain impassable for days. Most residents and travelers in Sullivan County are aware of the winter weather reputation in the county and avoid travel when under a winter storm watch. There have only been a few occasions when a stranded motorist has required emergency transportation and temporary shelter.

4.3.13.4 Future Occurrence

There is a likely probability of winter weather and winter storms occurring in Sullivan County, with expected annual events. A risk factor of 2.6 is associated with this natural hazard. Approximately thirty-five winter storm events occur across Pennsylvania and about three to five in Sullivan County annually.

4.3.13.5 Vulnerability Assessment

Sullivan County is vulnerable to winter weather. The economic impacts from snow removal, road and infrastructure repair, etc. impart a great strain on the budgets and material resources of local municipalities. Along with municipalities, other vulnerable entities in the County include businesses and utility companies. Drivers experience automobile accidents and homeowners experience property damage from heavy snow and ice. Municipalities are burdened with snow and ice removal, businesses are constantly losing income from closures, and utility companies are tasked with repairing the damage done to critical infrastructure (fallen power lines, water main breaks, etc.). Residents in the northwestern sector of Sullivan County are subject to

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isolation when winter storms strike. State Routes US 220, SR 42, and SR 87 may have stranded motorists requiring emergency transportation. A map identifying vulnerable areas to winter storms is located in **Appendix H-2**.

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4.3.14 Civil Disturbance

4.3.14.1 Location and Extent

Throughout the history of the Commonwealth, riots have occurred infrequently. However, as seen in other parts of the country, riots can cause significant property damage, injury, and loss of life. Civil disorders vary widely in size and scope, and impact is generally low. Sullivan County has one location where a civil disturbance incident has occurred. In 2012, a civil disturbance occurred at the Sullivan County Red Rock Job Corps facility located in the town of Lopez.

4.3.14.2 Range of Magnitude

Sullivan County's greatest threat to civil disorder would occur in Colley Township, home of the Red Rock Job Corps Center. Red Rock Job Corps Center is a no-cost education and career training program administered by the U.S. Department of Labor that helps young people ages 16-24 improve the quality of their lives through career technical and academic training. Citizens, property, and infrastructure in and around the Colley Township area could be affected if a large-scale disorder were to take place.

Local government operations and the delivery of services in the community may experience short-term disruptions. Environmental impact is likely to be limited, unless acts of sabotage are performed. The greatest secondary effect is the impact on the economic and financial conditions of the affected community, particularly in relation to the property, facilities, and infrastructure damaged as a result of the disturbance. More serious acts of vandalism may result in limited power failure or hazardous material spills, leading to a possible public health emergency. Altered traffic patterns may increase the probability of a transportation accident.

4.3.14.3 Past Occurrence

Major civil disorders and riots have had a minimal impact on the county. Sullivan County has experienced one civil disturbance at the Red Rock Job Corps Center. This disturbance occurred on April 30, 2012. Twenty students were rioting at the facility and assaulting teachers. Dozens of State Police and local police were summoned to the location. Parts of route 487 had to be shut down during the incident. Several minor injuries were reported.

4.3.14.4 Future Occurrence

The probability is unlikely for a large-scale civil disorder in Sullivan County to occur. A risk factor of 1.3 is associated with this hazard. Occurrence of some civil disorder could happen every 30 years or less.

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4.3.14.5 Vulnerability Assessment

Minor civil disobedience and public disorder is something that may occur, but with minimal impact. These events may be sparked for various reasons and seriousness of the event may well be exacerbated by how authorities handle the crowd. The following map identifies the location of previous civil disturbances in Sullivan County. A map reflecting civil disturbance vulnerability is located in **Appendix H-3**.

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4.3.15 Dam/Levee Failure

4.3.15.1 Location and Extent

Dam failures are usually a secondary effect of massive rainfall and flooding and occur when too much water enters the spillway system. This will occur with little or no warning. Spring thaws, severe thunderstorms, and heavy rainfall are also contributory factors. Poor engineering or poor maintenance may also cause dam failures. The Pennsylvania Department of Environmental Protection and the U.S. Army Corps of Engineers award permits for dams and also shares inspection responsibilities. Inspection results are characterized as either safe or unsafe. Dams are evaluated on categories such as slope instability, excessive seepage, and inadequate spillways.

Dams are classified in terms of hazard potential as: high, significant, or low, with high-hazard dams requiring Emergency Action Plans. Of all the dams in Sullivan County, seven require Emergency Action Plans Table 4.3.15-1 lists an inventory of Sullivan County high-hazard and significant-hazard dams.

Table 4.3.15.1: Sullivan County Dam Inventory

Dam Name	River	Owner	Hazard Level	EAP Completed
DEER LAKE	OGDONIA CREEK	DWIGHT LEWIS LUMBER CO INC.	High	YES
STUMP POND	TR EIK CREEK	LEONARD HEATON, III		
FOSTER POND	FLAG MARSH RUN	ROBERT J. & ALICE FOSTER		
LAKE JOHN	TR MEHOOPANY CREEK	PA GAME COMMISSION		
LAKE MOKOMA	MILL CREEK	LAKE MOKOMA ASSOCIATION	High	YES
UPPER BOONE LAKE	SPRING RUN	HIGHVIEW FARMS, INC	High	YES
CONNELL	BIRCH CREEK	WHITE ASH LAND ASSOCIATION		
PAINTER DEN POND	PAINTER DEN CREEK	PAINTER DEN CLUB, INC		
PROSPECT POND	LICK CREEK	O. KENNETH SHAFFER	High	YES
MAPLE LAKE	TR BLACKWATER RUN	CAROL HOUK – LINNET	High	YES
SONES POND	COAL RUN	DCNR		
SPLASH	MEHOOPANY CREEK	PA GAME COMMISSION		
ROSCOE BURGESS	KINGS CREEK	SONDRA THOMAS	High	YES
HUNTERS LAKE	TROUT RUN	PA FISH & BOAT COMMISSION	High	YES
SULLIVAN	BIRCH CREEK	WHITE ASH LAND ASSOCIATION		

Source: National Inventory of Dams

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4.3.15.2 *Range of Magnitude*

Sullivan County is home to seven high-hazard dams that require emergency action plans. The municipalities where these high-hazard dams are located are at the greatest risk for a significant dam failure. Flooding is the most common secondary effect of dam failure. If the dam failure is severe, a large amount of water will enter the downstream body of water and overflow the stream banks for miles. Depending on the contents of the water and the path it takes, there may be significant environmental vulnerability.

4.3.15.3 *Past Occurrence*

There have been no dam failures in Sullivan County.

4.3.15.4 *Future Occurrence*

Minor dam failures occur quite frequently. However, they often go unnoticed and cause little or no damage or effects on the general population. A risk factor of 2.2 has been assigned to this hazard. Significant dam failures occur much less frequently. The probability of a significant dam failure in Sullivan County is unlikely to occur. Dam failures are often a secondary effect, resulting from another hazard, such as heavy rainfall from a hurricane or tropical storm.

4.3.15.5 *Vulnerability Assessment*

There is always the possibility any dam could fail, however the probability is unlikely in Sullivan County. According to PEMA, minor dam failures occur every year, but their impact is minimal. Usually they are gradual, low volume releases that are unexpected, and do not cause loss of life or damage to the environment. Sullivan County has both high-hazard and significant-hazard dams within the county.

Dam failures are most likely to occur at the locations of the high-hazard dams in Sullivan County. Sullivan County has seven high-hazard dams, all of which have completed Emergency Action Plans. Saxe's Pond Dam is located just north of Sullivan County in Bradford County. This dam is a high hazard dam. In the event of a failure of this dam, Sullivan County would be greatly impacted with the inundation of the compounded water. Sullivan County EMA maintains an emergency action plan for this dam as does Bradford County EMA. While most dam failures are minor, it is critical that the dam inventory be kept up to date with routine inspections.

Dams assigned the significant-hazard potential classification are those dams where failure or incorrect operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but

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could be located in areas with population and significant infrastructure. Dams assigned the high-hazard potential classification are those where failure or incorrect operation has a great possibility of causing loss of human life. A map of dams located is located in **Appendix H-4**.

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4.3.16 Disorientation

4.3.16.1 Location and Extent

Disorientation is the loss of one’s sense of direction, position, or relationship with one’s surroundings. This can also be defined as mental confusion or impaired awareness. In Sullivan County disorientation can vary from a missing child to a suicidal person. Emergency services will be expected to search for missing or disoriented persons at all times of the year and in all types of conditions. Disorientation events have the potential to take place throughout the county.

4.3.16.2 Range of Magnitude

All ranges of the population, from age to social status, would be at a maximum threat to disorientation as 89.8 percent of land use is forests in Sullivan County. The county has state game-lands, state parks, and state forests; to include Loyalsock State Forest, State Game Land 66, State Game Land 13, and State Game Land 134. There is also a small amount of State Game Land 12 in the north western part of the county.

4.3.16.3 Past Occurrence

The table 4.3.16-1 below depicts the events that required emergency service personnel to be utilized for search and rescue of disoriented persons from January 1, 2004 to July 1, 2013. Those persons that were disoriented but did not require emergency service personnel to assist them are not accounted for and is difficult to determine the frequency of occurrence.

Table 4.3.16-1: Disorientation incidents in Sullivan County requiring first responders				
Date	Location / Municipality	Duration of search	Missing	Outcome
11/27/2007	Camp Brule Area, Elkland Township	11/27/2007 to 11/30/2007	1 -hunter	Lost hunter did not survive.
03/27/2007	Fox Township	11:33 P.M. to 4:06 P.M.	A 4-year old	Unknown
09/12/2006	Lake Mokoma, Davidson Township	09/12/2006 to 09/16/2006	Suicidal female	Victim was found
03/10/2006	Hunters Lake, Shrewsbury Township	03/10/2006 to 3/11/2006	1 ice-fisherman	Fire personnel and divers were dispatched for a drowning. Unknown outcome
07/31/2004	Camp Brule, Elkland Township	12:24 P.M. to 5:44 P.M.	2 hikers	Both were found in good condition

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4.3.16.4 *Future Occurrence*

The probability of a disorientation event is highly likely. Citizens should be aware of their surroundings, although the very young and those with mental incapacities will always be at a higher risk. A risk factor of 2.6 has been assigned to this hazard.

4.3.16.5 *Vulnerability Assessment*

Disorientation events are typically a local event, but sometimes may span across municipality and county borders as state game lands and forests lie within numerous municipalities. A search and rescue operation can take place in all types of settings, to include a village, a park, forested lands, or lakes and ponds. A map identifying vulnerable areas for disorientation is located in **Appendix H-5**.

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4.3.17 Drowning

4.3.17.1 Location and Extent

Drowning events in Sullivan County can occur in the numerous streams, ponds and lakes within the county. It is the intention of this report to document this hazard in natural bodies of water and not in swimming pools or other commercial/residential settings.

4.3.17.2 Range of Magnitude

There are a multitude of streams and lakes within Sullivan County. With fishing (to include ice fishing) at 2.8% of land use and hunting at 89.8 % of forested land within the county, there is a high potential for a drowning to occur.

Table 4.3.17.2-1 lists the streams, ponds and lakes within Sullivan County

Table 4.3.17.2-1 Sullivan County Streams, Ponds and Lakes							
Name	Type		Name	Type		Name	Type
Barkshed Run	Stream		Bear Run	Stream		Bear Swamp Run	Stream
Bearwallow Pond	Lake		Bearwallow Run	Stream		Beaver Pond	Lake
Big Bottom Run	Stream		Big Run	Stream		Birch Creek	Stream
Black Creek	Stream		Blackwater Run	Stream		Bloody Run	Stream
Brunnerdale Run	Stream		Bully Run	Stream		Cabin Run	Stream
Cape Run	Stream		Celestial Lake	Lake		Cherry Run	Stream
Coal Run	Stream		Cold Run	Stream		Conklin Run	Stream
Crystal Lake	Lake		Deep Hollow Run	Stream		Deer Lake	Lake
Double Run	Stream		Dry Run	Stream		Dutchman Run	Stream
Eagles Mere Lake	Lake		East Branch Mill Creek	Stream		Elk Creek	Stream
Elk Lake	Lake		Elk Run	Stream		Elklick Run	Stream
Ellis Creek	Stream		Fall Run	Stream		Falls Run	Stream
Flag Marsh Run	Stream		Floodwood Creek	Stream		Gallows Run	Stream
Ganoga Lake	Lake		Glass Creek	Stream		Glass Creek Pond	Lake

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Table 4.3.17.2-1 Sullivan County Streams, Ponds and Lakes

Name	Type	Name	Type	Name	Type
Hemlock Run	Stream	High Rock Run	Stream	Hoagland Branch	Stream
Hog Run	Stream	Huckle Run	Stream	Hunters Lake	Lake
Joes Run	Stream	Ketchum Run	Stream	Kettle Creek	Stream
Kings Creek	Stream	Lake Akela	Lake	Lake John	Lake
Lake Run	Stream	Laurel Run	Stream	Lick Creek	Stream
Lick Run	Stream	Little Loyalsock Creek	Stream	Little Swamp Run	Stream
Long Brook	Stream	Long Run	Stream	Lopez Creek	Stream
Lopez Pond	Lake	Lopez Pond Branch	Stream	Mackeys Run	Stream
Marsh Run	Stream	Meeker run	Stream	Middle Branch Mill Creek	Stream
Mill Creek	Stream	Mill Run	Stream	Mosey Run	Stream
Mud Lake	Lake	Noon Run	Stream	Ogdonia Creek	Stream
Open Run	Stream	Oxhorn Run	Stream	Painter Den Creek	Stream
Painter Run	Stream	Payne Run	Stream	Peterman Run	Stream
Peters Creek	Stream	Pigeon Creek	Stream	Pine Marsh	Lake
Pine Marsh Creek	Stream	Pole Bridge Run	Stream	Porter Creek	Stream
Rainbow Lake	Lake	Rock Run	Stream	Rocky Run	Stream
Rough Run	Stream	Rouse Pond	Lake	Rusty Run	Stream
Ryman Pond	Lake	Sand Run	Stream	Santee Creek	Stream
Scar Run	Stream	Shanerburg Run	Stream	Sherman Run	Stream
Shingle Mill Run	Stream	Shumans Lake	Lake	Slab Run	Stream
Slip Run	Stream	Smith Cabin Run	Stream	South Branch Rock Run	Stream
Spring Brook	Stream	Spring Run	Stream	Stoney Run	Stream
Streby Run	Stream	Swamp Run	Stream	Swanks Run	Stream
Tamarack Run	Stream	The Outlet	Stream	Trout Run	Stream
Tublick Run	Stream	Wampole Run	Stream	Weed Creek	Stream

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Table 4.3.17.2-1 Sullivan County Streams, Ponds and Lakes							
Name	Type		Name	Type		Name	Type
Williams Lake	Lake		Wolf Run	Stream		Yellow Run	Stream

A secondary hazard from a drowning is the potential for a rescuer to lose their life while trying to rescue a drowning person, or recover a drowned person’s body. There is also a hazard from drowning during flash flooding. The National Weather Service has adopted the “Turn Around, Don’t Drown” slogan to inform the public of the hazards of traveling through or near flood waters. People often underestimate the force and power of water. Many of the deaths occur in automobiles as they are swept downstream. The next highest percentage of flood-related deaths is due to walking into or near flood waters. A mere six inches of fast-moving water can knock over an adult and it only takes two feet of rushing water to carry away most vehicles; to include pickups and SUVs.

