Lycoming County 2010 Hazard Mitigation Plan

Prepared for:
Lycoming County Planning and
Community Development
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Approved on:

Executive Summary

After suffering the effects of floods, winter storms, tornadoes, and other natural and man-made hazards, the citizens, business leaders, and officials of Lycoming County recognized the need to develop a long-term approach to reducing their vulnerability to hazards. Beginning as part of Project Impact in 1998, Lycoming County has actively engaged in a hazard mitigation planning process to accomplish several tasks:

- Develop a common understanding of hazards and their impact
- Identify technically feasible and cost-effective risk reduction measures that reinforce community priorities and support sustainable development
- Engage property owners and municipalities in a multi-jurisdictional approach toward watershed management
- Advance an action plan that approaches hazard mitigation in a balanced manner

This process culminated in the development of the first version of this Lycoming County Hazard Mitigation Plan (HMP), which was adopted by the County and all 52 municipalities, and was approved by the Pennsylvania Emergency Management Agency (PEMA) and Federal Emergency Management Agency (FEMA) in 2005. This document represents the work of citizens, elected and appointed government officials, business leaders, and volunteer and nonprofit groups to protect community assets, preserve the economic viability of the community, and save lives.

In 2009, PEMA contracted the services of Michael Baker, Jr., Inc. (Baker) and its subcontractors to revise and update 14 HMPs across the Commonwealth of Pennsylvania. This document was among those 14, and the task of leading the County's Steering Committee through the mitigation planning process was given to Baker's subcontractor, Delta Development Group, Inc. (Delta). The planning process consisted of the following steps:

- Identification and prioritization of the hazards that may affect the County and its municipalities
- Assessment of the County's and municipalities' vulnerability to these hazards
- Identification of the mitigation actions that can reduce that vulnerability
- Development of a strategy for implementing those actions, including identifying the agency(ies) responsible for that implementation

Throughout the planning process, the general public was given the opportunity to comment on the existing HMP and provide suggestions for the updated version. Two public meetings were conducted to give residents an opportunity to provide input on the HMP.

The following hazards were identified by the Steering Committee as presenting the highest risk to the County and its municipalities:

- Flood, flash flood, and ice jams
- Winter storms
- Tornadoes and windstorms
- Thunderstorms and hail
- Drought and water supply deficiencies
- Traffic accidents
- Power outages
- Terrorism
- Fixed nuclear facility incidents
- Natural gas drilling incidents

This HMP also includes hazard profiles for the following hazards:

- Earthquakes
- Subsidence and Sinkholes
- Wildfires

To mitigate against the effects of those hazards, the Steering Committee identified the following goals for hazard mitigation over the next five years:

- Prevent hazards from impacting the community
- Protect the people, property, and environment in hazard areas
- Maintain and enhance emergency services capabilities in the community
- Protect natural resources within the hazard areas
- Ensure that stakeholder groups have the necessary information to mitigate against hazard impacts
- Implement structural projects to reduce the impacts of hazards

The individual goals, objectives, and actions that will be implemented are shown in Section 6.4.

Certification of Annual Review Meetings

The Lycoming County Hazard Mitigation Steering Committee has reviewed this Hazard Mitigation Plan. See Section 7 of the Lycoming County Hazard Mitigation Plan for further details regarding this form. The Hazard Reduction Planner of the Lycoming County Planning and Community Development Department hereby certifies the review.

YEAR	DATE OF MEETING	PUBLIC OUTREACH ADDRESSED?*	SIGNATURE
2011			
2012			
2013			
2014			
2015			

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

Record of Changes

DATE	DESCRIPTION OF CHANGE MADE, MITIGATION ACTION COMPLETED, OR PUBLIC OUTREACH PERFORMED	CHANGE MADE BY (PRINT NAME)	CHANGE MADE BY (SIGNATURE)
11/24/10	Added additional information based on FEMA comments; added additional description of mitigation actions taken since 2004; added additional surveys	Tony Subbio (consultant)	

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

Table of Contents

1. Introduction

1.1. *Background*

Across the United States, natural and human-caused disasters have led to increasing levels of deaths, injuries, property damage, and interruption of business and government services. The time, money, and efforts to recover from these disasters exhaust resources, diverting attention from important public programs and private agendas. With 101 statewide or county-specific gubernatorial and presidential disaster declarations since 1954, the emergency management community, citizens, elected officials, and other stakeholders in Lycoming County, Pennsylvania, recognized the impact of disasters on their community and concluded that proactive efforts were needed to reduce the impact of natural and human-caused hazards.

Federal and state governments have utilized mitigation concepts to minimize environmental degradation and to reduce loss of life and property associated with natural hazards. However, mitigation was most often applied in a post-disaster environment. In an effort to increase public awareness and to reduce the costs associated with disaster preparedness, the Federal Emergency Management Agency (FEMA) developed a National Mitigation Strategy. The National Mitigation Strategy was an outgrowth of changing perceptions of hazards and their relationship to development. It represents a sustained effort to reduce hazard vulnerabilities through public outreach and partnership development, and was created with input from federal agencies, state and local governments, and the general public.

Hazard mitigation is a phrase that describes actions taken to prevent or reduce the long-term risks to life and property from hazards. Pre-disaster mitigation actions are taken in advance of a hazard event and are essential to breaking the typical disaster cycle of damage, reconstruction, and repeated damage. With careful selection, mitigation actions can be long-term, cost-effective means of reducing the risk of loss.

Accordingly, the Lycoming County Hazard Mitigation Steering Committee and watershed planning groups, composed of County officials, municipal representatives, emergency responders, and business leaders, has updated this Hazard Mitigation Plan (HMP). The update was sponsored by the Pennsylvania Emergency Management Agency (PEMA), which is using Emergency Management Performance Grant funds to update 14 county HMPs between July 2009 and May 2010. As part of this process, PEMA contracted with Michael Baker, Jr., Inc. (Baker), which in turn subcontracted the update of Lycoming County's HMP to Delta Development Group, Inc. (Delta).

The HMP update is the result of six months of work by the citizens and officials of the County and representatives from Baker and Delta to develop a pre-disaster multi-hazard mitigation plan that will not only guide the County toward greater disaster resistance, but will also respect the character and needs of the community.

1.2. *Purpose*

The purpose of this HMP is to minimize the effects that natural, technological, and human-made hazards have on the people, property, environment, and business operations within Lycoming County. This document exists to provide the background information and rationale for the mitigation actions that the Steering Committee and planning groups have chosen to implement.

The document is governed by the Disaster Mitigation Act of 2000 (DMA 2000) and it's implementing regulations (44 CFR §201.6, published February 26, 2002). Local jurisdictions must comply with the DMA 2000 and these regulations in order to remain eligible for funding and technical assistance from state and federal hazard mitigation programs. Local mitigation plans must include, at a minimum, (1) an action plan to mitigate hazards, risks, and vulnerabilities, and (2) a strategy to implement those actions.

1.3. *Scope*

The implementation actions within this HMP apply to Lycoming County and any municipalities that adopt this HMP as their own. However, only those municipalities that have participated in the plan update process will remain eligible for state and federal hazard mitigation funding through the HMP. For the purpose of this Plan update, municipal participation was defined as completion and submission of a Risk Assessment Update Worksheet and Capability Assessment Survey, and attendance by a municipal official at a planning or public meeting conducted as part of the planning process.

1.4. *Authority and References*

This section lists references used to prepare the Lycoming County HMP. Existing plans and studies were reviewed and integrated into the HMP. The County Comprehensive Plan, located on the Lycoming County Planning and Community Development Department's Web site, was incorporated into multiple aspects of this HMP. Information from the Comprehensive Plan and other documents was used to formulate the County profile, to identify the history of individual hazards, and to detail the population projections in Lycoming County.

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2. Community Profile

2.1. *Geography and Environment*

Situated in North-central Pennsylvania at the convergence of two geomorphologic provinces - the Allegheny Plateau and the Valley and Ridge province - Lycoming County boasts a scenic landscape characterized by steep slopes, deep river valleys, and abundant forestland. At 1,246 square miles, Lycoming is the largest of Pennsylvania's 67 counties, equivalent in size to the state of Rhode Island.

The County of Lycoming lies entirely within the Susquehanna River Basin, one of four major drainage basins in Pennsylvania. Over 2,200 miles of streams traverse the County, whose fertile valleys were settled long before land use controls and floodplain regulations were in place. The County's most populated watershed is the West Branch of the Susquehanna River, which flows throughout the County for a distance of 38 miles. Major tributaries of the West Branch include Pine Creek, Little Pine Creek, Larry's Creek, Lycoming Creek, Loyalsock Creek, Muncy Creek, Little Muncy Creek, White Deer Hole Creek, and Antes Creek. Several of these tributaries comprise watersheds that have been designated "exceptional and high quality" watersheds by the Pennsylvania Environmental Quality Board. The County's six major watersheds are described as follows:

Pine Creek Watershed – Historically an area of low population density, Pine Creek Watershed currently accounts for 1 percent of Lycoming County's total population. A majority of the watershed's land acreage is designated state forest, game lands, and wild or natural areas. Furthermore, the close proximity of several major transportation corridors to meandering creek beds has created a localized flood hazard. Several times a year, Pine Creek overtops its banks, forcing the closure of S.R. 414. Although private properties have rarely sustained water damage, flooding along S.R. 414 has impaired emergency service delivery on several occasions. The meandering nature of Little Pine Creek poses a threat to the village of English Center. A state-owned suspension bridge may be at risk if the creek continues to erode its banks during high-water events.