4.3.17.3 Past Occurrence

There is only one recorded incident from January 1, 2004 to July 1, 2013 in the Sullivan County PEIRS data. On March 10, 2006 there was a search and rescue – water rescue at Hunters Lake. Fire personnel and divers were dispatched at 1:58 a.m. on March 10, 2006 for a male that was ice fishing. Hunters Lake is a 117 acre lake located in the mountains of Sullivan County.

Figure 4.3.17.3-1 Hunters Lake, Sullivan County



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4.3.17.4 *Future Occurrence*

The potential exists for future occurrence of drowning due to the large number of bodies of water within Sullivan County. Research will continue on this hazard. A risk factor of 1.6 has been assigned to this hazard.

4.3.17.5 *Vulnerability Assessment*

With the 120 lakes, ponds and streams that are listed above in table 4.3.17.2-1 and the numerous un-named ponds the potential for a drowning to occur is great. Those that are vulnerable to a drowning include all ages of the population and the emergency services personnel that assist in these disasters. A map identifying vulnerable drowning areas is located in **Appendix H-6**.

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4.3.18 Environmental Hazards

4.3.18.1 Location and Extent

One of the greatest threats to those who reside in the Commonwealth is the constant production, storage, use, and transportation of hazardous materials. The release of these materials from a facility is less dangerous than the release of these materials while being transported. Hazardous materials include flammable liquids, solids, gasses, combustible liquids, explosives, blasting agents, radioactive materials, oxidizing materials, corrosive materials, poisons, refrigerated liquids, hazardous waste/substances, and other regulated material. With the multiple forms of transportation in Sullivan County, hazardous materials such as chemicals, fuels, and other hazardous materials such as manure are frequently transported through the county. The carriers of hazardous materials, however, must have response plans in place in the event of an accident.

Pennsylvania was the first place in the world where a commercial successful well was drilled for oil production. Natural gas wells followed. Pennsylvania is a significant producer of natural gas in the northeast United States. Since the first commercial oil well was drilled in Pennsylvania in 1859, perhaps as many as 350,000 oil and gas wells have been drilled in the state.

Any facility in Pennsylvania that uses, manufactures, or stores hazardous materials must comply with Title III of the Superfund Amendments and Reauthorization Act (SARA). This is also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). They must also comply with the reporting requirements, as amended, in Pennsylvania's Hazardous Materials Emergency Planning and Response Act (1990-165). The community right-to-know reporting requirements keep communities abreast of the presence and release of chemicals at individual facilities. EPCRA was designed to ensure that state and local communities are prepared to respond to potential chemical accidents through Local Emergency Planning Committees (LEPCs). LEPCs are charged with developing emergency response plans for SARA Title III facilities; these plans cover the location and extent of hazardous materials, establish evacuation plans, response procedures, methods to reduce the magnitude of a materials release, and establish methods and schedules for training and exercises. Information about the chemicals that are being manufactured or processed in facilities can be found in the U.S. Environmental Protection Agency's (USEPA) Toxic Release Inventory (TRI) database (http://www.epa.gov/enviro/geo_data.html). There are additional resources at this site as listed below:

- Superfund National Priorities List sites,
- RCRAInfo (EPA and state treatment, storage, disposal) facilities,
- Toxic Release Inventory System (TRI) sites,
- Integrated Compliance Information System and Permit Compliance System - National Pollutant Discharge Elimination System Majors,
- RCRAInfo - Large Quantity Generators,

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- Air Facility System - Major discharges of air pollutants,
- RCRAInfo - Corrective Actions,
- Risk Management Plan,
- Section Seven Tracking System Sites (Pesticides)
- ACRES - Brownfields Properties.

Transportation of hazardous materials on highways involves tanker trucks or trailers. Unsurprisingly, large trucks are responsible for the greatest number of hazardous material release incidents.

There are no SARA Title III planning facilities located in Sullivan County.

4.3.18.2 *Range of Magnitude*

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

Gas and Oil wells are still operational in the county. According to reports there are currently 127 Gas and Oil sites in Sullivan County. Of the 127 Oil and Gas well sites 74 are listed by Sullivan County as Critical Infrastructures. Recent advances in drilling technology and rising natural gas prices have attracted new interest in the gas located in the Marcellus shale formation. The Marcellus Shale is a rock formation that underlies at a depth of 5,000 to 8,000 feet.

4.3.18.3 *Past Occurrence*

The National Response Center lists 16 HazMat instances occurring in Sullivan County between October 1990 and July 2013. The Commonwealth as a whole experienced 914 spills in 2012. Most hazardous spills occur on highways. According to the Bureau of Transportation Statistics, in 2000, of the 1,115 spills in Pennsylvania, 1,065 happened on highways. These spills cost the Commonwealth approximately \$2.5 million. With all of Sullivan County having the Marcellus Shale formation there has been an increase in this type of well drilling. This type of well drilling brings with it different hazards not seen with shallow well drilling. There have been incidents involving wells in the past including well heads being struck, gas migrating into water wells and gas migrating into structures.

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4.3.18.4 *Future Occurrence*

The overall probability of Sullivan County experiencing an environmental hazard is possible. A risk factor of 2.3 has been assigned to this hazard utilizing the Risk Factor methodology probability criteria. The increase in drilling activities increases the potential for incidents. The occurrence of this event is high, however; the potential for a large scale event is present.

Transportation hazardous material spills occur annually. While minor spills are more common than larger spills, both can occur with varying levels of severity. It is extremely difficult to predict a transportation hazardous material incident. Weather conditions, roadway conditions and other human factors impact the occurrence of these incidents.

Fixed facility hazardous material releases do occur but not as frequent as transportation incidents. The Local Emergency Planning Commission (LEPC) for Sullivan County maintains and updates emergency plans for SARA Title III facilities throughout the county. The county LEPC also identifies the facilities that must report the Tier II chemicals for their facility through the Hazardous Materials Emergency Planning and Response Act (1990-165) as amended.

4.3.18.5 *Vulnerability Assessment*

A hazardous materials spill can be the result of human carelessness, an intentional act, or a natural hazard. Human carelessness occurs predominantly during the manufacturing, transporting, or storing of the material. An intentional act would be considered either a terrorist act, criminal act, or act of vandalism. A hazardous materials spill can be a secondary effect of a natural hazard (e.g., flooding, earthquake, or severe weather). Due to the agricultural industry and traffic on transportation routes Sullivan County is susceptible to hazardous material spills including manure spills.

Extracting natural gas from the Marcellus Shale formation requires both vertical and horizontal drilling, combined with a process known as 'hydraulic fracturing.' To drill these wells requires 3-4 acres of land for roads and drilling pad. There is a large amount of employees, equipment, supplies and drilling rigs are much larger than standard well drilling rigs. These sites have many hazards including confine spaces, high angle drill rigs, chemicals, radioactive materials, explosives and high pressure equipment. After the well is drilled, cased and cemented to protect groundwater and the escape of natural gas and other fluids, drillers pump large amounts of water mixed with sand and other fluids into the shale formation under high pressure to fracture the shale around the well, which allows the natural gas to flow freely to the well bore. The amount of water typically required for hydraulic fracturing ranges from about one million gallons for a vertical well to approximately five million gallons for a vertical well with a horizontal lateral. This used water creates issues in itself in that the water contains contaminants such as brine, radioactive materials and other chemicals. Also, Sullivan County has some underground coal mines that are not mapped. These can lead to issues in the well drilling process.

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Crucial factors in a hazardous materials spill include location, weather conditions, and response. The location of a spill is critical for several reasons. The material could spill in a highly populated area, leak into a waterway, or be spilled in some other area that would cause other secondary effects. Those who are closest to the spill are the greatest at risk, but some hazardous materials can travel great distances. Weather conditions play a large role with even mild breezes carrying hazardous gases and fumes long distances. Air temperature is also a determining factor of how far the material will travel by air. Contaminated waterways and even rainfall can have a negative impact on the scope of the spill. Finally, the response to the incident can determine the extent of the damage. If the closest response team is miles from the incident, the material may have time to spread into the ground and waterways or in the air. However, all of these factors depend on the type of material that is released.

A map identifying the Tier II critical infrastructure and the manure storage areas and a map identifying Marcellus Gas Wells and the pipeline network is located in **Appendix H-7**.

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4.3.19 Building/ Structure Collapse

4.3.19.1 Location and Extent

Structural collapses could happen anywhere in Sullivan County due to the age, construction and maintenance performed on buildings. Structural collapse could be a primary event or a secondary event due to a storm, fire, earthquake, flood or mechanical means.

4.3.19.2 Range of Magnitude

Occupational Health and Safety Administration (OSHA) defines a structural collapse as a point when a load bearing structural elements fails. The severity can range from one element failing or a cascading event in which the entire structure collapses.

After a collapse many secondary events may occur causing a hazardous environment. Building construction has blueprinted voids and chases in them to accommodate gas, water, electric and sewage lines. Considering the age of the structure and the magnitude of the collapse dust particulates including gypsum and asbestos could create an inhalation hazard.

4.3.19.3 Past Occurrence

No specific occurrences were identified during research.

4.3.19.4 Future Occurrence

Structural collapse in Sullivan County is generally considered a secondary event following another incident. The regional geography, soil make-up, and age of infrastructure leave it prone to incidents such as land subsidence, sinkhole, and flooding based upon location can lead to a partial or total structural collapse. Based upon the Risk Factor Criteria, the likelihood of a structural collapse within the region, due to a primary event remains very unlikely. A risk factor of 1.3 has been determined for this hazard based on the risk factor assessment tool.

4.3.19.5 Vulnerability Assessment

All commercial buildings and residential structures within Sullivan County are vulnerable to loss due to structural collapse whether it be a collapse as a secondary incident or a catastrophic structural failure. This vulnerability is compounded due to the ground composition and topography in the geographical area. A map identifying vulnerable areas to structural collapse is located in **Appendix H-8**.

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4.3.20 Terrorism

4.3.20.1 Location and Extent

Terrorism is the unlawful use, or threat of the 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 major weapons and activities of terrorists include chemical and biological agents, radiological dispersion devices (RDD; commonly referred to as “dirty bombs”), nuclear weapons, conventional explosives, improvised explosive devices (IED; includes incendiary devices), kidnappings, hijackings, arson, school bombs, and shootings. Terrorist targets are usually high-value, high-profile, and high-visibility targets. Such targets may include: international airports, large cities, major special events, critical infrastructure, resorts, important landmarks, political and/or business leaders. It is important to keep in mind that these are specific people, places, and targets and not regions.

A nuclear detonation is potentially the most destructive of any terrorist attack. The amount of destruction caused by a nuclear attack is determined by the size of the weapon. The effects of the fallout are determined by other factors such as wind speed and weather conditions. “Dirty bombs” are not included in the category of nuclear weapons and do not result in a nuclear explosion, but are one of the many forms of explosives used by terrorists.

Anthrax, as an example of bioterrorism, is an infectious disease that can be spread by inhaling, ingesting, or touching the spore-forming bacteria. As seen in the past, terrorists (either international or domestic) can use the U.S. Postal Service to spread anthrax. With the massive size of the Postal Service, this form of terrorism is extremely difficult to stop.

Other types of terrorism include:

- Agriterrorism – Intentionally contaminating the food supplies or the introduction of pests and/or disease agents to crops and livestock.
- Cyberterrorism – Terrorism that involves computers and networks, and the information they contain.

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4.3.20.2 *Range of Magnitude*

The largest impact resulting from a terrorist event can vary from nominal to catastrophic, depending on the type, location, and severity of the event. The greatest impact would be to the health and safety of the citizens, the continuation of government operations, facilities, critical infrastructure, and economic stability county-wide.

The rural areas of Sullivan County are most susceptible to agriterrorism and school bomb threats.

The impact of agriterrorism could be severe to the traditional family-operated farm, low-density residential areas, commercial agriculture operations, resource production facilities, and small-scale operations. The areas along the major transportation routes, including US 220 would be susceptible to some form of public transit terrorist attack. The more populated areas of the county could be susceptible to chemical, biological, radiological, nuclear, or explosive (CBRNE) events, due to the concentration and density of residential communities.

The impact of bomb threats disrupts the learning atmosphere in schools, disrupts worker productivity in businesses, can cause traffic to be re-routed, and ties up the tax payers' assets such as police and fire units.

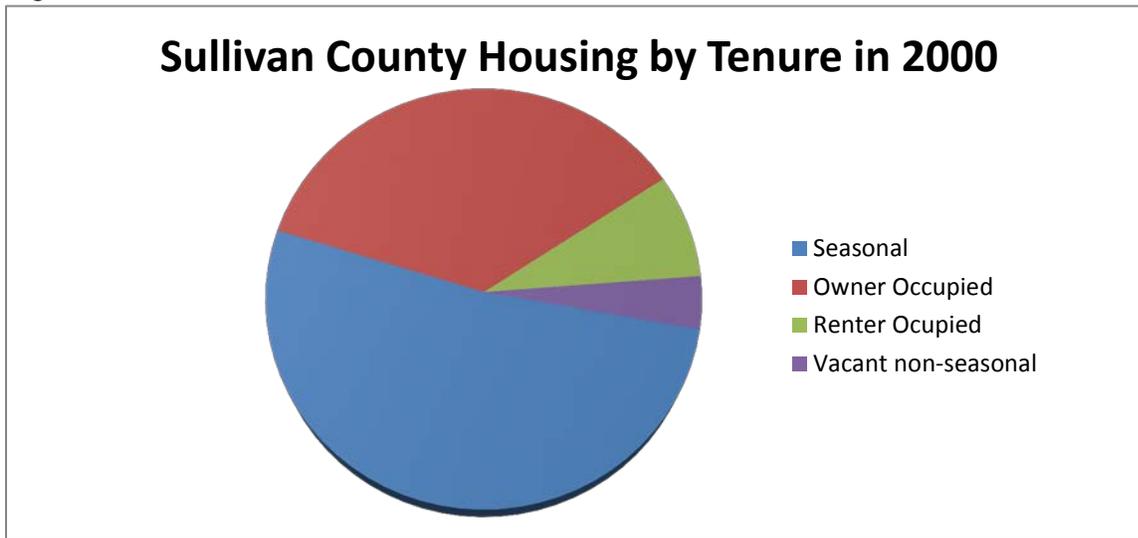
The resulting secondary effects from an act of terrorism are contingent on the type, location, and severity of an event. Nominal effects, similar to what Somerset County experienced in the wake of the Flight 93 tragedy on September 11, 2001, may be relatively minor compared to the impact on the populace, property, and surrounding environment. Emotional trauma, subsequent property damage, and the introduction of small amounts of hazardous materials into the environment are the more likely secondary effects of a similar incident occurring in Sullivan County.

Secondary effects can also range to the catastrophic in impact and may be more damaging and have a greater lasting impact than the initial event. This may occur as the result of a CBRNE event that directly or indirectly affects the county. Critical protective actions may be required of first responders or the entire population. Resulting mass evacuations could lead to traffic congestion and a breakdown in civil order, further exacerbating the situation. Government operations may be disrupted, due to the need to displace or operate under reduced capacity. The environment may experience damaging long-term effects from radiation fallout, chemical introduction into the ground water, or biologic/germ introduction into the ecosystem. Critical infrastructure may be irreparably damaged and a loss in agriculture productivity could permanently affect the county's economy.

Another secondary effect of terrorism would be the migration from heavily populated areas to Sullivan County. The seasonal housing in Sullivan County accounts for just more than half of all the housing.

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Figure 4.3.20.2-1

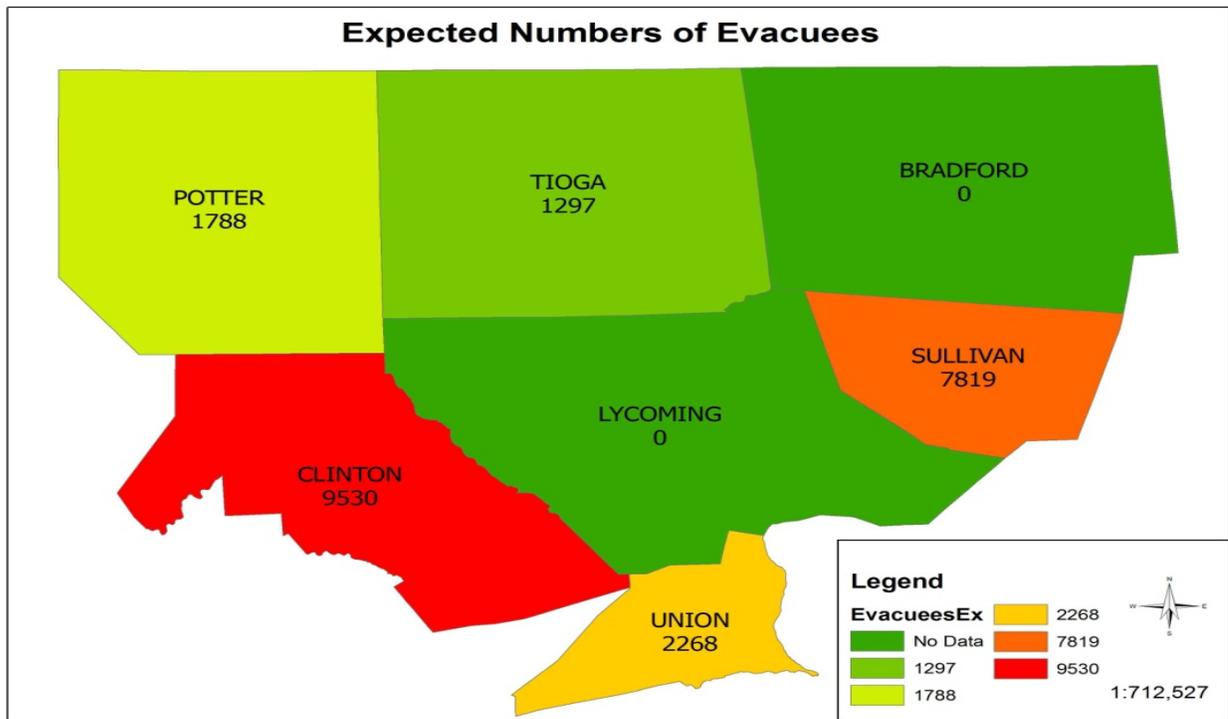


An on-line planning tool at <http://www.cei.psu.edu/evac/about/index.html> includes a web based mapping evacuation planning tool that can be used to assist in emergency evacuation planning.

Using the number of persons per household according to the census – person per household, 2000 – and multiplying by the number of non-resident households in each county the following expected number of evacuees was developed for the Urban to Rural Evacuation PowerPoint for Pennsylvania’s Northern Tier in December 2009.

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Figure 4.3.20.2-2



4.3.20.3 Past Occurrence

The only terrorist activity recorded in Sullivan County was a school bomb threat on January 19, 2006 at the Sullivan County High School in Laporte. State Police, Laporte, received the incident at 3:03 p.m. and bomb dogs arrived at the school at 4:19 p.m. No bomb was found and the incident was terminated at 7:07 p.m.

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4.3.20.4 *Future Occurrence*

Terrorist events are unpredictable by nature. While significant improvements have been made in their detection and prevention, terrorist events remain challenging to predict in size, scope, intent, and frequency. Although the likelihood of an occurrence in Sullivan County or the surrounding area is possible, it is possible the county could experience the effects of a terrorist event within the next 30 years or more. A risk factor of 1.6 has been assigned to this hazard utilizing the Risk Factor methodology probability criteria.

4.3.20.5 *Vulnerability Assessment*

The likelihood of an attack at any location in Sullivan County is unlikely. Agriterrorism poses the greatest threat to Sullivan County since agricultural land accounts for 10.06%, the second largest, land use in the county. The largest land use in the county is attributed to forest land at 83.80%. It is important to note that the use and exposure to biological agents can remain unknown for several days until the infected person(s), livestock, or crops begin to experience symptoms. Often these agents are contagious and the infected person must be quarantined, livestock culled, and/or crops destroyed.

It is not likely that Sullivan County will experience a direct attack by a terrorist organization. The county is more likely to experience the secondary effects of a nearby area being attacked; this would include Three Mile Island, located in Middletown (outside of Harrisburg). However, the threat of a terrorist attack with chemical, biological, radiological, nuclear, or explosive (CBRNE) weapons is increasing. One method to assess the potential for a terrorist attack is by looking at the amount of critical infrastructure in the area. Facilities such as power plants and water facilities; if attacked could disrupt a much larger area more prone to terrorist attacks. Another way to gauge the threat of a terrorist attack is by reviewing law enforcement threat warnings and the Department of Homeland Security's Threat Advisory System.

A map identifying the schools and the large farms/manure storage areas of Sullivan County is located in **Appendix H-9**.

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4.3.21 Transportation Accident

4.3.21.1 Location and Extent

Transportation accidents will claim more lives annually and cause more injuries than any other hazard. With rail, air, and highway transportation available all over Pennsylvania, every county in the Commonwealth is susceptible to this hazard. Sullivan County is served by one U.S. Highway (U.S. Routes 220) and PA State Routes 87, 154, 42 and 487. Sullivan County has 244 miles of state maintained highways and nearly 298 miles of locally owned roads. Hazardous materials travel through Sullivan County daily.

Sullivan County has three identified airports in the county. Dwight's Delight, Merritt Field and the old Eagles Mere Airport are airports in the county. Dwight's Delight Airport is located 3 miles west of Dushore. This is a private use airport and permission to land must be sought prior to landing. Merritt Field Airport is located in Eagles Mere and is a private use airport. Permission is required to land with this site also. The old Eagles Mere Airport is 4 miles west of Eagles Mere and has a grass runway that is private and closed to traffic. All air traffic in the county is private use only. No commercial traffic occurs in the county.

Sullivan County has a vast amount of pipelines in the county. Most of the pipelines are due to the natural gas exploration and extraction. New pipelines are continuously being constructed or upgraded. Most of the pipelines are located underground but there locations that are located above ground and pose a risk for release.

There are no active railroads in the county.

4.3.21.2 Range of Magnitude

In terms of transportation, the maximum threat to Sullivan County is when the incident occurs in or near a heavily populated area. Each mode of public transit experiences accidents on an annual basis. Each of these incidents can occur on both small and large scales, depending on the number of vehicles involved.

Automobile accidents can occur on any roadway. Typically, the higher speeds and more heavily traveled roads, such as U.S. 220, experience a higher percentage of the county's automobile accidents. These traffic accidents are most common during periods of inclement weather. Airplane accidents are most common near take-off and landing points. This is why the most vulnerable areas are those near and around airports. Significant pipeline accidents are not very common. The most vulnerable areas are those with pipelines running through or along hillsides. Mudslides and falling rocks can cause pipeline breaks. Hazardous material spills are the most common secondary effect of transportation accidents.

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4.3.21.3 Past Occurrence

Sullivan County has witnessed less than the state average in automobile accidents from 2007-2011. Fatal accidents in Sullivan County between that five-year period are also below the state average. In 2011, 79 percent of those involved in reported accidents in Sullivan County were wearing a seatbelt.

	2007	2008	2009	2010	2011
Total Crashes	89	80	82	105	95
State Average	1,950	1,870	1,809	1,810	1,871
Fatal Crashes	0	1	3	6	1
State Average	22	22	19	20	19
Seatbelt Usage	79%	80%	86%	84%	84%
State Average	75%	76%	77%	77%	78%

Source: Pennsylvania Department of Transportation

Sullivan County has experienced two aviation accidents recorded by the Federal Aviation Administration (FAA) since 1990.

- January 27, 1991, Guthrie One Air Ambulance Helicopter, from Robert Packer Hospital in Sayre, crashed on the North Mountain near Sonestown in Sullivan County killing all four crewmembers.
- August 31, 2010, a BIRD CK crashed upon take off in a grass field at the Merritt Airfield near Eagles Mere. No injuries were reported and the aircraft received moderate damage.

4.3.21.4 Future Occurrence

The probability of a transportation accident is highly likely. Automobile accidents, both minor and fatal, will occur more frequently than a pipeline incident or an aviation accident. Roadway accidents occur annually, often with limited impact. The exploration and extraction of natural gas in Sullivan County has led to an increase of truck and heavy equipment traffic in Sullivan County. A risk factor of 2.5 has been assigned to this hazard utilizing the risk factor methodology probability criteria.

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4.3.21.5 Vulnerability Assessment

The vulnerability for highway accident is directly related to the population and traffic density of that area. The more populated an area the more vulnerable it is to an accident.

U.S. 220 and PA State Routes 87, 154, 42 and 487 carry the largest volumes of traffic. The increased truck and heavy equipment activity in Sullivan County due to the exploration and extraction of natural gas adds increased risk to highway and secondary road accidents.

According to the Federal Aviation Administration (FAA), none of the Sullivan County airports were listed on the National Plan of Integrated Airport System (NPIAS) report, which lists all significant national air transportation systems. However, this does not discount the county's vulnerability to an aviation accident.

Sullivan County's vulnerability to a pipeline break depends on its vulnerability to three other hazards: floods, earthquakes, and landslides. Each of these hazards tends to be the primary hazard, while the pipeline break is the secondary hazard. Other hazards that affect pipelines, that are not as frequent in Sullivan County, include hurricanes and tornadoes. Pipelines continue to be built and upgraded in Sullivan County due to the natural gas industry boom. The pipelines that carry natural gas have grown significantly over the past 5 years. Since there are an increased numbers of pipelines there is an increased risk of a pipeline incident. Some of the new pipelines have static pressures of over 1000 pounds per square inch.

A map identifying the transportation networks (roads, airports and large pipelines) of Sullivan County is located in **Appendix H-10**.

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4.3.22 Urban Fire and Explosion

4.3.22.1 *Location and Extent*

Urban fire and explosion hazards incorporate vehicle and building/structure fires as well as overpressure rupture, overheat, or other explosions that do not ignite. Statewide, this hazard occurs in the denser, more urbanized areas and occurs most often in residential structures (US Fire Administration, 2009). Urban fires can more easily spread from building to building in these denser areas.

Although fires can start from various causes, major fires are often the result of other hazards such as storms, droughts, transportation accidents, hazardous material spills, and criminal activity (arson) or terrorism. Small structural fires occur often and will not have a large impact on an area, but the increase in insurance rates from these fires will.

4.3.22.2 *Range of Magnitude*

Urban fires can occur in any populated area. Fires affecting one structure happen quite often. The greatest risk urban fires present, is the rapid spread of the fire from one structure to another. Sullivan County is listed as a rural county.

Severe urban fires result in extensive damage to residential, commercial, and/or public property. Damages ranges from minor smoke and/or water damage to the destruction of buildings. People are often displaced for several months to years depending on the magnitude of the fire or explosion event. Urban fires and explosions can also cause injuries and death. Although most instances of fire do not reach disaster proportions, the sum of the impact of all small fires is often much greater than the impact of the few major fire and explosion hazards that occur.

There are additional economic consequences related to this hazard. Urban fires and explosions may result in lost wages due to temporarily or permanently closed businesses, destruction and damage involving business and personal assets, loss of tax base, recovery costs, and lost investments on destroyed property. The secondary effects of urban fire and explosion events relate to the ability of public, private, and non-profit entities to provide post-incident relief. Human services agencies (community support programs, health and medical services, public assistance programs and social services) can be affected by urban fire and explosion events as well. Effects may consist of physical damage to facilities and equipment, disruption of emergency communications, loss of health and medical facilities and supplies, and an overwhelming load of victims who are suffering from the effects of the urban fire, including loss of their home or place of business.

4.3.22.3 *Past Occurrence*

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From 1910 until 1990, the Commonwealth of Pennsylvania experienced 13 major fires in suburban and urban settings, 10 of them from 1980-1990. Between 1978 and 1982, the average number of deaths per fire was 2.7. Since October 1990, the average number of deaths per fire has decreased. Table 4.3.22-1 reflects documented major fires that have occurred in Sullivan County since 2000.

Table 4.3.22-1: Sullivan County Major Fires and Explosions			
Date	Location	Borough/Township	Outcome
3/7/2009	The Highlands Nursing Home, Laporte	Laporte Borough	Automatic Fire Alarm – light smoke. No evacuations
4/17/2007	Along US 220	Davison Twp.	Residential structure fire. US 220 North was closed during the fire.
3/31/2007	Wilcox Road	Forks Twp.	Residential structure fire. Bodies of 1 adult and two children were recovered from the structure. The 2-story cement block house was a total loss.
5/30/2004	1.5 miles South of Mildred on Route 487	Cherry Twp.	A mine fire, 70' long and 9' deep, was reported in Cherry Township. No injuries or damage to structures were reported.

4.3.22.4 *Future Occurrence*

The probability of an urban fire or explosion in Sullivan County is unlikely. However, most urban fires are contained and cause little damage. A risk factor of 1.3 has been assigned to this hazard utilizing the risk factor methodology probability criteria. Minor events will likely happen more frequently than major fires or explosions in the future.

4.3.22.5 *Vulnerability Assessment*

Fire and explosion vulnerability greatly depends on the vulnerability of other hazards. Most fires result from the secondary effect of another hazard. The probability of a fire or explosion occurring has been increasing with population and economic growth. This is due to human error and carelessness, which are other factors contributing to urban fires. The natural gas industry and exploration is an example of the increased growth in Sullivan County. This risk also increases as the use of wood burning and kerosene space heaters increases. The elderly (65

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and older) tend to be more vulnerable to fires than any other age group. They will also experience the highest number of deaths per fire. The second most vulnerable age group is those who are 14 and younger. These groups are generally affected while they are at home, and in the case of children, they may often be home alone. Additionally, many homes destroyed by urban fires are often the older homes in the community. Fire can spread faster in areas with higher concentrations of housing, as opposed to rural areas. The potential secondary effects of an urban fire include utilities failure and hazardous materials spill. A map identifying previous fires and fatal fires is located in **Appendix H-11**.

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4.3.23 Utility Interruption

4.3.23.1 Location and Extent

Utility interruptions in Sullivan County include disruptions in fuel, water, electric and telecommunications capabilities in the county, but the primary focus is on electric power failures. Utility interruptions are often a secondary impact of another hazard like severe storms, tornados, winter storms or tropical storms. Severe thunderstorms, tornados, and winter storms can also lead to more regional utility interruptions, while localized outages can be caused by traffic accidents or wind damage. Heat waves may also result in rolling blackouts where power may not be available for an extended period of time. Additional utility interruptions may be caused by traffic accidents. Utility interruptions have the potential to take place throughout the county.