Larry's Creek Watershed – Larry's Creek Watershed drains an 89-square-mile area in western Lycoming County. The landscape is 84 percent forested and characterized by narrow valleys and steep wooded hillsides. Larry's Creek forms in Cogan House Township and flows southwesterly to its mouth on the West Branch Susquehanna River.

Lycoming Creek Watershed – Next to the West Branch Susquehanna, the Lycoming Creek Watershed is the most densely populated watershed in the County. While the City of Williamsport has lost population over the last 20 years, communities throughout the basin have witnessed new development. Sanitary sewer lines are being extended north along Lycoming Creek Road, and a new limited-access highway is under construction, both signs that the corridor is poised to be the next growth area in the County.

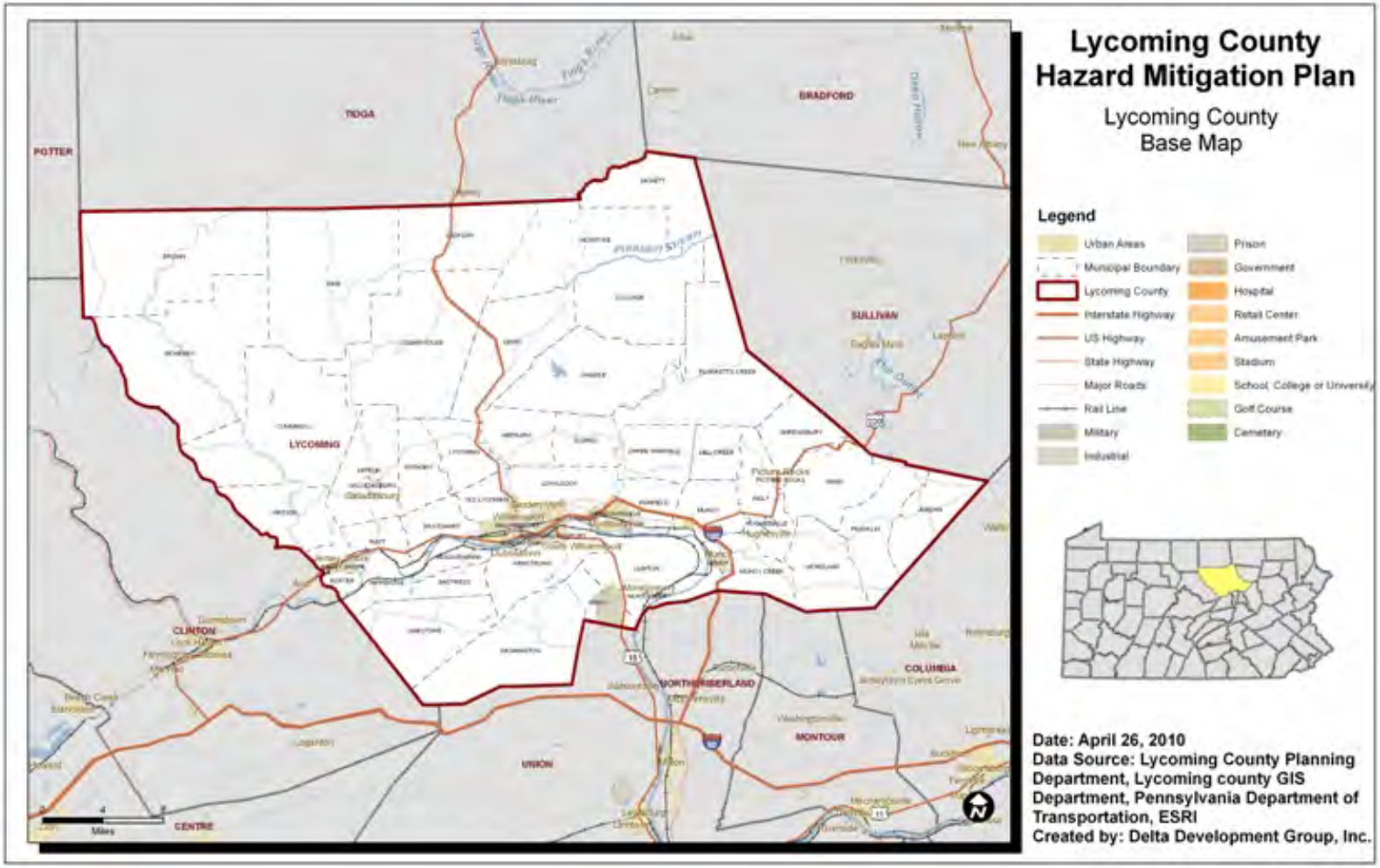
Loyalsock Creek Watershed – Five townships comprise the bulk of population in this watershed: Upper Fairfield Township, Eldred Township, Gamble Township, Plunkett's Creek Township, and Cascade Township. Loyalsock Creek begins in the western edge of Wyoming County and flows for 60 miles until it reaches its mouth at the West Branch Susquehanna River in Montoursville Borough. It drains a region 494 square miles in area.

Muncy Creek Watershed – Muncy Creek is 33 miles long and drains a 216-square-mile area that encompasses parts of Sullivan, Columbia, Montour, and Lycoming Counties. The upper reaches of the drainage basin are relatively rough, forested areas, while the lower reaches consist of rolling topography and broad agricultural lands.

West Branch Susquehanna Watershed – The most heavily populated areas of the County can be found along its southern extent, trailing the West Branch of the Susquehanna River. The West Branch Susquehanna is one of six major sub-basins of the Susquehanna River, the largest tributary of the Chesapeake Bay. Although not the most developed, it is the largest sub-basin, draining an area some 6,992 square miles in extent. The predominant land use in the western half of the basin is coal mining. Agriculture and urban land uses predominate in the eastern and southern areas. The sub-basin supports a population of nearly 400,000, with major population centers in State College, Lock Haven, and Williamsport.

A map of Lycoming County can be found on the following page.

Map 1: Lycoming County Base Map



2.2. Community Facts

Despite its rural location, the County is quite accessible from urban areas throughout the Susquehanna River Valley. As Map 1 illustrates, U.S. Route 15 provides access to points north and south while Interstate 180 and U.S. Route 220 link the County with Interstate 80, a major east-west trending highway that extends from New Jersey to the Ohio state line. The County is comprised of 52 municipalities, including 42 townships, 9 boroughs, and the City of Williamsport, the metropolitan center and County seat.

2.3. Population and Demographics

Population and demographic information provide baseline information about residents. Changes in demographics or populations may be used to identify higher-risk populations. Maintaining up-to-date data on demographics will allow the County to better assess magnitudes of hazards and develop more specific mitigation plans. Baseline demographic information for Lycoming County is provided in Table 1.

Table 1

Demographics	2008 Estimates
Population	116,916
Male	57,280
Female	59,636
Median age	40.7
Under 5 years	6,468
18 years and over	92,214
65 years and over	19,124

U.S. Census Bureau, 2006-2008 American Community Survey, Lycoming County

Lycoming County has an estimated population of 116,916, making Lycoming the most populated county in the Pennsylvania Wilds region, which consists of Lycoming, Clearfield, Clinton, Cameron, Warren, McKean, Jefferson, Potter, Tioga, Clarion, Elk, and Forest Counties. Clearfield, with a population of approximately 82,879, has the next largest population in the region.

Much of Lycoming County's population can be attributed to the city of Williamsport, which has a population of approximately 29,668. The Williamsport Metropolitan Statistical Area (MSA) consists of all of Lycoming County, and therefore also has an estimated population of 116,916. The two closest MSAs to the Williamsport MSA are the Scranton-Wilkes Barre-Hazelton MSA to the east, and the State College MSA to the west of Lycoming County. Both MSAs are larger than the Williamsport MSA. The Scranton-Wilkes Barre-Hazelton MSA has a population of approximately 624,776 and is made up of Lackawanna, Luzerne, and Wyoming Counties. The

State College MSA has an approximate population of 144,105 and consists only of Centre County.

Over 16 percent of Lycoming County's population is 65 or older. These residents may have special needs. For example, many may be unable to drive; therefore, special evacuation plans may need to be created for them. They may also have hearing or vision impairments which could make receiving emergency instructions difficult. Both older and younger populations have higher risks for contracting certain diseases. Lycoming County's combined under 5-years-of-age and over-65 populations represent approximately 22 percent of its population.

Table 2 on the following page shows population projections through 2020.

Table 2

Municipality	Census Counts				Population Projections					
	1990	2000	1990-2000 Change		2010	2000-2010 Change		2020	2010-2020 Change	
	#	#	#	%	#	#	%		#	%
Lycoming County	118,779	120,444	1,542	1.40	121,397	1,542	1.28	122,859	1,590	1.31
Greater Williamsport Alliance Planning Area	56,510	55,499	-1,011	-1.79	54,416	-1,083	-1.95	53,107	-1,309	-2.40
Lower Lycoming Creek Planning Area	21,961	21,965	4	0.02	21,948	-17	-0.08	21,846	-101	-0.46
Montoursville-Muncy Planning Area	6,023	5,836	-187	-3.10	5,640	-196	-3.35	5,420	-220	-3.90
Muncy Creek Planning Area	11,838	12,203	365	3.08	12,567	364	2.98	12,895	327	2.60
US 15 South Planning Area	6,656	10,823	4,167	62.61	11,512	689	6.37	12,153	641	5.57
US 220/Future I-99 Planning Area	9,164	9,771	607	6.62	10,394	623	6.38	11,005	610	5.87
Rural Lycoming County	21,341	22,359	1,018	4.77	23,440	1,081	4.83	24,604	1,164	4.97
AnthonyTownship	727	904	177	24.35	1,094	190	21.07	1,297	203	18.54
BastressTownship	513	574	61	11.89	637	63	11.05	702	64	10.06
Brown Township	102	111	9	8.82	120	9	8.34	129	9	7.63
CascadeTownship	382	419	37	9.69	457	38	9.11	495	38	8.33
Cogan House Township	807	974	167	20.69	1,152	178	18.28	1,339	187	16.24
Cummings Township	334	355	21	6.29	376	21	6.02	397	21	5.48
Eldred Township	2,056	2,178	122	5.93	2,302	124	5.69	2,421	119	5.17
Franklin Township	915	915	0	0.00	914	-1	-0.12	909	-5	-0.52
Gamble Township	744	854	110	14.78	969	115	13.51	1,088	118	12.21
Jackson Township	421	414	-7	-1.66	406	-8	-1.84	397	-9	-2.31
Jordan Township	872	878	6	0.69	883	5	0.58	885	2	0.19
Limestone Township	1,894	2,136	242	12.78	2,388	252	11.82	2,645	256	10.73
McHenry Township	246	145	-101	-41.06	52	-93	-64.13	50	-2	-3.80
McIntyre Township	588	539	-49	-8.33	489	-50	-9.22	438	-52	-10.57
McNett Township	200	211	11	5.50	222	11	5.28	233	11	4.78
Mifflin Township	1,111	1,145	34	3.06	1,179	34	2.94	1,208	30	2.53
Mill Creek Township	477	572	95	19.92	673	101	17.67	779	106	15.74
Moreland Township	985	1,036	51	5.18	1,088	52	4.97	1,136	49	4.49
NippenoseTownship	742	729	-13	-1.75	715	-14	-1.93	698	-17	-2.40
Penn Township	788	900	112	14.21	1,017	117	13.03	1,137	120	11.80
Pine Township	290	329	39	13.45	370	41	12.39	411	42	11.23
Plunketts Creek Township	906	771	-135	-14.90	637	-134	-17.35	502	-135	-21.17
Salladasburg Borough	301	260	-41	-13.62	219	-41	-15.69	178	-41	-18.86
Susquehanna Township	1,047	993	-54	-5.16	937	-56	-5.60	877	-60	-6.39
Upper Fairfield Township	1,775	1,854	79	4.45	1,933	79	4.28	2,007	74	3.83
Washington Township	1,553	1,613	60	3.86	1,673	60	3.72	1,728	55	3.29
Watson Township	565	550	-15	-2.65	534	-16	-2.89	516	-18	-3.42

Source: Bondata

Population estimates done for the County 2006 Comprehensive Plan show that the County should reach a population of 122,859 by 2020. Census data in 2000 indicated that the County population was 120,444. However, Census estimates for 2008 approximate the County population to be 116,916. The County may be losing population rather than gaining it. The population projections from the comprehensive plan include population estimates for each of the 52 municipalities. More accurate population figures will be available at the conclusion of the 2010 Census, which will begin as the 2010 version of Lycoming County's HMP is being finalized.

Approximately 3 percent of Lycoming County's population speaks a language other than English. Hazard mitigation strategies will need to address language barriers to ensure that all residents can receive emergency instructions.

Lycoming County has 53,847 residential properties. These properties may be vulnerable to various natural hazards, in particular, flooding and windstorms. Damage to residential properties is not only expensive to repair or rebuild, but also devastating to the displaced family.

Table 3

Housing Characteristics	2008 Estimates
Total housing units	53,847
Owner-occupied housing units	33,052
Renter-occupied housing units	14,592
Vacant housing units	6,203
Median home value (dollars)	$116,100

U.S. Census Bureau, 2006-2008 American Community Survey, Lycoming County

Approximately 12 percent of the County's residential properties are vacant. Vacant buildings are particularly vulnerable to arson and criminal activity. Since many vacant properties have not been maintained, many are structurally deficient and at risk of collapsing.

Approximately 27 percent of the County's population rents. Renters are more transient than home owners; therefore, communicating with renters may be more difficult than with home owners. Similarly, tourists would be a harder population to communicate with during an emergency event. Communication strategies should be developed to ensure that these populations can be given proper notification.

The median household income in the County is $42,139 which is lower than the Commonwealth of Pennsylvania's median household income of $53,220. The County's per capita income of $21,868 is also lower than the Commonwealth's per capita income of $27,722.

Table 4

Economic Characteristics	2008 Estimates
Median household income (in 2008 inflation-adjusted dollars)	42,139
Median family income (in 2008 inflation-adjusted dollars)	50,856
Per capita income (in 2008 inflation-adjusted dollars)	21,868

U.S. Census Bureau, 2006-2008 American Community Survey, Lycoming County

2.4. *Land Use and Development*

Lycoming County is mostly rural with the majority of its population located in the south-central area of the County, centered along U.S. Route 15, Interstate 180, and U.S. Route 220. The County's vision as documented in the 2006 Comprehensive Plan is to keep growth centralized and protect its natural resource areas in the outer regions. Map 2 reflects this goal.

The County has many land development regulations in place to protect its natural, historic, and environmentally sensitive areas. Table 5 below shows municipalities that have protective ordinances in place.

In its Comprehensive Plan, the County has identified growth areas where the County will target economic development activity. These areas, which can be seen in Map 2, are focused on development around Interstate 180, U.S. Route 15, U.S. Route 220, and the future development of Interstate 99.

Map 2

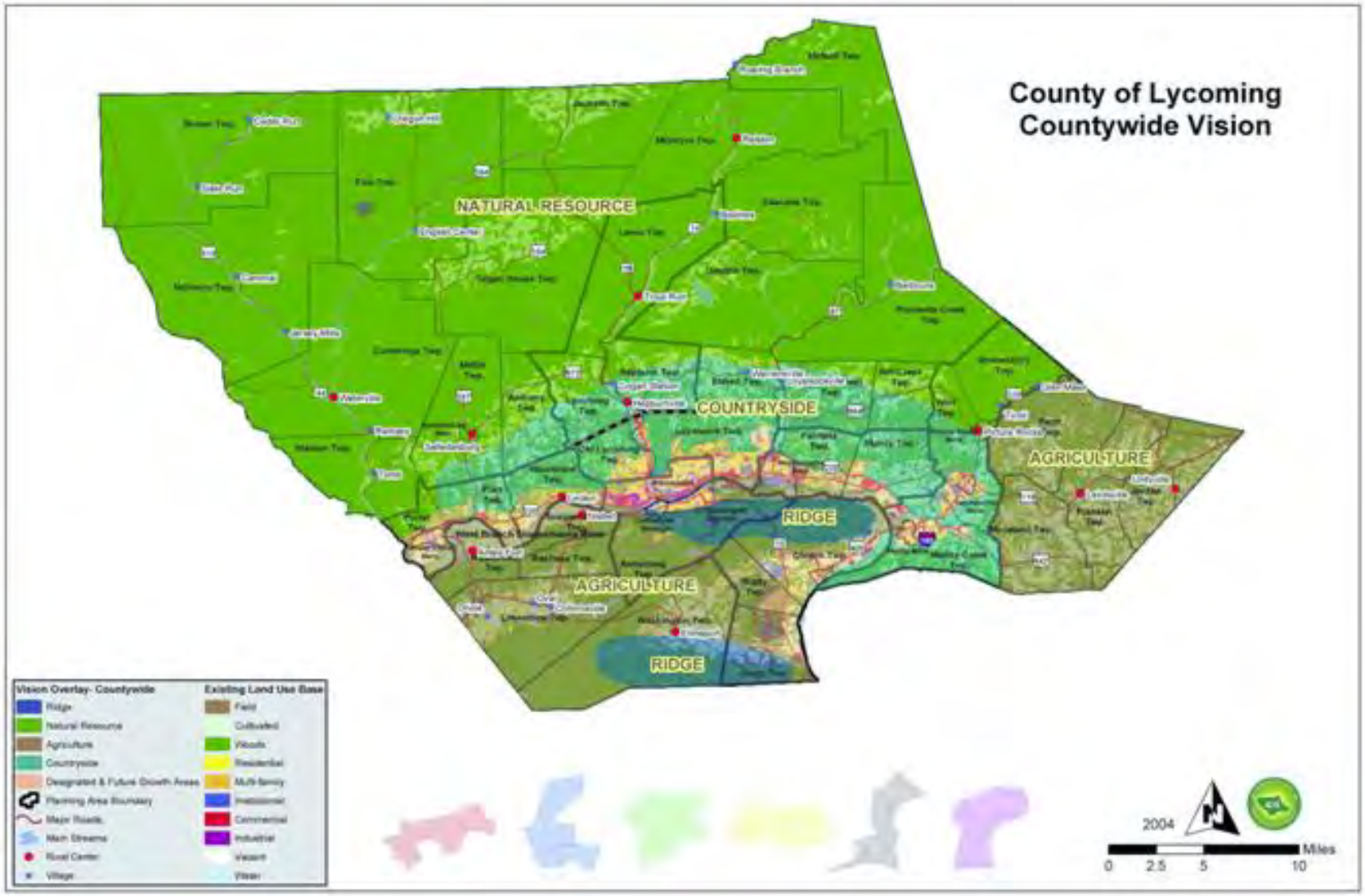

County of Lycoming
Countywide Vision
NATURAL RESOURCE
COUNTRYSIDE
AGRICULTURE
RIDGE
AGRICULTURE
RIDGE
Vision Overlay- Countywide
Ridge
Natural Resource
Agriculture
Countryside
Designated & Future Growth Areas
Planning Area Boundary
Major Roads
Main Streams
Rural Center
Village
Existing Land Use Base
Field
Cultivated
Woods
Residential
Multi-family
Institutional
Commercial
Industrial
Vacant
Water
2004
0
2.5
5
10
Miles