Table 4.3.23-1 identifies the utility providers per municipality in Sullivan County.

Table 4.3.23-1: Sullivan County Municipal Utility Provider Summary						
Municipality	Electric	Water	Gas	Telephone	Public Sanitary Sewer	Cable
Cherry Township	Penelec Sullivan County Rural Electric Cooperative Claverack REC, Inc.	None	None	Frontier	Mildred	Comcast Blue Ridge Cable
Colley Township	Penelec	None	None	Frontier	None	None
Davidson Township	Penelec	None	None	Frontier	Sonestown	None
Dushore Borough	Penelec	Dushore Municipal Water Systems	None	Frontier	Dushore Municipal Sewer System	None
Eagles Mere Borough	Penelec	None	None	Frontier	Eagles Mere Borough Municipal Sewer System	None
Elkland Township	Penelec	None	None	Frontier	None	None
Forks Township	Penelec	None	None	Frontier	None	None
Forksville Borough	Penelec Sullivan County Rural Electric	None	None	Frontier	None	None
Fox Township	Penelec	None	None	Frontier	None	None

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Table 4.3.23-1: Sullivan County Municipal Utility Provider Summary

Municipality	Electric	Water	Gas	Telephone	Public Sanitary Sewer	Cable
Hillsgrove Township	Penelec	None	None	Frontier	None	None
Laporte Borough	Penelec Sullivan County Rural Electric	Laporte Municipal Water System	None	Frontier	None	None
Laporte Township	Penelec	None	None	Frontier	None	None
Shrewsbury Township	Penelec	None	None	Frontier	None	None

Source: Sullivan County Comprehensive Plan September 2010 and Planning Department

4.3.23.2 Range of Magnitude

The special needs population would face the maximum threat, posed by a utility failure in Sullivan County. Loss of resources, such as electricity, communications, gas, and water supply could have a serious effect on the health, safety, and general welfare of the citizenry. The special needs population can be vulnerable to loss of heat or air conditioning during extreme weather months. The county must account for its special needs population during times of extended utility failure.

The potential secondary effect of a loss of communications and water is an inadequate emergency response. Efficient and effective communications and adequate portable water supply are critical resources for first responders. A loss of electricity and gas can have a negative impact on first responders, as well. However, the most critical secondary effect would be the loss of heating compounded by periods of severe cold.

4.3.23.3 Past Occurrence

It is commonly known that utility failures occur annually, at a minimum. The continued documentation of these failures may provide opportunities for the county to mitigate such service failures. Table 4.3.23-2 outlines documented utility outages that have occurred since May 2004.

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Table 4.3.23-2: Sullivan County Utility Outages				
Utility	Provider	Date(s) of outage	Municipality	Contributing factors
Telephone	Frontier Communications	6/26/2009	Elkland Township	Software problem
Telephone	Frontier Communications	6/9/2009	Elkland Township	Unknown problem
Power	Penelec/First Energy	1/1/2009	Davidson Township	Transportation Emergency – one residence affected
Power	Penelec/First Energy	9/21/2008	Colley Township	586 customers affected
911 Communications	Bill's Electronics	06/9/2008	County Wide	911 Center lost all capabilities to transmit over the radio system.
Telephone	Frontier Communications	5/20/2008	Forsville Borough	Unknown problem
Power	Penelec/ First Energy	5/5/2008	Davidson Township	Trees and wires were down due to weather
911 Communications	Bill's Electronics	2/25/2008 to 2/28/2008	County wide Fire/EMS dispatch	"Spatter" traced to an arcing receptacle at North Mountain Tower Site
Power	Penelec/ First Energy	4/16/2007	County wide	Winter Weather related
Telephone	Commonwealth Telephone	2/20/2007	Elkland Township	86 customers affected.
Water	DEP, Keystone Water Testing Service	7/1/2006 to 7/4/2006	Forsville – Almost Heaven Campgrounds well water	Boil Water Advisory for a chemical imbalance
Telephone	Commonwealth Telephone	8/31/2005	Elkland and Forks townships	150 customers affected
Power	Penelec/ First Energy	6/21/2005	Davidson Township	Unknown
Telephone	Commonwealth Telephone	6/10/2005	Elkland Township	196 customers affected
Telephone	Commonwealth Telephone	3/24/2005	Davidson Township	217 customers Adverse winter weather
Power	Penelec/ First Energy	3/24/2005	Davidson Township	450 + customers winter weather
Power	Penelec/ First Energy	5/10/2004	Shrewsbury Township	2 wires of a 3 phase electric line had a tree fall on it.

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4.3.23.4 *Future Occurrence*

The probability of a large-scale and extended utility failure is highly likely. Utility interruptions are difficult to predict. Most utility interruptions are secondary to severe weather. Citizens should always be prepared for these hazards. A risk factor of 2.7 has been assigned to this hazard utilizing the Risk Factor methodology probability criteria.

4.3.23.5 *Vulnerability Assessment*

Electric

Severe weather is one of the largest causes of power loss. Snow, ice, high winds, and lightning can damage the electric power grid infrastructure. Worker strikes have not been known to cause major power outages. However, in some cases, minor power failures have occurred. Other causes of power outages include flooding, falling tree limbs, vehicle accidents involving utility poles, and small animals climbing the lines and shorting out the power supply.

When power shortages or failures do occur, they are typically on a regional scale, not simply in a single county. Causes and potential causes include infrastructure failure, sabotage, human error, and worker strikes. Also, power outages are often a secondary effect of severe weather. Power outages can damage both homes and businesses. Often, power outages will result in spoiled refrigerated inventories, affecting both residences and businesses.

Water

Water contamination can occur naturally, by human error, or intentionally. Occasionally, releases of manure and milk into the water supply can cause contamination. Overflows from sewage systems and lagoons on farms can also cause contamination of groundwater and drinking water. There are also times when accidental spills and releases of hazardous materials contaminate water. Water supplies along transportation routes may be affected by hazardous materials spills.

Water distribution can be affected in three ways: the amount of water available; the quality of the water; and the viability of the physical components of the distribution systems. The quantity of water depends on nature. Humans, on the other hand, are primarily responsible for the maintenance of water quality. Since Sullivan County is a rural county, a majority of the residential water comes from wells. Well contamination or water shortages due to drought would pose a high vulnerability.

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Communications

The Sullivan County primary provider for land based telecommunications is Frontier Communications. Since Frontier is the only provider of land based communications in the county, a failure in this system could be a county wide emergency. Small-scale failures occur annually.

Cellular communications and coverage is sporadic in the county. Drastic elevation changes, topography issues and a lack of cellular towers in the county lead to a decreased ability to use cellular communications. Cellular communications infrastructure has grown over the past 5 years but is still limited.

Maps identifying vulnerable locations and infrastructure are located in **Appendix H-11**.

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4.3.24 Wildfire

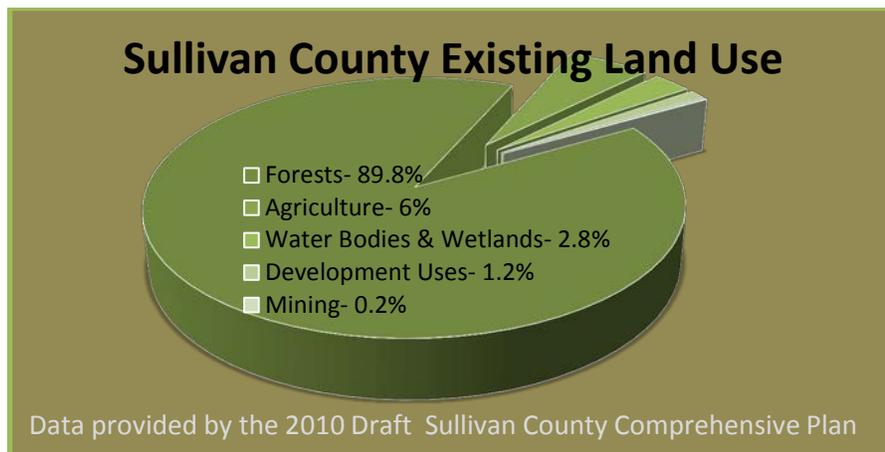
4.3.24.1 Location and Extent

The most frequent causes of devastating wildfires are droughts, arson, and human carelessness. During the drought of 1999, almost 8,500 acres of forest were burned in Pennsylvania. During the spring of 2001, 2,549 acres of Pennsylvania forestland were burned. Pennsylvania will lose around 10,000 acres of forestland per year because of wildfires. Nationally, in 2003, wildfires burned five million acres in the United States (National Interagency Fire Center).

4.3.24.2 Range of Magnitude

The rural areas of the county are at the greatest risk for wildfires. Sullivan County must be watchful of wildfires that could severely hinder farming, logging, or food processing. Wildfires usually occur following prolonged periods of dry weather; and with approximately 90 percent of Sullivan County covered in forests a wildfire could prove to be costly.

Table 4.3.24-1



If an urban fire or wildfire is not contained, certain secondary hazards may affect Sullivan County. Power outages may be the most prevalent of these hazards. Environmental hazards could also result from a wildfire or urban fire.

4.3.24.3 Past Occurrence

The Pennsylvania Department of Conservation of Natural Resources (DCNR) Bureau of Forestry tracks forest fires by forest districts. Sullivan County is located in the Loyalsock Forest District of Pennsylvania (D-20). According to DCNR, there were only 3 fires within the Loyalsock Forest District in 2011, approximately 0.1 percent of the state total. Of these fires two were in the spring and one was during the fall of 2011.

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Table 4.3.24-2 shows the wildfire percentage occurrence during each month.

Table 4.3.24-2



Source: PA DCNR

Table 4.3.24-3 reflects the Loyalsock District Report from 2003-2011.

Table 4.3.24-3: Statewide Wildfires in the Loyalsock District, 2003-2011					
Year	Forest District	Fires	% of Statewide	Acres	% of Statewide
2003	Loyalsock (D-20)	21	5.1%	125.4	6.2%
	State Totals	408	-	2026.9	-
2004	Loyalsock (D-20)	13	6.3%	2378.2	85.6%
	State Totals	205	-	2779.6	-
2005	Loyalsock (D-20)	44	5.4%	552.7	12.9%
	State Totals	809	-	4268.2	-
2006	Loyalsock (D-20)	4	0.4%	12.6	0.2%
	State Totals	911	-	7919.8	-
2007	Loyalsock (D-20)	4	0.7%	0.5	0.0%
	State Totals	540	-	1140.3	-
2008	Loyalsock (D-20)	10	1.5%	17.4	0.2%
	State Totals	689	-	7670.4	-
2009	Loyalsock (D-20)	46	7.4%	192.8	3.2%
	State Totals	619	-	6064.9	-

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Table 4.3.24-3: Statewide Wildfires in the Loyalsock District, 2003-2011

Year	Forest District	Fires	% of Statewide	Acres	% of Statewide
2010	Loyalsock (D-20)	34	6.0%	197.4	5.8%
	State Totals	569	-	3398.3	-
2011	Loyalsock (D-20)	3	1.5%	0.5	0.1%
	State Totals	202		579.1	

4.3.24.4 Future Occurrence

Rural fires, or wildfires, have a likely probability and the frequency of these events is low. No significant wildfires have occurred in Sullivan County’s recorded history.

Weather conditions play a major role in the occurrence of these wild fires. Dry conditions with decreased humidity are an ideal scenario for a wild fire.

The Sullivan County Emergency Management Agency coordinates countywide burn bans when the conditions are ideal for wildfires. Public information and press releases are issued to help decrease the risk of a major fire thus reducing the possibility of future occurrences. Sullivan County DES disseminates all red flag warnings.

4.3.24.5 Vulnerability Assessment

Although no significant wildfires have been recorded by the NCDC (National Climatic Data Center) for Sullivan County, rural areas of the County can be prone to wildfires. The size and impact of a wildfire depends on its location, climate conditions, and the response of firefighters. If the right conditions exist, these factors can usually mitigate the effects of wildfires. During a drought, wildfires can be devastating. Lightning strikes are another cause of wildfires. However, human carelessness and negligence is the leading factor, causing 98 percent of wildfires in Pennsylvania.

Wildfires are most common in the spring (March – May) and fall (October – November) months. During spring months the lack of leaves on the trees allows the sunlight to heat the existing leaves on the ground from the previous fall. The same theory applies for the fall; however, the dryer conditions are a more crucial factor.

A map identifying vulnerable areas to wildfire is located in **Appendix H-13**.

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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 local planning team, and information collected through development of the hazard profiles included in Section 4.3. The RF approach produces numerical values that allow identified hazards to be ranked against one another; the higher the RF value, the greater the hazard risk.

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

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

Table 4.4-1 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.

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Table 4.4-1: Summary of Risk Factor approach used to rank hazard risk.

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

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4.4.2. Ranking Results

Using the methodology described in Section 4.4.1, Table 4.4-2 lists the Risk Factor calculated for each of the 24 potential hazards identified in the 2014 HMP. Hazards identified as *high* risk have risk factors greater than 2.5. Risk Factors ranging from 2.0 to 2.4 were deemed *moderate* risk hazards. Hazards with Risk Factors 1.9 and less are considered *low* risk.

Table 4.4-2: Ranking of hazard types based on risk factor methodology

HAZARD RISK	HAZARD NATURAL (N) or HUMAN-MADE (M)	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Hurricanes and Tropical Storms (N)	3	3	4	1	4	3.1
	Utility Interruptions (M)	4	1	3	4	2	2.7
	Disorientation (M)	4	2	2	4	3	2.6
	Flood and Flash Flood (N)	3	2	3	3	2	2.6
	Radon (N)	3	2	3	1	4	2.6
	Winter Storms (N)	3	2	4	1	2	2.6
	Transportation Accidents (M)	4	2	1	4	1	2.5
MODERATE	Environmental Hazards (M)	2	1	1	4	1	2.3
	Tornadoes and Wind Storms (N)	2	2	2	4	3	2.3
	Dam Failure (M)	1	3	2	4	2	2.2
	Drought (N)	2	1	4	1	4	2.2
	Invasive Species (N)	2	1	1	4	1	2.0
LOW	Wildfires (M)	3	1	1	3	2	1.9
	Earthquakes (N)	1	1	3	4	1	1.7
	Lightning Strikes (N)	3	1	1	2	1	1.7
	Drowning (M)	2	1	1	4	1	1.6
	Subsidence and Sinkholes (N)	1	2	1	4	1	1.6
	Terrorism (M)	2	1	1	4	1	1.6
	Extreme Temperature (N)	2	1	1	1	3	1.5
	Building or Structure Collapse (M)	1	1	1	4	1	1.3
	Civil Disturbance (M)	1	1	1	4	1	1.3
	Landslide (N)	1	1	1	4	1	1.3
	Pandemic (N)	1	1	1	1	4	1.3
	Urban Fires/Explosions (M)	1	1	1	4	1	1.3

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Based on these results, there are seven *high* risk hazards, five *moderate* risk hazards and twelve *low* risk hazards in Sullivan 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 4.4-3 shows the different municipalities in Sullivan 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 team based on the findings in the hazard profiles of Section 4.3.3.