Table 5

Municipality	Zoning Ordinance	Subdivision/Land Development Ordinance	Steep Slope Protection Ordinance	Ridgetop Development Ordinance
Anthony Township (M)	■	□	No	No
Bastress Township	■	■	No	No
Brown Township	□	□	Yes	Yes
Cascade Township	□	■	Yes	Yes
Cogan House Township	□	□	Yes	Yes
Cummings Township	□	□	Yes	Yes
Eldred Township	■	■	No	No
Franklin Township	■	■	No	No
Gamble Township	■	□	No	No
Hughesville Borough	■	■	No	No
Jackson Township	□	□	Yes	Yes
Jordan Township	□	□	Yes	Yes
Limestone Township	■	□	No	No
McHenry Township	□	□	Yes	Yes
McIntyre Township	□	□	Yes	Yes
McNett Township	□	□	Yes	Yes
Mifflin Township	□	□	Yes	Yes
Mill Creek Township	■	□	No	No
Moreland Township	□	□	Yes	Yes
Nippenose Township	■	■	No	No
Penn Township	□	□	Yes	Yes
Pine Township	■	□	No	No
Plunketts Creek Township	■	■	No	No
Salladasburg Borough	□	□	No	No
Susquehanna Township	■	■	No	No
Upper Fairfield Township	■	■	No	No
Washington Township	□	□	Yes	Yes
Watson Township	■	□	No	No

Legend:

■ Municipal Enacted Ordinance

□ Lycoming County Enacted Ordinance

Source: County and Municipal Ordinances

2.5. *Data Sources*

Information for the Community Profile was developed by using information from the *All-Hazard Mitigation Plan: Lycoming County 2004, U.S. Census Bureau, 2006-2008 American Community Survey, Lycoming County, and the Lycoming County Comprehensive Plan 2006.*

3. Planning Process

A successful planning process builds partnerships and brings together members representing government agencies, the public, and other stakeholders to reach consensus on how the community will prepare for and respond to hazards that are most likely to occur. Applying a comprehensive and transparent process adds validity to the Plan. Those involved gain a better understanding of the problem or issue and how solutions and actions were devised. The result is an updated set of common community values and widespread support for directing financial, technical, and human resources to an agreed-upon action. The planning process was an integral part of updating the Lycoming County Multi-Jurisdictional Hazard Mitigation Plan (HMP), which was originally adopted on September 24, 2004. This section describes Lycoming County's update process and how the HMP evolved since it was first approved by the Federal Emergency Management Agency (FEMA).

3.1. *Update Process and Participation Summary*

To facilitate the update of this and 13 other HMPs across the Commonwealth of Pennsylvania, the Pennsylvania Emergency Management Agency (PEMA) utilized Emergency Management Performance Grant funding to contract with Michael Baker, Jr., Inc. (Baker), a Philadelphia, Pennsylvania, firm, to update 14 counties' HMPs and provide related services. Baker in turn subcontracted Delta Development Group, Inc. (Delta), a Mechanicsburg, Pennsylvania, firm, to lead the update of four of those HMPs, including the Lycoming County HMP.

In accordance with the Disaster Mitigation Act of 2000 (DMA 2000) requirements, this plan documents the following topics:

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

As part of the overall project, Baker was tasked by PEMA with developing a standardized planning process to guide HMP updates in Pennsylvania. This process is described in the *Standard Operating Guide* listed in Section 1.4.4 and was followed during the update of the Lycoming County HMP. The process used during this update was not very different from the process used by the County to create the plan in 2004. During the 2004 process, planners began by identifying the hazards that could significantly impact the County and its municipalities, and they determined these hazards' economic, social, and environmental impacts. From this analysis, the County created an action strategy identifying technically feasible and cost-effective mitigation actions to reduce hazard impacts. Public input was solicited numerous times during the planning process. The review, analysis, and update of

each of the hazard identification, risk assessment, and mitigation strategy sections are described in Sections 4.2, 4.1, and 6.1, respectively.

Public participation and Steering Committee meetings served as the main forums for gathering information to update the current HMP. The Steering Committee and consultants were afforded access to the knowledge of relevant, and approved, plans, policies, and procedures for Lycoming County. Opportunities for public participation included attending public meetings, completing written surveys, and reviewing and commenting on the existing Plan and other documents. Through this process, the County was able to develop a comprehensive approach to reducing the effects of hazards to the County and its municipalities.

3.2. *The Hazard Mitigation Steering Committee*

The County's Steering Committee consists of:

- John Lavelle, Hazard Reduction Planner
- Fran Jones, GIS/Data Systems Administrator
- Kurt Hausammann, Executive Director of the Lycoming County Planning Commission
- Bill Kelly, Deputy Director of the Lycoming County Planning Commission

John Lavelle serves as chair of the committee.

The Steering Committee was supported by six planning groups that were organized by watershed. The member organizations of these planning groups are shown in Table 6.

Table 6: Watershed Planning Groups

Loyalsock Creek Watershed	***Pine Creek Watershed***
Cascade Township	Black Hole Creek Watershed Association
Eldred Township	Brown Township
Fairfield Township	Cummings Township
Gamble Township	Jackson Township
Loyalsock Township	McHenry Township
Loyalsock Creek Watershed Association	Pine Creek Preservation Association
Mill Creek Township	Pine Township
Montoursville Borough	Watson Township
Plunketts Creek Township	***West Branch 1/Larry's Creek***
Rose Valley/Mill Creek Watershed Group	City of Williamsport
Upper Fairfield Township	Duboistown Borough
Lycoming Creek Watershed	Jersey Shore Borough
Anthony Township	Mifflin Township
Cogan House Township	Nippenose Township
Hepburn Township	Piatt Township
Lewis Township	Porter Township
Lycoming Township	Salladasburg Borough
McIntyre Township	South Williamsport Borough
McNett Township	Susquehanna Township
Old Lycoming Township	Woodward Township
Muncy Creek Watershed	***West Branch 2 Watershed Group***
Franklin Township	Armstrong Township
Hughesville Borough	Bastress Township
Jordan Township	Brady Township
Moreland Township	Clinton Township
Muncy Borough	Limestone Township
Muncy Creek Watershed Association	Montgomery Borough
Muncy Creek Township	Washington Township
Muncy Township	
Penn Township	
Picture Rocks Borough	
Shrewsbury Township	
Wolf Township	

The Steering Committee and planning groups acknowledged that identifying hazards that specifically affect Lycoming County and assessing their likelihood of occurrence, and the potential damage to the people, property, and environment of the County, was one of the most important steps in developing a comprehensive HMP. The Steering Committee chose to focus on an all-hazards approach as opposed to narrowing the focus to human-caused or natural disasters only.