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Table 4.4-3: Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR											
	Hurricanes and Tropical Storms (N)	Utility Interruption (M)	Disorientation (M)	Flood, Flash Flood (N)	Radon (N)	Winter Storms (N)	Transportation Accidents (M)	Environmental Hazard (M)	Tornados and Wind Storms (N)	Dam Failure (M)	Drought (N)	Invasive Species (N)
	3.1	2.7	2.6	2.6	2.6	2.6	2.5	2.3	2.3	2.2	2.2	2.0
Cherry Township	=	=	=	<	=	=	=	=	=	=	=	=
Colley Township	=	=	=	<	=	=	=	=	=	=	=	=
Davidson Township	=	=	=	=	=	=	=	=	=	>	=	=
Dushore Borough	=	=	=	=	=	=	=	=	=	>	=	=
Eagles Mere Borough	=	=	=	<	=	=	=	=	=	=	=	=
Elkland Township	=	=	=	<	=	=	=	=	=	=	=	=
Forks Township	=	=	=	<	=	=	=	=	=	=	=	=
Forksville Borough	=	=	=	=	=	=	=	=	=	>	=	=

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Table 4.4-3: Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR											
	Hurricanes and Tropical Storms (N)	Utility Interruption (M)	Disorientation (M)	Flood, Flash Flood (N)	Radon (N)	Winter Storms (N)	Transportation Accidents (M)	Environmental Hazard (M)	Tornados and Wind Storms (N)	Dam Failure (M)	Drought (N)	Invasive Species (N)
	3.1	2.7	2.6	2.6	2.6	2.6	2.5	2.3	2.3	2.2	2.2	2.0
Fox Township	=	=	=	<	=	=	=	=	=	=	=	=
Hillsgrove Township	=	=	=	>	=	=	=	=	=	>	=	=
Laporte Borough	=	=	=	<	=	=	=	=	=	=	=	=
Laporte Township	=	=	=	<	=	=	=	=	=	=	=	=
Shrewsbury Township	=	=	=	<	=	=	=	=	=	=	=	=

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Table 4.4-3: Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR											
	Wildfires (M)	Earthquakes (N)	Lightning Strikes (N)	Drowning (M)	Subsidence and Sinkholes (N)	Terrorism (M)	Extreme Temperature (N)	Building and Structure Collapse (M)	Civil Disturbance (M)	Landslide (N)	Pandemic (N)	Urban Fires and Explosions (M)
	1.9	1.7	1.7	1.6	1.6	1.6	1.5	1.3	1.3	1.3	1.3	1.3
Cherry Township	=	=	=	=	=	=	=	=	=	=	=	=
Colley Township	=	=	=	=	=	=	=	=	=	=	=	=
Davidson Township	=	=	=	=	=	=	=	=	=	=	=	=
Dushore Borough	=	=	=	=	=	=	=	=	=	=	=	=
Eagles Mere Borough	=	=	=	=	=	=	=	=	=	=	=	=
Elkland Township	=	=	=	=	=	=	=	=	=	=	=	=
Forks Township	=	=	=	=	=	=	=	=	=	=	=	=
Forksville Borough	=	=	=	=	=	=	=	=	=	=	=	=
Fox Township	=	=	=	=	=	=	=	=	=	=	=	=

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Table 4.4-3: Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR											
	Wildfires (M)	Earthquakes (N)	Lightning Strikes (N)	Drowning (M)	Subsidence and Sinkholes (N)	Terrorism (M)	Extreme Temperature (N)	Building and Structure Collapse (M)	Civil Disturbance (M)	Landslide (N)	Pandemic (N)	Urban Fires and Explosions (M)
	1.9	1.7	1.7	1.6	1.6	1.6	1.5	1.3	1.3	1.3	1.3	1.3
Hillsgrove Township	=	=	=	=	=	=	=	=	=	=	=	=
Laporte Borough	=	=	=	=	=	=	=	=	=	=	=	=
Laporte Township	=	=	=	=	=	=	=	=	=	=	=	=
Shrewsbury Township	=	=	=	=	=	=	=	=	=	=	=	=

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4.4.3. Potential Loss Estimates

Flooding and tornadoes/windstorms are significant natural hazards in Sullivan County. The estimation of potential loss in this assessment focuses on the monetary damage that could result from these hazards. The potential property loss was determined for each municipality and for the entire county. The following primary datasets were utilized for this estimated potential loss analysis: Flood Insurance Rate Maps and the Sullivan County Tax Assessment Database.

The Sullivan County Assessment Office houses a dataset with the total assessed value for each tax parcel throughout the county. Estimated potential losses were calculated by first determining what tax parcels and structures were intersected by the 1% annual chance floodplain. Once the impacted parcels and structures were identified, then primary residence structures and commercial structures were identified. Sullivan County has a large amount of seasonal structures that are located in the 1% annual chance special flood hazard area. These seasonal structures were not included in the estimation of loss. The county assessed value for all primary residences and commercial structures located in the 1% annual chance special flood hazard area was determined. The total of both land assessed value and the building assessed value provides a total assessed value for that property. The total assessed value for each parcel in a municipality was tallied to derive the total assessed value per municipality for every structure that was located in the 1% annual chance special flood hazard area. Total market value for the land and structure located in the SFHA was calculated by multiplying the assessed value by the common level ratio of 1.43. Market value was tallied per municipality. The quantity of primary residence and commercial structures in the floodplain per municipality is located in **Appendix D**.

Table 4.4-4 outlines the potential flooding losses for each municipality in Sullivan County. Losses shown here can only be viewed as estimates and as potential, based on the random occurrence of flood conditions and limited data. Assessed value and market value data include those based on a point within a two-dimensional (latitude and longitude) plane. This data, however, does not include attribute information on first-floor flood elevations, which is essential to assess the base flood elevation's impact on the county's infrastructure. Further, this analysis assumes a total loss for any parcel intersected by the floodplain. As a result of these limitations, the estimates are likely overstated, but to what degree the potential losses are overstated cannot be determined.

Table 4.4-4 Sullivan County Potential Flooding Loss Estimates per Municipality			
Municipality		Total Assessment Value	Total Market Value
Cherry Township		\$148,400.00	\$212,212.00
Colley Township		\$92,200.00	\$131,846.00

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Table 4.4-4 Sullivan County Potential Flooding Loss Estimates per Municipality		
Municipality	Total Assessment Value	Total Market Value
Davidson Township	\$3,229,900.00	\$4,618,757.00
Dushore Borough	\$9,529,910.00	\$13,627,771.00
Eagles Mere Borough	\$0.00	\$0.00
Elkland Township	\$860,500.00	\$1,230,515.00
Forks Township	\$759,700.00	\$1,086,371.00
Forksville Borough	\$1,054,890.00	\$1,508,492.00
Fox Township	\$223,700.00	\$319,891.00
Hillsgrove Township	\$4,682,595.00	\$6,696,111.00
Laporte Borough	\$932,900.00	\$1,334,047.00
Laporte Township	\$149,500.00	\$213,785.00
Shrewsbury Township	\$119,700.00	\$171,171.00
Total	\$20,850,995.00	\$31,150,969.00

Table 4.4-5 outlines the potential tornado and windstorm losses for each municipality in Sullivan County. Mobile homes are the most susceptible to wind related damage during wind events. Mobile home GIS data was utilized to determine the loss estimates. All non-primary residence mobile homes or camps were removed from the list once compiled. In Sullivan County there are a large number of mobile homes that are used as camps. Once all primary residence mobile homes were identified and quantified per municipality, the data was then intersected with the county assessment data to determine the assess value loss per municipality. After the assessed value was determined, then the fair market value for the mobile homes per municipality was determined. Losses shown here can only be viewed as estimates and as potential, based on the random occurrence of high wind conditions and limited data.

Table 4.4-5 Sullivan County Potential Tornado and Windstorm Loss Estimates per Municipality		
Municipality	Total Assessment Value	Total Market Value
Cherry Township	\$6,625,500.00	\$9,474,465.00
Colley Township	\$2,793,600.00	\$3,994,848.00
Davidson Township	\$3,353,600.00	\$4,795,648.00
Dushore Borough	\$286,600.00	\$409,838.00
Eagles Mere Borough	\$143,100.00	\$204,633.00

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Table 4.4-5 Sullivan County Potential Tornado and Windstorm Loss Estimates per Municipality

Municipality	Total Assessment Value	Total Market Value
Elkland Township	\$1,698,900.00	\$2,429,427.00
Forks Township	\$2,751,300.00	\$3,934,359.00
Forksville Borough	\$521,700.00	\$746,031.00
Fox Township	\$4,288,000.00	\$6,131,840.00
Hillsgrove Township	\$1,583,300.00	\$2,264,119.00
Laporte Borough	\$47,700.00	\$68,211.00
Laporte Township	\$1,283,000.00	\$1,834,690.00
Shrewsbury Township	\$1,020,900.00	\$1,459,887.00
Total	\$26,397,200.00	\$37,747,996.00

4.4.4. Future Development and Vulnerability

No population projections can accurately predict all the factors that may affect the county's future growth rate. However, population projections that are made depend primarily on the economic growth factors in the county and region. Population projections were developed for the Sullivan County Comprehensive Plan by the Bureau of Watershed Management of the Pennsylvania Department of Environmental Protection. It is projected that the county's population will increase by 4.6 percent from 2000-2030.

Housing trends for Sullivan County varies throughout the county. Seasonal housing accounts for 52% of the total housing in Sullivan County. Municipalities with large numbers of seasonal housing units include Fox Township, Cherry Township, Colley Township and Davidson Township. Median value of Sullivan County housing is \$74,900. No specific projections for future housing are identified in the current version of the county comprehensive plan.

Existing land use in Sullivan County consists of 89.8% Forests, 6% Agriculture, 2.8% Water bodies and wetlands, 1.2% is Residential, Institutional, Industrial and Commercial Properties and 0.2% Mining. State and non-resident land ownership consists of 70% of the county land. Zoning regulations are limited to Eagles Mere Borough and Laporte Borough. The entire county is under the jurisdiction of the Sullivan County Subdivision and Land Development Ordinance. Forest and agriculture will continue to be the leading use of land in Sullivan County over the next 10 years. Anticipated growth and redevelopment was not identified in the comprehensive plan. The natural gas industry has increased dramatically in the past 5 years. Expansion and addition of pipelines is expected to continue in the future.

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5. Capability Assessment

5.1. Update Process Summary

The capability assessment is an evaluation of Sullivan 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. The capability assessment has two components: an inventory of the county's and municipalities' mission, programs, and policies; and an analysis of their capacity to execute them. 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 matrix/questionnaire was provided to the municipalities during the planning process at meetings of Sullivan 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 13 municipalities. 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 categories listed above – 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 Sullivan County and its municipalities have the capacity to do and provides an understanding of what must be changed to mitigate loss.

Sullivan County has a number of resources it can access to implement hazard mitigation initiatives including emergency response measures, local planning and regulatory tools, administrative assistance and technical expertise, fiscal capabilities, and participation in local, regional, state, and federal programs. The presence of these resources enables community resiliency through actions taken before, during, and after a hazardous event. While the capability assessment serves as a good instrument for identifying local capabilities, it also provides a means for recognizing gaps and weaknesses that can be resolved through future

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mitigation actions. The results of this assessment lend critical information for developing an effective mitigation strategy.

5.2. Capability Assessment Findings

5.2.1. Emergency Management

The Sullivan County Emergency Management Agency coordinates county-wide 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 and reviewed at least once annually. According to the capability assessment surveys completed by municipal leaders, none of the municipalities in the county have adopted by resolution the Sullivan County Emergency Operations Plan (EOP) as the municipal plan. All of the municipalities have adopted or are in the process of developing a municipal EOP.

5.2.2. 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:

- Prohibiting manufactured homes in the floodway.
- Prohibiting manufactured homes within the area measured 50 feet landward from the top-of bank of any watercourse within a special flood hazard area.
- Special requirements for recreational vehicles within the special flood hazard area.
- Special requirement for accessory structures.

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- 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.
- Providing the County Conservation District an opportunity to review and comment on all applications and plans for any proposed construction or development in any identified floodplain area.

Act 166 mandates municipal participation in and compliance with the NFIP. It also establishes higher regulatory standards for new or substantially improved structures 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 CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that meet a minimum of three of the following CRS goals:

- Reduce flood losses
- Protect public health and safety
- Reduce damage to property
- Prevent increases in flood damage from new construction
- Reduce the risk of erosion damage
- Protect natural and beneficial floodplain functions
- Facilitate accurate insurance rating
- Promote the awareness of flood insurance

There are 10 CRS classes. 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 45 percent for Class 1 communities. The CRS recognizes 18 creditable activities, organized under four categories:

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Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness.

Sullivan County and 11 of its 13 municipalities participate in the NFIP. All eleven (11) municipalities that participate in the NFIP have floodplain regulations and ordinances. None of the municipalities participate in the NFIP-CRS program. Table 5.2-1 identifies each municipality for floodplain compliancy and NFIP participation.

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Table 5.2-1: Summary of planning tools adopted by each municipality in Sullivan County (HMP Capability Assessment Surveys, 2013; Sullivan County Planning Department 2013)

COMMUNITY	COMPREHENSIVE PLAN	BUILDING CODE	NFIP PARTICIPANT	FLOODPLAIN ORDINANCE	SUBDIVISION & LAND DEVELOPMENT ORDINANCE	ZONING ORDINANCE
Cherry Township	No	Yes	Yes	Yes	Yes-County	Yes-County
Colley Township	Yes-Township	Yes	Yes	Yes	Yes-County	Yes-County
Davidson Township	Yes-County	Yes	Yes	Yes	Yes-County	Yes-County
Dushore Borough	Yes	Yes	Yes	Yes	Yes	Yes-06/12/2012
Eagles Mere Borough	Did not complete an assessment					
Elkland Township	No	Yes	Yes	Yes	No	No
Forks Township	Yes-2009	Yes-2004	Yes	Yes	Yes-County	No
Forksville Borough	No	Yes	Yes	Yes	Yes-County	No
Fox Township	No	Yes	Yes	Yes	Yes-County	No
Hillsgrove Township	Did not complete an assessment					
Laporte Borough	Yes-County	Yes	No	Yes	Yes-2009	Yes-2003
Laporte Township	No	Yes-2004	Yes	Yes	No	No
Shrewsbury Township	Yes-Township	Yes-04/07/2004	Yes	Yes	No	No

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5.2.3. 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 stormwater 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 Sullivan 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 region of the country in respect of 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

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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 PA 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 Sullivan County adhere to the standards of the Pennsylvania Uniform Construction Code (Act 45). All of Sullivan County’s municipalities have “opted in” except for Eagles Mere Borough and Hillsgrove Township.

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. Sullivan County has a county zoning ordinance. Three of the 13 municipalities within Sullivan County utilize the county zoning ordinances: Cherry Township, Colley Township, and Davidson Township. Dushore Borough and Laporte Borough utilize local zoning ordinances. Eagles Mere Borough, Elkland Township, Forks Township, Forksville Borough, Fox Township, Hillsgrove Township, Laporte Township and Shrewsbury Township do not have a local zoning ordinance. See Table 5.2-1.

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. In Sullivan County six municipalities utilize the county’s subdivision ordinance. Two municipalities have local subdivision ordinances: Dushore

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Borough and Laporte Borough. And, five municipalities have no provisions for subdivision ordinances. See Table 5.2-1.

Stormwater Management Plan/Stormwater Ordinance

The proper management of stormwater 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 stormwater 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 stormwater management plan by amending or adopting laws and regulation for land use and development. The implementation of stormwater 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 stormwater 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 stormwater 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 6 watersheds in Sullivan County: Fishing Creek; Loyalsock Creek; Lycoming Creek; Mehoopany Creek; Muncy Creek; and Towanda Creek. None of these watersheds have Act 167 Stormwater Management Plans.

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 10 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,

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suggests that the plan give consideration to floodplains and other areas of special hazards and other similar uses. The MPC also requires comprehensive plans to include a plan for community facilities and services, and recommends giving consideration to storm drainage and floodplain management.

Sullivan County has a county comprehensive plan that was adopted in January 2012.

Article III of the Municipality Planning Code (MPC) enables municipalities to prepare a comprehensive plan; however, development of a comprehensive plan is voluntary. Six municipalities within Sullivan County have comprehensive plans, two of which are the county comprehensive plan.

Article III and XI of the MPC authorize municipalities and counties to participate in inter-governmental cooperative planning and implementation efforts. Multi-municipal planning efforts as permitted in Acts 67 and 68 of 2000 are growing, and efforts are occurring in all but four counties.

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, stormwater 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 Sullivan County that have a Capital Improvements Plan.

Emergency Operations Plan

Title 35, the Pennsylvania Emergency Management Services Code, requires all political jurisdictions to prepare, maintain and keep current a disaster emergency operations plan for the prevention and minimization of injury and damage caused by disaster; prompt and effective response to disaster; and disaster emergency relief and recovery of consonance with the Pennsylvania Emergency Operations Plan.

Sullivan County's Emergency Operations Plan (EOP) is an "all hazards" plan, complies with the National Incident Management System (NIMS), and is the basis for a coordinated and effective response to any disaster that may affect lives and property in Sullivan County. The EOP, or portions thereof, would be implemented when emergency circumstances warranted. Sullivan County's EOP was adopted in April of 2011. All municipalities within Sullivan County have a local EOP.

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5.2.4. Administrative and Technical Capability

There are four (4) boroughs and nine (9) townships within Sullivan 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.

Sullivan County has a planning department. This department supports all the Sullivan County municipalities with planning needs. Laporte Borough does have a planning committee that conducts planning activities.

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. Municipalities in Sullivan County utilize county or subcontracted engineers.

Personnel Skilled in GIS or HAZUS

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.

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The GIS also includes information about map features such as the capacity of a municipal water supply or the acres of public land.

Sullivan County has GIS capabilities. Employees of the Planning Department and Emergency Services Department provide and maintain the GIS capabilities. No employees of Sullivan County have completed the HAZUS course or have HAZUS capabilities.

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 his/her 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 Sullivan County and its municipalities to have an emergency management coordinator.

Intergovernmental Cooperation

There are many governmental agencies, activities, and institutions that cut across municipal boundaries and tie us together into larger communities. Intergovernmental cooperation is one manner of accomplishing common goals, solving mutual problems, and reducing expenditures.

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5.2.5. Fiscal 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.

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.

Council of Government

A Council of Government is a general, multi-purpose, cooperative organization. A joint authority is only a hollow framework until organized as a joint sewer authority or joint transit authority, for instance. Councils of Government (COGs) are a special kind of Act 180 organization. COGs are general or multi-purpose organizations established to enable a group of municipalities to work together on mutually-beneficial projects. A COG has a broad responsibility; it may study and propose new joint programs and projects and is almost always composed of elected officials. Sullivan County municipalities participate in the Sullivan County Council of Governments.

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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.

5.2.6. 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.

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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, scores ranged from 0-5 with an average score of 2.5

5.2.7. 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 5.2-2 summarizes the results of the self-assessment survey.

Municipality Name	Capability Category			
	Planning and Regulatory Capability	Administrative and Technical Capability	Fiscal Capability	Community Political Capability
Cherry Township	M	M	L	M
Colley Township	M	M	L	M
Davidson Township	M	M	L	L
Dushore Borough	Did not complete this section of the assessment			
Eagles Mere Borough	Did not participate			
Elkland Township	L	L	L	L

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Table 5.2-2: Sullivan County Capability Self-Assessment Matrix

Municipality Name	Capability Category			
	Planning and Regulatory Capability	Administrative and Technical Capability	Fiscal Capability	Community Political Capability
Forks Township	M	L	L	M
Forksville Borough	L	L	L	L
Fox Township	L	L	M	M
Hillsgrove Township	L	L	L	L
Laporte Borough	M	L	H	M
Laporte Township	M	M	M	M
Shrewsbury Township	L	L	L	L

5.2.8. 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 municipality 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.

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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 five goals and no objectives identified in the 2008 HMP; in the 2014 HMP Update, there are five (5) goals and eighteen (18) objectives, but objectives have been added, deleted, and rearranged in order to associate them with the most appropriate goal. These changes are noted in Table 6.1-1. A list of these 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 6.1-1. 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. These meetings were conducted on September 11, 2013 through September 12, 2013. Copies of these meetings and all documentation associated with the meetings are located in **Appendix C**.

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Table 6.1-1: Sullivan County Mitigation Goals and Objectives Review Worksheet		Comments
GOAL 1	<i>Increase planning and emergency response efforts</i>	<p>Review:</p> <p>All of the goals and objectives were extracted from a narrative section of the current HMP. The local planning team agreed to carry forward Objective 1.1, 1.2 and 1.3. Objective 1.3 was changed slightly by removing the word “care” from the title. New objective 1.4 was added to goal 1.</p>
Objective 1.1	Enhance public warning capabilities	
Objective 1.2	Coordinate emergency response planning for evacuations	
Objective 1.3	Protect critical care facilities	
New Objective 1.4	Review all comprehensive plans to ensure incorporation of hazard mitigation planning goals, objectives and actions	
GOAL 2	<i>Increase natural resource and open space protection from hazards</i>	<p>Review:</p> <p>All of the goals and objectives were extracted from a narrative section of the current HMP. The LPT reviewed the goal and all associated objectives. The LPT requested to remove objective 2.1 since this objective has been completed. New objective 2.4 was added to the list based on discussions. Objectives will be renumbered based on the removal of 2.1.</p>
Objective 2.1	Develop a natural resource protection plan.	
Objective 2.2	Inventory and map natural resources throughout the county	
Objective 2.3	Increase working relationships with county and state agencies that are dedicated to the preservation and restoration of natural areas and their natural functions	
New Objective 2.4	Develop, implement and enforce stormwater management plans	
GOAL 3	<i>Increase public awareness of existing hazards and conduct public outreach</i>	<p>Review:</p> <p>All of the goals and objectives were extracted from a narrative section of the current HMP. The LPT reviewed the goal and all associated objectives. No changes were recommended to objectives 3.1, 3.2, and 3.3 by the LPT. New objective 3.4 was added to goal 3.</p>
Objective 3.1	Utilize websites and other multimedia resources to disseminate public information in reference to hazard mitigation	
Objective 3.2	Develop public displays with brochures at key locations throughout the county	
Objective 3.3	Utilize newspapers and radio stations to conduct public service announcements	
New Objective 3.4	Publicize the hazard mitigation plan and encourage participation	

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Table 6.1-1: Sullivan County Mitigation Goals and Objectives Review Worksheet		Comments
GOAL 4	<i>Protect lives and properties from identified risk hazards</i>	<p>Review: All of the goals and objectives were extracted from a narrative section of the current HMP. The LPT reviewed the goal and all associated objectives. The LPT requested to remove the word “enforce” and replace it with “existing” for objective 4.1. 4.3 will be changed to state “Utilize the FEMA buyout program to remove flood prone and repetitive loss properties from the floodplain”.</p>
Objective 4.1	Update and enforce zoning regulations for all hazards	
Objective 4.2	Enforce uniformed construction codes at the municipal level	
Objective 4.3	Acquire, demolish and elevate flood prone properties and repetitive loss properties to remove and mitigate risks to homeowners and property	
NEW GOAL 5	<i>Reduce current and future risk from flooding and flash flooding</i>	<p>Review: Since flooding is a high priority hazard that was identified during the risk assessment portion of the plan, the LPT decided to add this new goal and all associated objectives to support the mitigation efforts towards flooding.</p>
New Objective 5.1	Encourage municipal participation in the National Flood Insurance Program	
New Objective 5.2	Adopt new flood insurance rate maps as they become available	
New Objective 5.3	Develop and implement flood plain management ordinances in accordance with the National Flood Insurance Program	
New Objective 5.4	Conduct outreach to homeowners and business owners to encourage participation in the National Flood Insurance Program	

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Actions provide more detailed descriptions of specific work tasks to help the county and its municipalities achieve prescribed goals and objectives. There were twenty three (23) actions identified in the 2008 Mitigation Strategy; three (3) of these actions have been entirely completed or discontinued while another twenty (20) are continual actions that reduce risk, vulnerability, and losses. A list of these actions as well as a review and summary of their progress based on comments from the Sullivan County Local Planning Team is included in Table 6.1-2. Actions were evaluated by the Local Planning Team with the intent of carrying over any actions that were incomplete but still viable for the next five years.

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Table 6.1-2: 2008 Sullivan County Mitigation Actions Review						
Existing Mitigation Actions	Status					Review Comments
	No Progress / Unknown	In Progress / Not Yet Complete	Continuous	Completed	Discontinued	
1. Promote natural functioning of flood plains			X			The Local Planning Team (LPT) reviewed this action and stated that it should remain. Objective 2.3
2. Implement multi-objective watershed management approach			X			The LPT would like to change the word "implement" to "support". This supports Objective 2.3
3. Promote safe sustainable community initiatives			X			No changes were made to this action. This action supports objective 3.1
4. Educate the public about "what to do" in emergencies			X			No changes were made to this action. This action supports objectives 3.1, 3.2 and 3.3
5. Encourage NOAA alert radio use by homeowners			X			No changes were made to this action. This action supports objective 1.1
6. Adopt a community disaster plan that is sustainable			X			No changes were made to this action. This action supports objective 1.4
7. Incorporate hazard mitigation objectives into comprehensive plans			X			The action was enhanced and now reads "Incorporate hazard mitigation objectives into applicable plans that support the hazard mitigation planning process". This supports objective 1.4
8. Develop and implement a storm water management plan	X					No changes were made to this action. This action supports objective 2.1
9. Regularly clean and maintain drainage culverts					X	The LPT feels that this action should be considered a municipal opportunity. The LPT will work with the municipalities to complete mitigation opportunities as needed to suffice this strategy.

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Table 6.1-2: 2008 Sullivan County Mitigation Actions Review						
Existing Mitigation Actions	Status					Review Comments
	No Progress / Unknown	In Progress / Not Yet Complete	Continuous	Completed	Discontinued	
10. Improve floodplain management practices		X				This action supports objective 5.3. New DFIRMs and ordinances are being developed and approved. The LPT updated this action to read "Encourage increased floodplain management principles and practices."
11. Implement planned acquisitions, relocations via mitigation grant opportunities			X			The LPT updated this action to read "Encourage planned acquisitions, relocations via mitigation grant opportunities." This action supports objective 4.3.
12. Protect or remove repetitive loss properties			X			The LPT updated this action to read "Support and assist municipal governments with the protection or removal of RL properties. This action supports objective 4.3
13. Assist in relocation of historically significant structures					X	The LPT requested that this action be removed. They stated that there is not historical structures that require relocation.
14. Seek funding to retrofit flood prone homes and businesses					X	The LPT requested that this action be removed. As these locations are identified, mitigation opportunity forms will be completed by municipalities and submitted. Attempts to buyout all repetitive flooded properties will be completed as it is felt that this is the best option for these sites.

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Table 6.1-2: 2008 Sullivan County Mitigation Actions Review						
<i>Existing Mitigation Actions</i>	<i>Status</i>					<i>Review Comments</i>
	<i>No Progress / Unknown</i>	<i>In Progress / Not Yet Complete</i>	<i>Continuous</i>	<i>Completed</i>	<i>Discontinued</i>	
15. Improve severe weather warnings to residents/business owners			X			No changes were made to this action. This supports objective 1.1
16. Improve emergency response procedures			X			No changes were made to this action. This supports objective 1.2
17. Coordinate evacuation plans with major employers			X			No changes were made to this action. This supports objective 1.2
18. Provide emergency alert radios to critical facilities			X			No changes were made to this action. This supports objective 1.3
19. Seek funds to protect public sewer, water and critical facilities			X			Remove "Seek funds" and add "Support efforts". No changes were made to this action. This supports objective 1.3
20. Enhance construction codes in the floodplain			X			No changes were made to this action. This supports objective 4.2
21. Incorporate hazard mitigation needs into capital investment plans			X			No changes were made to this action. This supports objective 1.3
22. Make vulnerable critical facilities disaster resistant			X			No changes were made to this action. This supports objective 1.3
23. Identify developing areas and collect data on land development trends			X			No changes were made to this action. This supports objective 2.2

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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 five (5) goals and eighteen (18) corresponding objectives was developed. Table 6.2-1 details the mitigation goals and objectives established for the 2014 HMP update.

Table 6.2-1: Sullivan County 2014 Goals and Objectives	
GOAL 1	<i>Increase planning and emergency response efforts</i>
Objective 1.1	Enhance public warning capabilities
Objective 1.2	Coordinate emergency response planning for evacuations
Objective 1.3	Protect critical facilities
Objective 1.4	Review all comprehensive plans to ensure incorporation of hazard mitigation planning goals, objectives and actions
GOAL 2	<i>Increase natural resource and open space protection from hazards</i>
Objective 2.1	Inventory and map natural resources throughout the county
Objective 2.2	Increase working relationships with county and state agencies that are dedicated to the preservation and restoration of natural areas and their natural functions
Objective 2.3	Develop, implement and enforce stormwater management plans
GOAL 3	<i>Increase public awareness of existing hazards and conduct public outreach</i>
Objective 3.1	Utilize websites and other multimedia resources to disseminate public information in reference to hazard mitigation
Objective 3.2	Develop public displays with brochures at key locations throughout the county
Objective 3.3	Utilize newspapers and radio stations to conduct public service announcements
Objective 3.4	Publicize the hazard mitigation plan and encourage participation
GOAL 4	<i>Protect lives and properties from identified risk hazards</i>
Objective 4.1	Update existing and develop new zoning regulations for all hazards
Objective 4.2	Enforce uniformed construction codes at the municipal level
Objective 4.3	Utilize the FEMA buyout program to remove flood prone and repetitive loss properties from the floodplain

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Table 6.2-1: Sullivan County 2014 Goals and Objectives	
GOAL 5	<i>Reduce current and future risk from flooding and flash flooding</i>
Objective 5.1	Encourage municipal participation in the National Flood Insurance Program
Objective 5.2	Adopt new flood insurance rate maps as they become available
Objective 5.3	Develop and implement flood plain management ordinances in accordance with the National Flood Insurance Program
Objective 5.4	Conduct outreach to homeowners and business owners to encourage participation in the National Flood Insurance Program

6.3. Identification and Analysis of Mitigation Techniques

The Pennsylvania Emergency Management Agency standard operating guide for hazard mitigation provides a comprehensive list of hazard mitigation ideas. Sullivan County used this guide to identify mitigation techniques and develop mitigation actions. There are six categories of mitigation actions which Sullivan County considered in developing its Mitigation Action Plan. A designation of how each category will protect or reduce the impact of specific hazards on new and existing buildings is included in each section. Those six categories of mitigation actions are:

- Prevention:** Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built and public activities to reduce hazard losses. Examples include planning, zoning, building codes, subdivision regulations, hazard-specific regulations (such as floodplain regulations), capital improvement programs, open-space preservation, and stormwater regulations.