3.3. *Meetings and Documentation*

The Steering Committee held the following meetings during the update process of the County HMP:

- Kick-off Meeting – Lycoming County Planning and Community Development Department Executive Plaza, Wednesday, September 30, 2009
  - The purpose of the meeting was to make the public aware of the hazard mitigation plan update process.
  - Outcomes of the meeting included the determination of which goals of the existing Plan were still relevant and the delivery of the Capabilities and Risk Assessments.
  - The meeting minutes that further detail this meeting can be found in Appendix B.
- Lycoming County Townships Association Meeting, Thursday, October 22, 2009
  - Lycoming County representatives discussed the HMP and the update process with Alliance members, and solicited input from them.
  - The sign-in sheet from this meeting is found in Appendix B.
- Public Meeting – Old Lycoming Fire Hall, Wednesday, November 4, 2009
  - The purpose of this meeting was to determine which hazards pose the largest threat to the County and determine if new hazards exist.
  - Outcomes of the meeting included determining that flooding was still the number one hazard in the County, but traffic accidents and power outages are also common. Marcellus Shale gas drilling has emerged as a new potential hazard.
  - The meeting minutes that further detail this meeting are found in Appendix B.
- Hazard Mitigation Solutions Workshop, Tuesday, November 17, 2009
  - The purpose of this meeting was to determine which mitigation strategies can be used to mitigate which hazards.
  - The outcomes of the meeting included a need to strengthen zoning ordinances, review of the use of no-adverse-impact regulations for floodplain and stormwater ordinances, and improving the County's Continuity of Government Plan.
  - The meeting minutes that further detail this meeting are found in Appendix B.
- Greater Williamsport Alliance Meeting, Thursday, March 25, 2010

  - Lycoming County representatives discussed the HMP and the update process with Alliance members, and solicited input from them.
  - A simple agenda and the sign-in sheet from this meeting are found in Appendix B.
- Hazard Mitigation Plan Draft Review Meeting, Friday, April 9, 2010
  - The purpose of the meeting was to review the draft of the HMP.
  - Outcomes of the meeting included several minor revisions to be made to the draft before it is sent to FEMA for formal review, and approval to submit the HMP for review upon completion of those revisions.
  - The meeting minutes that further detail this meeting are found in Appendix B.
- Hazard Mitigation Plan Draft Review Public Meeting, Wednesday, September 22, 2010
  - The purpose of this meeting was to provide a public forum in which to solicit comments from plan stakeholders.
  - The attendees discussed the hazards that affect the County, as well as the mitigation goals, objectives, and actions that have been identified, evaluated, and prioritized to address those hazards.
  - The meeting minutes that further detail this meeting are found in Appendix B.
- West Branch Emergency Management Association Meeting, Sunday, October 17, 2010
  - Lycoming County representatives discussed the HMP and the update process with Association members, and solicited input from them.
  - Meeting minutes and the sign-in sheet are found in Appendix B.

Each meeting was followed by detailed meeting minutes that documented all discussion, decisions, and unmet needs identified during the meetings. These minutes were shared among the Steering Committee, consultants, and attendees of the meeting. Documentation from all meetings can be found in Appendix B. County residents were informed of public meetings through various sources, including public notices in the local newspaper.

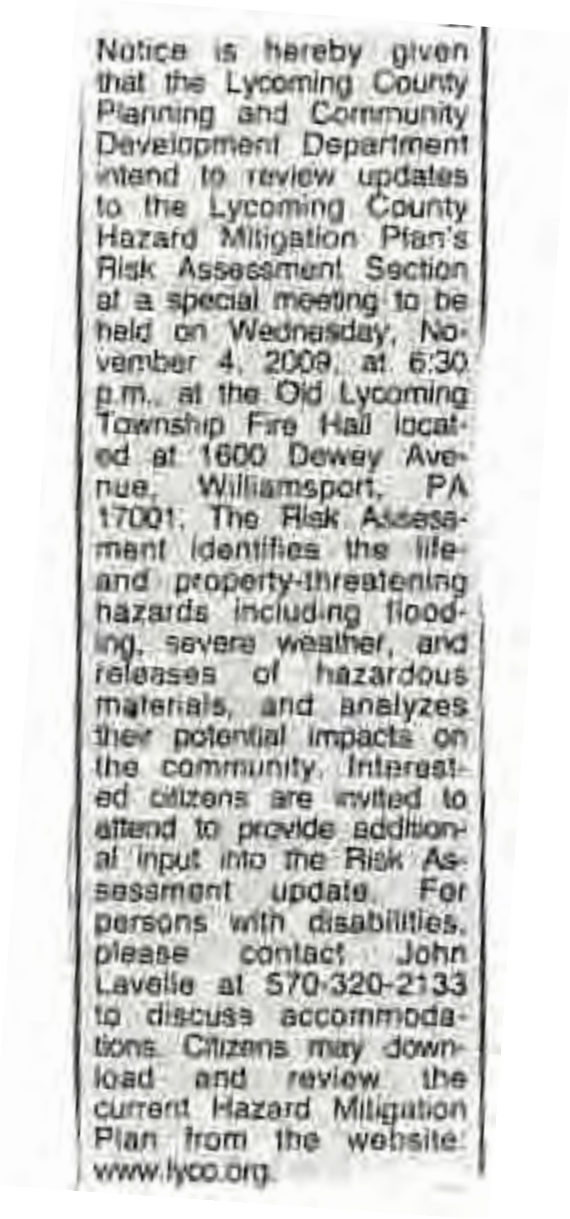
The Steering Committee partnered with Baker and Delta to aid in the development of the updated Plan. The consultants assisted the County in drafting planning documents, preparing meeting materials, and facilitating meetings. The Steering Committee reviewed any documentation produced by Baker and Delta, provided validation, and acted as an advocate for the Plan update.

3.4. *Public & Stakeholder Participation*

To maximize the effectiveness of the HMP, the Steering Committee sought continual public and stakeholder engagement. Public input was encouraged and collected through a variety of methods. A Risk Assessment Survey and a Capabilities Assessment Survey were sent out to each municipality in Lycoming County. All 52 municipalities in Lycoming County returned the Risk Assessment Survey and Capabilities Assessment Survey so that their findings could be reviewed and incorporated into the updated County HMP.

Local, state, and federal agencies, neighboring jurisdictions (e.g., Potter, Tioga, Bradford, Sullivan, Columbia, Montour, Northumberland, Union, and Clinton Counties), local businesses, community leaders, educators, and other relevant private and nonprofit groups (e.g., watershed associations) that had a vested interest in the development of the updated Plan were given the opportunity (through direct invitation – see the meeting materials in Appendix B) to participate in the planning process by attending a planning or public meeting, or offering comment on the Web site posting the existing HMP. Forty-five (45) municipalities' representatives attended at least one of these meetings. Through attendance at a Steering Committee and/or public meetings, the Lycoming County Commissioners, the American Red Cross, the Larry's Creek Watershed Association, the Muncy Creek Watershed Association, PennDOT, private industry (e.g., Anadarko Petroleum Corporation), the Pennsylvania State Police, and PEMA were provided the opportunity to guide the HMP's development. Representatives of these organizations participated in discussions and provided input on the HMP during the meetings they attended. Members of the general public also attended the November 4, 2009 public meeting.

Through public notices published in the local newspaper, the above groups and the general public were invited to review the Plan on the County's Web site (http://www.lyco.org) and send comments to the Lycoming County Planning and Community Development Department. In addition, public meetings were held during the planning process as listed in section 3.3 above. Each of these meetings was preceded by a public notice inviting the general public to review and comment on the Plan, as well as to attend the meeting itself. Copies of the actual public notices are found in Appendix B, immediately following the copy of materials used at the respective meetings. A copy of the public notice for the November 4, 2009 public meeting is shown below.



Notice is hereby given that the Lycoming County Planning and Community Development Department intend to review updates to the Lycoming County Hazard Mitigation Plan's Risk Assessment Section at a special meeting to be held on Wednesday, November 4, 2009, at 6:30 p.m., at the Old Lycoming Township Fire Hall located at 1600 Dewey Avenue, Williamsport, PA 17001. The Risk Assessment identifies the life and property-threatening hazards including flooding, severe weather, and releases of hazardous materials, and analyzes their potential impacts on the community. Interested citizens are invited to attend to provide additional input into the Risk Assessment update. For persons with disabilities, please contact John Lavelle at 570-320-2133 to discuss accommodations. Citizens may download and review the current Hazard Mitigation Plan from the website: www.lyco.org.

Finally, hazard mitigation was discussed at the October 22, 2009, meeting of the Lycoming County Townships Association meeting. This meeting was attended by many of the County's townships, as well as several of the County's businesses.

No comments were received from the general public. Section 3.5 includes a table showing overall municipal participation in the planning process.

3.5. *Multi-Jurisdictional Planning*

Lycoming County took a multi-jurisdictional approach to preparing its HMP. The County was able to provide resources to which the municipalities may not have had access. However, the County was dependent on the municipal buy-in since the municipalities have the legal authority to enforce compliance of land use planning and development issues. The County, together with Baker, undertook an intensive effort to involve all 52 municipalities in the update process.

Each municipality was given the opportunity to participate in this process. Municipal officials and representatives were invited to attend Steering Committee meetings, sent a copy of the existing Plan for comment, and asked to review and prioritize the mitigation actions. Those who were unable to attend a public or planning meeting during the planning process were contacted via telephone to discuss hazard mitigation in the County. Documentation of those telephone call can be found in Appendix B. Table 7 identifies how all 52 municipalities participated in the update of this HMP.

Table 7: Planning Participation

Municipality	Participated in 2005 Plan	Risk Assessment Survey Received	Capabilities Assessment Survey Received	Attended Meeting	Contacted via Telephone	Adopted 2010 Plan	2010 Plan Adoption Date
Lycoming County	X	X	X	X			
Anthony Township	X	X	X		X		
Armstrong Township	X	X	X	X			
Bastress Township	X	X	X	X			
Brady Township	X	X	X		X		
Brown Township	X	X	X	X			
Cascade Township	X	X	X	X			
Clinton Township	X	X	X	X			
Cogan House Township	X	X	X	X			
Cummings Township	X	X	X	X			
Duboistown Borough	X	X	X	X			
Eldred Township	X	X	X	X			
Fairfield Township	X	X	X	X			
Franklin Township	X	X	X	X			
Gamble Township	X	X	X	X			
Hepburn Township	X	X	X	X			
Hughesville Borough	X	X	X	X			
Jackson Township	X	X	X		X		
Jersey Shore Borough	X	X	X	X			
Jordan Township	X	X	X	X			
Lewis Township	X	X	X	X			

Municipality	Participated in 2005 Plan	Risk Assessment Survey Received	Capabilities Assessment Survey Received	Attended Meeting	Contacted via Telephone	Adopted 2010 Plan	2010 Plan Adoption Date
Limestone Township	X	X	X	X			
Loyalsock Township	X	X	X	X			
Lycoming Township	X	X	X	X			
McHenry Township	X	X	X	X			
McIntyre Township	X	X	X	X			
McNett Township	X	X	X	X			
Mifflin Township	X	X	X	X			
Mill Creek Township	X	X	X	X			
Montgomery Borough	X	X	X	X			
Montoursville Borough	X	X	X	X			
Moreland Township	X	X	X	X			
Muncy Borough	X	X	X		X		
Muncy Creek Township	X	X	X	X			
Muncy Township	X	X	X	X			
Nippenose Township	X	X	X	X			
Old Lycoming Township	X	X	X	X			
Penn Township	X	X	X		X		
Piatt Township	X	X	X	X			
Picture Rocks Borough	X	X	X	X			
Pine Township	X	X	X	X			
Plunketts Creek Township	X	X	X	X			
Porter Township	X	X	X	X			

Municipality	Participated in 2005 Plan	Risk Assessment Survey Received	Capabilities Assessment Survey Received	Attended Meeting	Contacted via Telephone	Adopted 2010 Plan	2010 Plan Adoption Date
Salladasburg Borough	X	X	X		X		
Shrewsbury Township	X	X	X	X			
South Williamsport Borough	X	X	X	X			
Susquehanna Township	X	X	X	X			
Upper Fairfield Township	X	X	X	X			
Washington Township	X	X	X	X			
Watson Township	X	X	X	X			
Williamsport, City of	X	X	X	X			
Wolf Township	X	X	X	X			
Woodward Township	X	X	X	X			

3.6. *Existing Planning Mechanisms*

The planning process also allowed for the review and incorporation, if appropriate, of existing plans, studies, reports, and other information that aid in the mitigation of hazards across the County (see Section 7.3 for a description of these interrelationships). Lycoming County will use existing plans and/or programs to implement the decided-upon hazard mitigation actions. Based on the capability assessments of the participating municipalities, the County will continue to plan and implement programs to reduce the effects to people, places, and the environment from hazards. This updated Plan builds upon the momentum developed through previous related planning efforts and mitigation programs, and recommends implementing actions, where possible.

4. Risk Assessment

4.1. *Update Process Summary*

The Risk Assessment section of the Lycoming County Multi-Jurisdictional Hazard Mitigation Plan (HMP) update utilizes existing data and analysis from the previous Federal Emergency Management Agency (FEMA)-approved HMP as well as more recent data and analysis on hazards occurring during the last five years.

For the 2005 version of this HMP, the following hazards were identified as posing the most risk to the County and its municipalities:

- Flooding
- Winter storms
- Tropical storms and hurricanes
- Tornadoes and wind storms
- Hazardous material incidents
- Fixed nuclear incidents
- Droughts and water supply deficiencies
- Fires
- Terrorism

A comprehensive, all-hazards list of events that have occurred or could occur in Lycoming County was developed for this HMP update. This section of the HMP update aims to identify all potential hazards that could affect Lycoming County, confirm the top nine hazards that present the greatest risk to the County, and provide a detailed profile of each of the top hazards. Each hazard profile describes and analyzes vulnerabilities and risks each of the top hazards creates for Lycoming County. Section 4.2 describes the hazards profiled in the 2005 version of the HMP, as well as the hazards that are addressed in this update.

Based on updated hazard and risk research, the following are the top hazards that could affect the County and its municipalities now:

- Flood, flash flood, and ice jams
- Winter storms
- Tornadoes and wind storms
- Thunderstorms and hail
- Drought and water supply deficiencies
- Traffic accidents
- Power outages

- Terrorism
- Fixed nuclear facility incidents
- Natural gas drilling incidents

4.1.1. Data Sources and Limitations

4.1.1.1. *Geospatial Data from Pennsylvania Spatial Data Access (PASDA)*

Title: *Impervious Surface Area for Northeast Pennsylvania, 1985*

Short Title: pa1985isaa_ne
Edition: Revision 2003
Type of Data: Raster Digital Data
Publication Information:

Publication Place: University Park, PA
Publisher: Penn State University, Department of Meteorology

Description:

Impervious surface area for Pennsylvania was estimated from Thematic Mapper data using algorithms developed by Dr. Toby Carlson. The Value attribute indicates percentage of the 25-meter grid cell that is impervious and ranges from 0 to 100 and uses integer rather than decimal values for reduced storage volume. Date of the imagery ranged from 1985 to 1987, and availability depended on extent of cloud cover at time of acquisition. All images were collected for the late spring or summer months (May-August).

Purpose:

The impervious surface data was generated to support hydrologic investigations. Impervious surfaces promote runoff during and following precipitation events. Runoff impacts both quantity and quality of receiving waters. Excessive quantities of runoff promote erosion and flooding. Runoff water acquires pollutants from the impervious surface over which it flows. Pollutants can then be transported to a receiving water body. Impervious surface area is also a useful tool in assessing urbanization and urban sprawl, including the effect of urbanization on surface microclimate.

Title: *Impervious Surface Area for Northeast Pennsylvania, 2000*

Short Title: pa2000isaa_ne
Edition: Revision 2003
Type of Data: Raster Digital Data
Publication Information:

Publication Place: University Park, PA
Publisher: Penn State University, Department of Meteorology

Description:

Impervious surface area for Pennsylvania was estimated from Thematic Mapper data using algorithms developed by Dr. Toby Carlson. The Value attribute indicates percentage of the 25-meter grid cell that is impervious and ranges from 0 to 100 and uses integer rather than decimal values for reduced storage volume. Date of the imagery ranged from 1999 to 2002, and availability depended on extent of cloud cover at time of acquisition. All images were collected for the late spring or summer months (May-August).

Purpose:

The impervious surface data was generated to support hydrologic investigations. Impervious surfaces promote runoff during and following precipitation events. Runoff impacts both quantity and quality of receiving waters. Excessive quantities of runoff promote erosion and flooding. Runoff water acquires pollutants from the impervious surface over which it flows. Pollutants can then be transported to a receiving water body. Impervious surface area is also a useful tool in assessing urbanization and urban sprawl, including the effect of urbanization on surface microclimate.

Title: *Pennsylvania County Boundaries, 2007*

Short Title: PennDOT – Pennsylvania County Boundaries 2007
Type of Data: Vector Digital Data
Publication Information:

Publication Place: Harrisburg, PA
Publisher: Pennsylvania Department of Transportation (PennDOT)

Description:

County boundaries within Pennsylvania as delineated for the PennDOT Type 10 general highway map.

Purpose:

Public information and support for transportation planning, design, and development.

Title: *Floodplains of Pennsylvania*

Type of Data: Vector Digital Data
Publication Information:

Publication Place: Harrisburg, PA
Publisher: Pennsylvania Department of Environmental Protection (DEP)

Description:

In an effort to expedite the permit review process for Water Obstruction and Encroachment Applications, the DEP has initiated a plan to replace hard copy maps with digital GIS sets. The project is referred to as the 105 Spatial Data System /8105SDS/9. Pennsylvania's river

floodplains and coastal floodplains are two of many spatial data sets that were used in the 105SDS project. As a result of work completed by Law Environmental, Inc., on the statewide low-level radioactive waste siting project, DEP received two coverages depicting river and coastal floodplains. However, due to the process used in constructing these data sets, there were many areas throughout the state in which floodplains were not digitized. The primary purpose of this task was to complete the digital floodplain mapping in these areas.

Purpose:

Created to do permit reviews for Water Obstruction and Encroachment Applications.

Limitations of Data:

Due to the nature of transferring the floodplains from the FEMA maps to the plotted 1:24000 scale maps, this coverage should be considered to be the “best representation” of the data but not as accurate as, for example, a map of Global Positioning System’s floodplain coordinates.

Title: *Streets and Highways, 2006*

Short Title: streetscarto.sdc
Type of Data: Vector Digital Data
Publication Information:

Publication Place: Redlands, CA
Publisher: ESRI

Description:

U.S. Streets Cartographic represents detailed streets, interstate highways, and major roads within the United States.

Purpose:

U.S. Streets Cartographic provides streets with a reduced number of attributes and features that are designed to support cartographic display.

Title: *Pennsylvania Active Railroads, 1996*

Short Title: Active Railroads
Type of Data: Vector Digital Data
Publication Information:

Publication Place: Harrisburg, PA
Publisher: Pennsylvania Department of Environmental Protection

Description:

Location of active rail lines in Pennsylvania digitized from 1:24,000 USGS topographic maps on a stable mylar base.

Purpose:

Educational

4.1.1.2. *County-Provided Data*

In addition to the data listed above, Lycoming County also prepared geospatial data used in the Geographic Information Systems (GIS) analysis. Information about the location of Lycoming County Superfund Amendments and Reauthorization Act (SARA) facilities was provided by the Lycoming County Emergency Management Agency. For details on the form and publication of this data, please contact the Lycoming County Planning and Community Development Department.