The prevention 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.

- Property Protection:** Actions that involve modifying or removing existing buildings or infrastructure to protect them from a hazard. Examples include structure acquisition, elevation, relocation; retrofitting; flood-proofing; and shatter-resistant glass use. While this category predominantly includes techniques that constitute a “sticks and bricks” approach to property protection, it also includes insurance.

The property protection technique will protect and reduce the impact of specific hazards on new and existing buildings through the alteration of existing structures with construction enhancements that will decrease or eliminate the effect of identified risk hazards. The implementation of increased hazard mitigation construction standards will decrease or eliminate the effects of identified hazards to new construction.

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- **Public Education and Awareness:** Actions to educate citizens, elected officials, and property owners about potential risks from hazards and potential ways to mitigate them. Examples include performing hazard mapping, implementing outreach projects, disseminating library materials, providing real estate disclosures, establishing hazard information centers, and developing educational programs for school-age children or for adults.

The public 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.

- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems. Examples include sediment and erosion control, stream corridor restoration, forest and vegetation management, wetlands restoration or preservation, slope stabilization, and historic property and archeological site preservation.
- **Structural Project Implementation:** Mitigation projects intended to lessen the impact of a hazard by using structures to modify the environment. Structures include stormwater controls (culverts); dams, dikes and levees; and safe rooms.

Structural project implementation is a technique that removes or diverts the hazard from structures. The new or renovated structures are therefore protected or have a reduced impact of hazards.

Emergency Services: Actions that typically are not considered mitigation techniques but reduce the impacts of a hazard event on people and property. These actions are often taken prior to, during, or in response to an emergency or disaster. Examples include warning systems, evacuation planning and management, emergency response training and exercises, and emergency flood protection procedures.

Table 6.3-1 provides a matrix identifying the mitigation techniques used for the moderate and high risk hazards in the county. The specific actions associated with these techniques are included in Table 6.4-1.

Table 6.3-1 Sullivan County Mitigation Strategy Technique Matrix						
HAZARD	MITIGATION TECHNIQUE					
	<i>Prevention</i>	<i>Property Protection</i>	<i>Public Education / Awareness</i>	<i>Natural Resource Protection</i>	<i>Structural Projects</i>	<i>Emergency Services</i>
Hurricane and Tropical Storms	X	X	X			X

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Table 6.3-1 Sullivan County Mitigation Strategy Technique Matrix

HAZARD	MITIGATION TECHNIQUE					
	<i>Prevention</i>	<i>Property Protection</i>	<i>Public Education / Awareness</i>	<i>Natural Resource Protection</i>	<i>Structural Projects</i>	<i>Emergency Services</i>
Utility Interruption	X	X	X			X
Disorientation	X		X			X
Flood or Flash Flood	X	X	X	X	X	X
Radon Exposure	X	X	X			
Winter Storm	X	X	X			X
Transportation Accident			X	X		X
Environmental Hazard	X		X	X		X
Tornadoes and Wind Storms	X		X			X
Dam Failure	X	X	X			X
Drought	X		X			X
Invasive Species	X		X	X		

6.4. Mitigation Action Plan

The Sullivan County Hazard Mitigation Local Planning Team (LPT) immediately began work on the mitigation strategy section of the 2014 HMP update after the risk assessment section was completed. The LPT started this section by reviewing the 2008 HMP mitigation strategy section. A review of the previous goals, objectives, actions and project opportunities documented in the 2008 HMP was conducted. The next step the LPT completed was brainstorming of possible new actions based on new identified risks. The LPT compiled all this information for a presentation to the municipalities.

The LPT identified the following accomplishments of the previous mitigation strategy. Those accomplishments are identified in the following bullet items:

- The Sullivan County Department of Public Safety has implemented a public outreach program within the last year that includes hazard mitigation brochures and

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documentation. This information was extremely beneficial prior to and after the major flooding of 2011.

- Some critical facilities throughout Sullivan County have been provided emergency alert weather radios. These radios enhance the notification of emergency conditions or weather related issues for these facilities. Public outreach has also been implemented and completed with the issuance of radios.
- Sullivan County municipalities have completed the review and comment period of the new digital flood insurance rate maps. The municipalities are currently developing new ordinances and floodplain regulations that meet or exceed the federal and state minimums.
- Sullivan County was able to participate in the FEMA buyout program after the major flooding in the fall of 2011. This participation removed some high hazard repetitive flood properties to be removed from the hazard areas throughout the county.

During the period of September 11, 2013 through September 12, 2013, MCM Consulting Group, Inc. along with the LPT completed municipality meetings at key locations throughout the county at different time periods for each day. 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. The municipalities were notified of previous actions from the 2008 HMP and of 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. A table outlining the review of the 2008 mitigation opportunities and the progress that municipalities have made on these opportunities is located in **Appendix I**. 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 Sullivan County Multi-Jurisdictional HMP are listed in two matrices: non-structural mitigation measures and structural mitigation measures. Each matrix lists, among other information, the project objective and the affected municipality. Table 6.4-1 is the 2014 Sullivan County Mitigation Action Plan. Table 6.4-2 is a matrix that identifies the county and/or municipalities responsible for which mitigation actions in the new mitigation action plan.

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Table 6.4-1: Sullivan County 2014 Mitigation Action Plan

Action Number	Mitigation Actions		Hazard Vulnerability	Benefit/Cost Prioritization			Implementation			Estimated Cost
	Category	Description/Action Items		High	Medium	Low	Schedule	Funding	Responsibility	
1.1.1	Prevention	Encourage NOAA alert radio use by homeowners	All Hazards		X		2014-2018	Local	County EMA	\$500
1.1.2	Prevention	Improve severe weather warnings to residents/business owners with an emergency notification system	Flooding, Tornado and Winter Storms		X		2014-2018	PDM, FMA, HMGP	County EMA	\$25,000 - \$50,000
1.1.3	Prevention	Identify special needs groups and individuals for planning and emergency response	All Hazards	X			2014-2015	Local	County EMA, Area Agency on Aging, and Human Services	\$1000
1.2.1	Emergency Services	Improve emergency response procedures	All Hazards	X			2014-2018	Local	County EMA	\$500
1.2.2	Prevention	Coordinate evacuation plans with major employers	All Hazards	X			2014-2018	Local	County EMA	\$500
1.2.3	Prevention	Review high risk dam emergency plans annually	Dam Failure	X			2014-2018	Local	County/Local EMA and Dam Owners	Under \$500
1.2.4	Prevention	Conduct a commodity flow study to determine hazardous materials that are transported through Sullivan County	Environmental and Transportation Accidents	X			2014	HMEP	County EMA	\$10,000
1.3.1	Prevention	Provide emergency alert radios to critical facilities	All Hazards		X		Upon Receipt of Grant	PDM, FMA, HMGP	County EMA	\$5000 - \$6000

Sullivan County 2014 Hazard Mitigation Plan

Table 6.4-1: Sullivan County 2014 Mitigation Action Plan

Action Number	Mitigation Actions		Hazard Vulnerability	Benefit/Cost Prioritization			Implementation			Estimated Cost
	Category	Description/Action Items		High	Medium	Low	Schedule	Funding	Responsibility	
1.3.2	Property Protection	Support efforts to protect sewer, water, and critical facilities	Utility Interruptions	X			2014-2018	Local	County EMA	Unknown
1.3.3	Prevention	Incorporate hazard mitigation needs into capital investment plans	All Hazards		X		2014-2018	Local and PDM	County EMA	Under \$500
1.3.4	Property Protection	Make vulnerable critical facilities disaster resistant	All Hazards	X			2014-2018	PDM, FMA, HMGP	County/Local EMA and Facility Owners	Unknown
1.3.5	Prevention	Conduct outreach to educate the public to report suspicious activities around gas well sites and transmission gas lines.	Environmental Hazards and Utility Interruptions	X			2014-2018	Local	County EMA and State Police	Under \$500
1.4.1	Prevention	Adopt a community disaster plan that is sustainable	All Hazards	X			2014-2018	Local	County EMA and County Planning Department	\$5000
1.4.2	Prevention	Incorporate hazard mitigation objectives into applicable plans that support the hazard mitigation planning process	All Hazards	X			2014-2018	PDM	County EMA and County Planning Department	\$10,000
2.1.1	Natural Resource Protection	Identify and map natural resources that will decrease the impact of hazards	All Hazards	X			2014-2018	Local	County EMA and County Planning Department	\$500
2.2.1	Natural Resource Protection	Identify developing areas and collect data on land development trends	All Hazards	X			2014-2018	Local	County Planning Department	\$500
2.3.1	Natural Resource Protection	Promote natural functioning of floodplains	Flooding and Hurricane/Tropical	X			2014-2018	Local	County EMA and Conservation District	\$500

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Table 6.4-1: Sullivan County 2014 Mitigation Action Plan										
Action Number	Mitigation Actions		Hazard Vulnerability	Benefit/Cost Prioritization			Implementation			Estimated Cost
	Category	Description/Action Items		High	Medium	Low	Schedule	Funding	Responsibility	
2.3.2	Natural Resource Protection	Support multi-objective watershed management approach	Flooding and Hurricane/Tropical	X			2014-2018	Local	Local EMA	Under \$500
2.3.3	Natural Resource Protection	Develop and implement a storm water management plan	Flooding and Hurricane/Tropical	X			2014-2018	PDM, FMA, HMGP	County Planning Department	Unknown
3.1.1	Public Awareness	Promote safe sustainable community initiatives	All Hazards		X		2014-2018	Local	County EMA	Under \$500
3.1.2	Public Awareness	Educate the public about “what to do” in emergencies	All Hazards		X		2014-2018	Local	County EMA	Under \$500
3.2.1	Public Awareness	Develop a brochure to educate the public about the dangers of radon and the impacts in Sullivan County.	Radon		X		2014-2018	PDM or HMGP	County EMA	\$500-\$1,000
3.2.2	Public Awareness	Ensure maps are available at key tourist and recreational areas for public access to decrease disorientation.	Disorientation	X			2014-2018	Local	County EMA and County Planning Department	\$500-\$1,000
3.3.1	Public Awareness	Develop public service announcements to utilize prior to storms during the winter season	Winter Storms	X			2014-2018	Local	County EMA	Under \$500
3.4.1	Public Awareness	Place the county hazard mitigation plan on the county website and provide outreach identifying how to access the plan	All Hazards		X		2014-2018	Local	County EMA and County Planning Department	\$500-\$1,000
4.1.1	Prevention	Ensure the zoning ordinance encourages higher densities outside of known hazard areas.	All Hazards	X			2014-2018	Local	Dushore Borough, Laporte Borough and Eagles Mere Borough	Unknown

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Table 6.4-1: Sullivan County 2014 Mitigation Action Plan											
Action Number	Mitigation Actions			Hazard Vulnerability	Benefit/Cost Prioritization			Implementation			Estimated Cost
	Category	Description/Action Items			High	Medium	Low	Schedule	Funding	Responsibility	
4.2.1	Prevention	Enhance construction codes in the floodplain	Flooding and Hurricane/Tropical	X			2014-2018	PDM, FMA, HMGP	Municipal Governments	Unknown	
4.3.1	Prevention	Encourage planned acquisitions, relocations via mitigation grant opportunities	Flooding	X			2014-2018	FMA, HMGP	Municipal Governments	Varies	
4.3.2	Prevention	Support and assist municipal governments with the protection or removal of repetitive loss properties	Flooding	X			2014-2018	FMA, HMGP	County EMA and Municipal Governments	Varies	
5.1.1	Prevention	Encourage municipalities to participate in the national flood insurance program.	Flooding	X			2014-2018	Local	County EMA	Under \$500	
5.2.1	Prevention	Conduct outreach to municipalities upon the issuance of updated digital flood insurance rate maps to encourage review, comment and adoption of maps	Flooding	X			2014-2018	PDM, FMA, HMGP	County EMA	\$500-\$1,000	
5.3.1	Prevention	Encourage increased floodplain management principles and practices	Flooding	X			2014-2018	Local	County EMA	Under \$500	
5.4.1	Public Awareness	Establish and publicize a user friendly public accessible repository of flood insurance rate maps.	Flooding	X			2014-2018	PDM, HMGP	County EMA and County Planning Department	\$5000	
5.4.2	Public Awareness	Conduct National Flood Insurance Program community workshops to provide information and incentives for property owners to acquire flood insurance.	Flooding	X			2014-2018	PDM, HMGP	County EMA and County Planning Department	\$5000	

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Table 6.4-2: Hazard Mitigation Actions – Municipal Checklist

Municipality	Mitigation Actions																				
	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.2.4	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	1.4.1	1.4.2	2.1.1	2.2.1	2.3.1	2.3.2	2.3.3	3.1.1	
Sullivan County	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cherry Township	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Colley Township	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Davidson Township	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Dushore Borough	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Eagles Mere Borough	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Elkland Township	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Forks Township	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Forksville Borough	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Fox Township	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Hillsgrove Township	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Laporte Borough	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Laporte Township	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X
Shrewsbury Township	X	X	X	X	X				X	X	X	X	X	X	X		X		X	X	X

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Table 6.4-2: Hazard Mitigation Actions – Municipal Checklist																		
Municipality	Mitigation Actions																	
	3.1.2	3.2.1	3.2.2	3.3.1	3.4.1	4.1.1	4.2.1	4.3.1	4.3.2	5.1.1	5.2.1	5.3.1	5.4.1	5.4.2				
Sullivan County	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Cherry Township	X	X				X	X	X	X			X		X				
Colley Township	X	X				X	X	X	X			X		X				
Davidson Township	X	X				X	X	X	X			X		X				
Dushore Borough	X	X				X	X	X	X			X		X				
Eagles Mere Borough	X	X				X	X	X	X			X		X				
Elkland Township	X	X				X	X	X	X			X		X				
Forks Township	X	X				X	X	X	X			X		X				
Forksville Borough	X	X				X	X	X	X			X		X				
Fox Township	X	X				X	X	X	X			X		X				
Hillsgrove Township	X	X				X	X	X	X			X		X				
Laporte Borough	X	X				X	X	X	X			X		X				
Laporte Township	X	X				X	X	X	X			X		X				
Shrewsbury Township	X	X				X	X	X	X			X		X				

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National Flood Insurance Program Related Mitigation Actions

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. Mitigation action numbers 5.1.1; 5.2.1; 5.4.1 and 5.4.2 comply for Sullivan County and all the Sullivan County municipalities.

Evaluate and Prioritize Mitigation Actions

Mitigation actions were then evaluated using the seven criteria which frame the *PASTEEL* method. These feasibility criteria include:

- **Political:** Does the action have public and political support?
- **Administrative:** Is there adequate staffing and funding available to implement the action in a timely manner?
- **Social:** Will the action be acceptable by the community or will it cause any one segment of the population to be treated unfairly?
- **Technical:** How effective will the action be in avoiding or reducing future losses?
- **Economic:** What are the costs and benefits of the action and does it contribute to community economic goals?
- **Environmental:** Will the action provide environmental benefits and will it comply with local, state and federal environmental regulations?
- **Legal:** Does the community have the authority to implement the proposed measure?