Description:

1. **Critical Infrastructure**
   - County buildings (owned or leased)
   - Municipal buildings
   - Police stations
   - Ambulance stations/EMS stations
   - Fire departments
   - Dams
   - Hospitals
   - Nursing homes and long-term care facilities
   - Day care centers
   - Churches
   - Telecommunication facilities (e.g., towers)
   - Utilities, electric substations (e.g., electric facilities, etc.)
   - Emergency Operation Centers
   - SARA facilities (see #3 below)
   - Superfund sites
   - Schools (public and private)
   - Public works facilities
   - Surface water intakes
   - Water treatment facilities
   - Sewer treatment facilities
   - Other applicable facilities
   - Transportation
     - Airports
     - Train stations
     - Public transit services
     - County pipeline information (Note: for HMP purposes, pipeline information is contained under Transportation.)

2. **Tax Parcels** – A GIS dataset containing the digital tax parcels of each municipality throughout the County.
3. **SARA Facilities** – A GIS dataset for all SARA facilities located in the County.
4. **Potential Loss Estimation** – A key component to the HMP product is the potential loss estimation. This analysis involves selecting structures in the County that are located within the 1% chance floodplain and then taking the assessed or market value of each of those structures and compiling them as totals on both the municipal and the County levels. The potential loss estimation has a significant GIS component and the data essential to perform this analysis is included in Section 4.1.1.
5. **Structures** – A GIS-ready dataset showing locations of all structures located throughout the County. To perform the potential loss estimation, the "structures" dataset must have the assessed or market value for each structure contained within the database.

The severe wind vulnerability analysis depended upon limited data. During the development of this plan, the ability to ascertain information from the property database, necessary to determine which structures were aged/dilapidated or which had basements, was affected by the lack of data. Subsequent versions of this plan will need to incorporate and respond to this data deficiency or need.

4.2. *Hazard Identification*

In order to identify all the hazards that present a risk to Lycoming County, and to confirm the top ten hazards that present the greatest risk, Lycoming County began by considering all natural and human-made hazards listed in the National Fire Protection Agency (NFPA) 1600: *Standard on Disaster/Emergency Management and Business Continuity Programs*, 2004 edition.

According to Section A.5.3.2 of NFPA 1600, hazard identification should include, but is not limited to, the following types of potential hazards:

1. Naturally occurring hazards that can happen without the influence of people and have a potential direct or indirect impact on the entity (people, property, the environment)
    a. Geological hazards (does not include asteroids, comets, meteors)
        i. Earthquake
        ii. Tsunami
        iii. Volcano
        iv. Landslide, mudslide, subsidence
        v. Glacier, iceberg
    b. Meteorological hazards
        i. Flood, flash flood, seiche, tidal surge
        ii. Drought
        iii. Fire (forest, range, urban)

iv. Snow, ice, hail, sleet, avalanche
v. Windstorm, tropical cyclone, hurricane, tornado, water spout, dust/sand storm
vi. Extreme temperatures (heat, cold)
vii. Lightning strikes
viii. Famine

c. Biological hazards
   i. Diseases that impact humans and animals (plague, smallpox, anthrax, West Nile virus, foot and mouth disease)
   ii. Animal or insect infestation

2. Human-caused events
   a. Accidental
      i. Hazardous material (chemical, radiological, biological) spill or release
      ii. Explosion/fire
      iii. Transportation accident
      iv. Building/structure collapse
      v. Energy/power/utility failure
      vi. Fuel/resource shortage
      vii. Air/water pollution, contamination
      viii. Water control structure/dam/levee failure
      ix. Financial issues, economic depression, inflation, financial system collapse
      x. Communications system interruptions
   b. Intentional
      i. Terrorism (conventional, chemical, radiological, biological, cyber)
      ii. Sabotage
      iii. Civil disturbance, public unrest, mass hysteria, riot
      iv. Enemy attack, war
      v. Insurrection
      vi. Strike
      vii. Misinformation
      viii. Crime
      ix. Arson
      x. Electromagnetic pulse

To focus this list on the hazards that pose the greatest risk to Lycoming County, the emergency declarations for the County over the last five years were documented and analyzed. Table 8 presents a comprehensive list of all natural disaster declarations that have occurred in

Lycoming County since 1955, according to the Pennsylvania Emergency Management Agency (PEMA). This list presents the foundation for identifying what hazards pose the greatest risk within Lycoming County.

According to Lycoming County's 2005 FEMA-approved HMP, the top nine hazards affecting the County were (1) flooding, (2) winter storms (including snow and ice storms), (3) tropical storms and hurricanes, (4) tornadoes and windstorms, (5) hazardous materials incidents, (6) fixed nuclear incidents, (7) droughts and water supply deficiencies, (8) fires, and (9) terrorism. Municipalities were surveyed and asked to identify any changes over the last five years in the natural and human-made hazards that affect their municipalities. In addition, online research and examination of the Pennsylvania Emergency Incident Reporting System (PEIRS) records were conducted to identify those natural and man-made hazards that have affected or could affect Lycoming County and its municipalities.

Based on that research, the Steering Committee identified those hazards that pose little risk to the County and its communities, either because they rarely/never affected the County or their impacts were so minor that they did not warrant additional attention. A quantitative analysis of the risk posed by each hazard is described in Section 4.4. The Steering Committee identified the following hazards as posing the greatest threat:

1. floods, flash floods, and ice jams
2. winter storms (including snow and ice storms)
3. tornadoes and windstorms
4. thunderstorms and hail
5. droughts and water supply deficiencies
6. traffic accidents
7. power outages
8. terrorism
9. fixed nuclear facility incidents
10. natural gas releases

The updated research and analysis supports the finding that these 10 hazards are the top hazards in Lycoming County. While the Risk Assessment in this HMP update focuses on these 10 hazards, the analysis illustrates how often these hazards are interrelated, causing or being caused by other hazards. The vulnerability of critical facilities due to social, economic, and environmental factors is analyzed by the threat each hazard poses. Earthquakes, subsidence and sinkholes, and wildfires are also profiled according to the requirements of the DMA 2000.

Because flooding has been the most damaging and life-threatening of the hazards affecting development within the County, this Plan emphasizes flood risk assessment and mitigation.

Within each of the County's principal watersheds, flood problems are identified and development trends considered.

All 52 of the county's 52 municipalities are vulnerable to the following hazards:

- Floods, flash floods, and ice jams
- Winter storms (including snow and ice storms)
- Tornadoes and windstorms
- Thunderstorms and hail
- Droughts and water supply deficiencies
- Traffic accidents
- Power outages
- Terrorism
- Earthquakes

Vulnerability to the following hazards is as follows:

- Fixed nuclear facility incidents
  - Armstrong Township
  - Bastress Township
  - Brady Township
  - Cascade Township
  - Clinton Township
  - Duboistown Borough
  - Eldred Township
  - Fairfield Township
  - Franklin Township
  - Gamble Township
  - Hepburn Township
  - Hughesville Borough
  - Jordan Township
  - Lewis Township
  - Limestone Township
  - Loyalsock Township
  - Lycoming Township
  - McIntyre Township
  - McNett Township
  - Mill Creek Township
  - Montgomery Borough
  - Montoursville Borough
  - Moreland Township
  - Muncy Borough
  - Muncy Creek Township
  - Muncy Township
  - Old Lycoming Township
  - Penn Township
  - Picture Rocks Borough
  - Plunketts Creek Township
  - Shrewsbury Township
  - South Williamsport Borough
  - Susquehanna Township
  - Upper Fairfield Township
  - Washington Township
  - Williamsport, City of
  - Wolf Township
- Natural gas releases
  - Anthony Township
  - Brown Township
  - Cascade Township
  - Cogan House Township
  - Cummings Township
  - Eldred Township

- Fairfield Township
- Franklin Township
- Gamble Township
- Jackson Township
- Jordan Township
- Lewis Township
- Lycoming Township
- McHenry Township
- McIntyre Township
- McNett Township
- Mifflin Township
- Mill Creek Township
- Moreland Township
- Muncy Township
- Penn Township
- Pine Township
- Plunketts Creek Township
- Salladasburg Borough
- Shrewsbury Township
- Upper Fairfield Township
- Watson Township
- Wolf Township

- Subsidence and Sinkholes
  - Armstrong Township
  - Brady Township
  - Clinton Township
  - Duboistown Borough
  - Fairfield Township
  - Limestone Township
  - Montoursville Borough
  - Muncy Borough
  - Muncy Creek Township
  - Muncy Township
  - Nippenose Township
  - Piatt Township
  - Porter Township
  - South Williamsport Borough
  - Susquehanna Township
  - Washington Township
  - Williamsport, City of
  - Wolf Township
  - Woodward Township

- Wildfires
  - Armstrong Township
  - Brady Township
  - Brown Township
  - Cascade Township
  - Clinton Township
  - Cogan House Township
  - Cummings Township
  - Gamble Township
  - Jackson Township
  - Lewis Township
  - Limestone Township
  - McHenry Township
  - McIntyre Township
  - McNett Township
  - Nippenose Township
  - Pine Township
  - Plunketts Creek Township
  - Upper Fairfield Township
  - Washington Township
  - Watson Township
  - Wolf Township

4.2.1. Presidential Disaster Declarations

The following table lists the Presidential Disaster Declarations that have (or may have) been issued for Lycoming County since 1955.