The *PASTEEL* method use political, administrative, social, technical, economic, environmental and legal considerations as a basis means of evaluating which of the identified actions should be considered most critical. Economic considerations are particularly important in weighing the costs versus benefits of implementing one action prior to another.

FEMA mitigation planning requirements indicate that any prioritization system used shall include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects. To do this in an efficient manner that is consistent with FEMA's guidance on using cost-benefit review in mitigation planning, the *PASTEEL* method was adapted to include a higher weighting for two elements of the *economic* feasibility factor – Benefits of Action and Costs of Action. This method incorporates concepts similar to those described in Method C of FEMA 386-5: Using Benefit Cost Review in Mitigation Planning (FEMA, 2007).

Those participating in the 2014 HMP update process provided comments which allowed for the prioritization of the mitigation actions listed in Table 6.4-1 using the seven *PASTEEL* criteria. In order to evaluate and prioritize the mitigation actions, *favorable* and *less favorable* factors were identified for each action. Table 6.4-2 summarizes the evaluation methodology and provides the results of this evaluation for all mitigation actions. The first results column includes a

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summary of the feasibility factors, placing equal weight on all factors. The second results column reflects feasibility scores with benefits and costs weighted more heavily; and therefore, given greater priority. A weighting factor of three was used for each benefit and cost element. Therefore, a “+” benefit factor rating equals three pluses and a “-“ benefit factor rating equals three minuses in the total prioritization score.

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Table 6.4-3: Sullivan County Mitigation Action PA STEEL Review Sheet

Mitigation Actions		PA STEEL CRITERIA CONSIDERATIONS																				Results			
		(+) Favorable (-) Less favorable (N) Not Applicable																							
		P Political			A Administrative			S Social		T Technical			E Economic			E Environmental					L Legal			SUMMARY (EQUAL WEIGHTING)	SUMMARY (BENEFITS & COSTS PRIORITIZED)
Political Supports	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action (x3)	Cost of Action (x3)	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge			
1.1.1	Encourage NOAA alert radio use by homeowners	+	+	+	+	+	N	+	+	+	+	+	+	+	N	N	N	N	N	N	N	N	N	13(+) 0(-) 10(N)	17(+) 0(-) 10(N)
1.1.2	Improve severe weather warnings to residents and business owners with an emergency notification system	+	+	+	+	-	N	+	+	+	+	+	+	+	+	N	N	N	N	N	N	N	N	13(+) 1(-) 9(N)	17(+) 1(-) 9(N)

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Table 6.4-3: Sullivan County Mitigation Action PA STEEL Review Sheet

Mitigation Actions		PA STEEL CRITERIA CONSIDERATIONS																				Results			
		(+) Favorable (-) Less favorable (N) Not Applicable																							
NO.	Name	P Political			A Administrative			S Social		T Technical			E Economic				E Environmental				L Legal			SUMMARY (EQUAL WEIGHTING)	SUMMARY (BENEFITS & COSTS PRIORITIZED)
		Political Supports	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action (x3)	Cost of Action (x3)	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority		
1.1.3	Identify special needs groups and individuals for planning and emergency response	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	N	+	+	-	17(+) 1(-) 5(N)	21(+) 1(-) 5(N)
1.2.1	Improve emergency response procedures	+	+	+	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	19(+) 4(-) 0(N)	21(+) 6(-) 0(N)
1.2.2	Coordinate evacuation plans with major employers	+	+	+	+	+	N	+	+	+	+	+	+	+	-	N	N	N	N	+	+	+	+	17(+) 1(-) 5(N)	21(+) 1(-) 5(N)
1.2.3	Review high risk dam emergency plans annually	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	22(+) 1(-) 0(N)	26(+) 1(-) 0(N)

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Table 6.4-3: Sullivan County Mitigation Action PA STEEL Review Sheet

Mitigation Actions		PA STEEL CRITERIA CONSIDERATIONS																				Results				
		(+) Favorable (-) Less favorable (N) Not Applicable																								
		P Political			A Administrative			S Social		T Technical			E Economic			E Environmental				L Legal						
NO.	Name	Political Supports	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action (x3)	Cost of Action (x3)	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	SUMMARY (EQUAL WEIGHTING)	SUMMARY (BENEFITS & COSTS PRIORITIZED)
1.2.4	Conduct a commodity flow study to determine hazardous materials that are transported through Sullivan County	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22(+) 1(-) 0(N)	26(+) 1(-) 0(N)
1.3.1	Provide emergency alert radios to critical facilities	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	N	N	N	N	N	N	N	+	14(+) 2(-) 7(N)	18(+) 2(-) 7(N)

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Table 6.4-3: Sullivan County Mitigation Action PA STEEL Review Sheet

Mitigation Actions		PA STEEL CRITERIA CONSIDERATIONS																				Results			
		(+) Favorable (-) Less favorable (N) Not Applicable																							
NO.	Name	P Political			A Administrative			S Social		T Technical			E Economic				E Environmental				L Legal			SUMMARY (EQUAL WEIGHTING)	SUMMARY (BENEFITS & COSTS PRIORITIZED)
		Political Supports	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action (x3)	Cost of Action (x3)	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority		
1.3.2	Support efforts to protect sewer, water, and critical facilities	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	22(+) 0(-) 1(N)	26(+) 0(-) 1(N)
1.3.3	Incorporate hazard mitigation needs into capital investment plans	-	-	-	N	-	+	-	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	16(+) 6(-) 1(N)	18(+) 8(-) 1(N)
1.3.4	Make vulnerable critical facilities disaster resistant	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22(+) 1(-) 0(N)	26(+) 1(-) 0(N)

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Table 6.4-3: Sullivan County Mitigation Action PA STEEL Review Sheet

Mitigation Actions		PA STEEL CRITERIA CONSIDERATIONS																			Results					
		(+) Favorable (-) Less favorable (N) Not Applicable																								
NO.	Name	P Political			A Administrative			S Social		T Technical			E Economic			E Environmental				L Legal			SUMMARY (EQUAL WEIGHTING)	SUMMARY (BENEFITS & COSTS PRIORITIZED)		
		Political Supports	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action (x3)	Cost of Action (x3)	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority			Existing Local Authority	Potential Legal Challenge
1.3.5	Conduct outreach to educate the public to report suspicious activities around gas well sites and transmission gas lines.	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	N	21(+) 1(-) 1(N)	25(+) 1(-) 1(N)
1.4.1	Adopt a community disaster plan that is sustainable	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	21(+) 1(-) 1(N)	25(+) 1(-) 1(N)

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Table 6.4-3: Sullivan County Mitigation Action PA STEEL Review Sheet

Mitigation Actions		PA STEEL CRITERIA CONSIDERATIONS																				Results				
		(+) Favorable (-) Less favorable (N) Not Applicable																								
NO.	Name	P Political			A Administrative			S Social		T Technical			E Economic				E Environmental				L Legal			SUMMARY (EQUAL WEIGHTING)	SUMMARY (BENEFITS & COSTS PRIORITIZED)	
		Political Supports	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action (x3)	Cost of Action (x3)	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority			Potential Legal Challenge
2.2.1	Identify developing areas and collect data on land development trends	+	+	+	+	+	+	+	N	+	+	+	+	+	+	-	+	+	+	+	N	N	+	N	18(+) 1(-) 4(N)	22(+) 1(-) 4(N)
2.3.1	Promote natural functioning of floodplains	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23(+) 0(-) 0(N)	27(+) 0(-) 0(N)	
2.3.2	Support multi-objective watershed management approach	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23(+) 0(-) 0(N)	27(+) 0(-) 0(N)	

Sullivan County 2014 Hazard Mitigation Plan

Table 6.4-3: Sullivan County Mitigation Action PA STEEL Review Sheet

Mitigation Actions		PA STEEL CRITERIA CONSIDERATIONS																				Results			
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2.3.3	Develop and implement a storm water management plan	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	16(+) 7(-) 0(N)	20(+) 7(-) 0(N)
3.1.1	Promote safe sustainable community initiatives	+	+	+	+	+	+	+	+	+	+	+	+	+	-	N	N	N	N	N	N	+	N	15(+) 1(-) 7(N)	19(+) 1(-) 7(N)
3.1.2	Educate the public about "what to do" in emergencies	+	+	+	+	+	+	+	+	+	+	+	+	+	-	N	N	N	N	N	N	+	N	15(+) 1(-) 7(N)	19(+) 1(-) 7(N)

Sullivan County 2014 Hazard Mitigation Plan

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Political Supports	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action (x3)	Cost of Action (x3)	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge			
3.2.1	Develop a brochure to educate the public about the dangers of radon and the impacts in Sullivan County.	+	+	+	+	+	+	+	+	+	+	+	+	+	-	N	N	N	N	N	N	+	N	15(+) 1(-) 7(N)	19(+) 1(-) 7(N)
3.2.2	Ensure maps are available at key tourist and recreational areas for public access to decrease disorientation.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	N	+	+	N	17(+) 0(-) 6(N)	21(+) 0(-) 6(N)

Sullivan County 2014 Hazard Mitigation Plan

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3.3.1	Develop public service announcements to utilize prior to storms during the winter season	+	+	+	+	+	+	+	+	+	+	+	+	+	-	N	N	N	N	N	+	+	N	16(+) 1(-) 6(N)	20(+) 1(-) 6(N)
3.4.1	Place the County hazard mitigation plan on the County and other various websites and provide outreach identifying how to access the plan	+	+	+	+	+	+	+	+	+	+	+	+	+	-	N	N	N	N	N	N	+	N	15(+) 1(-) 7(N)	19(+) 1(-) 7(N)

Sullivan County 2014 Hazard Mitigation Plan

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4.1.1	Promote the zoning ordinance to encourage higher densities outside of known hazard areas.	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	22(+) 1(-) 0(N)	26(+) 1(-) 0(N)
4.2.1	Enhance construction codes in the floodplain	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	22(+) 1(-) 0(N)	26(+) 1(-) 0(N)
4.3.1	Encourage planned acquisitions, relocations via mitigation grant opportunities	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22(+) 1(-) 0(N)	26(+) 1(-) 0(N)

Sullivan County 2014 Hazard Mitigation Plan

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Political Supports	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action (x3)	Cost of Action (x3)	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge			
4.3.2	Support and assist municipal governments with the protection or removal of repetitive loss properties	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	22(+) 1(-) 0(N)	26(+) 1(-) 0(N)
5.1.1	Encourage municipalities to participate in the nation flood insurance program.	+	+	+	+	N	+	+	+	+	+	+	+	+	-	N	N	N	+	+	+	+	+	18(+) 1(-) 4(N)	22(+) 1(-) 4(N)

Sullivan County 2014 Hazard Mitigation Plan

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5.2.1	Conduct outreach to municipalities upon the issuance of updated digital flood insurance rate maps to encourage review, comment and adoption of maps	+	+	+	+	+	+	+	+	+	+	+	+	+	-	N	N	N	N	+	N	+	N	16(+) 1(-) 6(N)	20(+) 1(-) 6(N)
5.3.1	Encourage increased floodplain management principles and practices	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	N	22(+) 1(-) 0(N)	26(+) 1(-) 0(N)

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5.4.1	Establish and publicize a user friendly public accessible repository of flood insurance rate maps.	+	+	+	+	+	+	+	+	+	+	+	+	+	-	N	N	N	N	N	N	+	+	16(+) 1(-) 6(N)	20(+) 1(-) 6(N)
5.4.2	Conduct National Flood Insurance Program community workshops to provide information and incentives for property owners to acquire flood insurance.	+	+	+	+	-	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	18(+) 1(-) 4(N)	22(+) 1(-) 4(N)

Sullivan County 2014 Hazard Mitigation Plan

7. Plan Maintenance

7.1. Update Process Summary

Monitoring, evaluating and updating this plan, is critical to maintaining its value and success in Sullivan 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 Sullivan County HMP Local Planning Team decided to alter the current maintenance procedures. The 2014 HMP update establishes a review of the plan within 30 days of a disaster event in addition to continuing with an annual plan evaluation. This HMP update plan maintenance also defines the municipalities' role in updating and evaluating the plan. Finally, the 2014 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 Sullivan County is a responsibility of all levels of government (i.e., county and local), as well as the citizens of the county. The Sullivan County HMP Planning Team will be responsible for maintaining this Multi-Jurisdictional HMP. The HMP 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 a disaster after a disaster declaration. 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 Sullivan County HMP 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 Sullivan County Emergency Management Agency will maintain a copy of these records.

Sullivan 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.

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7.3. Incorporation into Other Planning Mechanisms

Sullivan 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 10 years. The Sullivan County Commissioners adopted the updated Sullivan County Comprehensive Plan on January 2, 2012.

The Sullivan County Planning Department is responsible for maintaining and updating the County Comprehensive Plan and the County Subdivision and Land Development Ordinance. It uses this information to identify necessary revisions and to amend both the Comprehensive Plan and the Subdivision and Land Development Ordinance.

Technical assistance on community planning matters is provided to the County Board of Commissioners through the Sullivan County Planning Department. The Planning Department administers the County Comprehensive Plan, along with the County Subdivision and Land Development Ordinance. The Planning Department also performs technical reviews of municipal subdivision and land development plans, municipal floodplain ordinances, and other community planning and development matters.

The next scheduled complete update of the comprehensive plan will be in 2022, based on the Municipalities Planning Code's 10-year review cycle. Certain sections of the county comprehensive plan may be update prior to 2022. Coupling this requirement with the DMA 2000-required five-year update cycle for HMPs, when possible, will allow the county to better integrate the County Comprehensive Plan and Multi-Jurisdictional HMP planning processes and strengthen public participation for both efforts.

The risk assessment section 4.3.1 through 4.3.24, Section 4.4.4 and the mitigation strategy section 6 of the Sullivan County Hazard Mitigation Plan will provide valuable information for the update of the next comprehensive plan and any section specific updates prior to 2022. Consideration and incorporation of data from this plan will ensure the inclusion of hazard mitigation practices in this county comprehensive plan.

Sullivan 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). Sullivan 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.

Sullivan County 2014 Hazard Mitigation Plan

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

The complete risk assessment section, mitigation actions and mitigation project opportunities identified in the Sullivan County Hazard Mitigation Plan will assist with 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 should consider the County's Multi-Jurisdictional HMP during its biennial review of the County EOP. Recommended changes to the HMP will then be coordinated with the Hazard Mitigation Planning Subcommittee.

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, Sullivan County and its municipalities must ensure that the components of the Multi-Jurisdictional Plan are integrated into existing community planning mechanisms and are generally consistent with goals, policies, and recommended actions. Sullivan County and the Hazard Mitigation Planning Subcommittee will utilize the existing maintenance schedule of each plan to incorporate the goals, policies, and recommended actions as each plan is updated.

7.4. Continued Public Involvement

The Sullivan County Planning Department will ensure that this Multi-Jurisdictional HMP is posted and maintained on the Sullivan County website and will continue to encourage public review and comment on the plan. The Sullivan County website that the plan will be located at is as follows: <http://sullivancounty-pa.org/>

The citizens of Sullivan County are encouraged to submit their comments to elected officials and/or members of the Sullivan County HMP Local Planning Team. To promote public participation, the County Planning Department 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 Sullivan County Hazard Mitigation Planning Team.

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8. Plan Adoption

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

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9. Appendices