Table 8: Presidential Disaster Declarations

Year	*Date*	*Disaster Type*	*Disaster Number*	*Public Assistance* Assistance to state and local governments and certain private, nonprofit organizations for emergency work and the repair or replacement of disaster-damaged facilities	*Individual Assistance* Assistance to individuals and households
2004	09/19	Tropical Depression Ivan	1557	Allegheny, Armstrong, Beaver, Bedford, Blair, Bradford, Bucks, Butler, Cameron, Carbon, Centre, Clarion, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Elk, Franklin, Fulton, Green, Huntingdon, Indiana, Jefferson, Juniata, Lackawanna, Lawrence, Lebanon, Lehigh, Luzerne, Lycoming, Mifflin, Monroe, Montour, Northampton, Northumberland, Perry, Pike, Potter, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Washington, Wayne, Westmoreland, Wyoming, and York for debris removal and emergency protective measures, and Allegheny, Armstrong, Beaver, Bedford, Blair, Bradford, Bucks, Butler, Cameron, Carbon, Centre, Clarion, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Fulton, Greene, Huntingdon, Indiana, Jefferson, Juniata, Lackawanna, Lebanon, Luzerne, Lycoming, Mifflin, Monroe, Montour, Northampton, Northumberland, Perry, Pike, Schuylkill, Snyder, Susquehanna, Tioga, Union, Washington, Wayne, Westmoreland, Wyoming, York	Allegheny, Armstrong, Beaver, Bedford, Blair, Bradford, Bucks, Butler, Cameron, Carbon, Centre, Chester, Clarion, Clearfield, Clinton, Columbia, Crawford, Cumberland, Dauphin, Delaware, Elk, Franklin, Fulton, Green, Huntingdon, Indiana, Jefferson, Juniata, Lackawanna, Lawrence, Lebanon, Lehigh, Luzerne, Lycoming, Mifflin, Monroe, Montgomery, Montour, Northampton, Northumberland, Perry, Philadelphia, Pike, Potter, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Washington, Wayne, Westmoreland, Wyoming, York
1999	09/22	Tropical Depression Dennis and Flash Flooding	1298	None	Dauphin, Lycoming, Northumberland, Snyder, Union

Year	Date	Disaster Type	Disaster Number	Public Assistance Assistance to state and local governments and certain private, nonprofit organizations for emergency work and the repair or replacement of disaster-damaged facilities	Individual Assistance Assistance to individuals and households
Public Assistance/Individual Assistance data not available prior to 1998					
1996	01/21	Flooding	1093	Statewide	
1996	01/13	Blizzard	1085	Statewide	
1985	06/03	Severe Storms, High Winds, Tornadoes	737	Erie, Crawford, Warren, McKean, Mercer, Venango, Forest, Butler, Beaver, Clearfield, Lycoming, Union, Northumberland	
1975	09/26	Severe Storms, Heavy Rains, Flooding	485	Adams, Berks, Bradford, Centre, Clinton, Columbia, Cumberland, Dauphin, Franklin, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Lycoming, Mifflin, Montour, Northampton, Perry, Potter, Schuylkill, Snyder, Sullivan, Susquehanna, Tioga, Union, Wayne, Wyoming, York	
1972	06/23	Tropical Storm Agnes	340	All 67 Counties	
1965	08/18	Water Shortage	206	Numerous Communities Statewide	
1955	08/20	Floods, Rains	40	Northeastern Counties	

Sources: FEMA, PEMA

4.2.2. Summary of Hazards

Most of the hazards listed in Section 4.2 either have not affected Lycoming County's communities, or have affected them in a minor way that the Steering Committee considers them of such low risk that they will not be addressed in this HMP.

Several of these hazards are described in Table 9, below.

Table 9: Natural Hazards Not Applicable to Lycoming County

Hazard	Description	Reason for Dismissal
Avalanche	An avalanche is a mass of snow sliding down a mountainside. It occurs when the stress (from gravity) trying to pull the snow downhill exceeds the strength of bonds that form between snow grains within the snow cover. Temperature, precipitation, wind, depth of snow cover, slope, and vegetation density all influence the frequency and intensity of avalanches. Conditions do not exist for avalanches to occur within Pennsylvania (FEMA, 1997).	They are present in North America, but have not existed in Pennsylvania for approximately 17,000 years (DCNR, 1999).
Coastal Erosion	Coastal erosion is a natural coastal process in which sediment outflow exceeds sediment inflow at a particular location. These sediments are typically transported from one location to another by wind, waves, currents, tides, wind-driven water, waterborne ice, runoff of surface waters, or groundwater seepage. Depending on the location and processes in place, coastal erosion can take place very slowly, whereby the shoreline shifts only inches to a foot per year; or more rapidly, whereby changes can exceed ten feet per year. Intense storms and human interference can result in avulsion events where large portions of a beach or dune are washed away by strong currents and large waves (FEMA, 1997).	Lycoming County is not along a coastline.

Hazard	Description	Reason for Dismissal
Coastal Storm	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).	Lycoming County is not along a coastline.
Hurricane	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).	Lycoming County is not along a coastline, and is therefore not vulnerable to storm surge. Flooding and severe winds, both aspects of hurricanes, are profiled separately.
Tsunami	A tsunami is a series of ocean waves generated by sudden displacements in the sea floor, landslides, or volcanic activity. In the deep ocean, the tsunami wave may only be a few inches high. The tsunami wave may come gently ashore or may increase in height to become a fast-moving wall of turbulent water several meters high. Worldwide, unusual wave heights have been known to be over 100 feet high, and depending on a number of factors, some low-lying areas could experience severe inland inundation of water and debris of more than 1,000 feet. No known tsunami events have been documented in Pennsylvania over the past 200 years (Dunbar & Weaver, 2007).	Lycoming County is not along a coastline.

Hazard	Description	Reason for Dismissal
Volcano	A volcano is a vent in the earth's crust through which magma, rock fragments, gases, and ash are ejected from the earth's interior. Over time, accumulation of these erupted materials on the earth's surface creates a volcanic mountain. Hazards associated with the eruption of volcanoes endanger people, buildings, and infrastructure. Volcanoes can lie dormant for centuries between eruptions, and the risk posed by volcanic activity is not always apparent.	There are no active or dormant volcanoes in Pennsylvania (FEMA, 1997).

However, the Steering Committee has identified 10 hazards, five of them natural and five man-made, that affect the County and its communities to a sufficient degree to warrant formal profiling and the creation of mitigation actions to minimize their impacts. These hazards are briefly summarized below, and profiled in Section 4.3. Section 4.3 also contains profiles of earthquakes, subsidence and sinkholes, and wildfires. The methodology used to prioritize these hazards is described in Section 4.4.

Lycoming County, like the majority of the Commonwealth of Pennsylvania, is most vulnerable to flood events that may be due to heavy rains or snow/ice melt. The largest metropolitan area in the County, the City of Williamsport, is itself protected from flooding along the Susquehanna River by a floodwall. Since 1993, there have been approximately 40 flood events reported throughout the County, ranging from individual roads being washed out to large-scale river and stream flooding.

The County is also susceptible to winter storms, with an average annual snowfall of between 50 and 60 inches. As the snow melts, it exacerbates the potential for flooding. Tornadoes and windstorms also pose a hazard to the County; a tornado is expected every two years, and intense straight-line winds occur annually.

Next, Lycoming County experiences thunderstorms on an annual basis, with several occurring each summer. These storms bring with them intense rainfall, strong winds, lightning, and hail.

Droughts are the last major natural hazard experienced by the County, depleting water supplies, destroying crops, and increasing the risk of wildfires.

Lycoming County is also vulnerable to the effects of several man-made hazards: traffic accidents, power outages, terrorism, fixed nuclear facility incidents, and natural gas drilling site incidents. Traffic accidents occur on a daily basis, with serious accidents occurring several times each year along the County's major roadways.

Power outages also occur frequently throughout the year, due to a variety of reasons. These outages threaten special needs populations, who may depend on their power for heat in the winter or cooling in the summer months, and may be more vulnerable to extreme temperatures than other segments of the population.

Next, terrorism is a significant risk to the County, as it hosts the site of the Little League World Series. This event brings in visitors from around the world, and represents a major target for attack.

Lycoming County also lies within the 50-mile Ingestion Exposure Pathway Emergency Planning Zone (EPZ) of the Susquehanna Steam Electric Station (SSES), and as such, its crops and dairy farms are at risk to radioactive contamination from a release at that power plant.

Finally, the burgeoning natural gas industry in the County poses a significant threat to the safety and well-being of the County's population, with almost 250 natural gas drilling sites spread throughout the County. Any of these sites could experience a release, fire, or explosion.

4.3. *Hazard Profiles*

Disaster frequency and its effects or severity are an important basis for planning emergency response and mitigation. Natural hazards tend to reoccur on a predictable seasonal basis, whereas human-caused or technological events tend to change over time with advancements in technology and methods of operation.

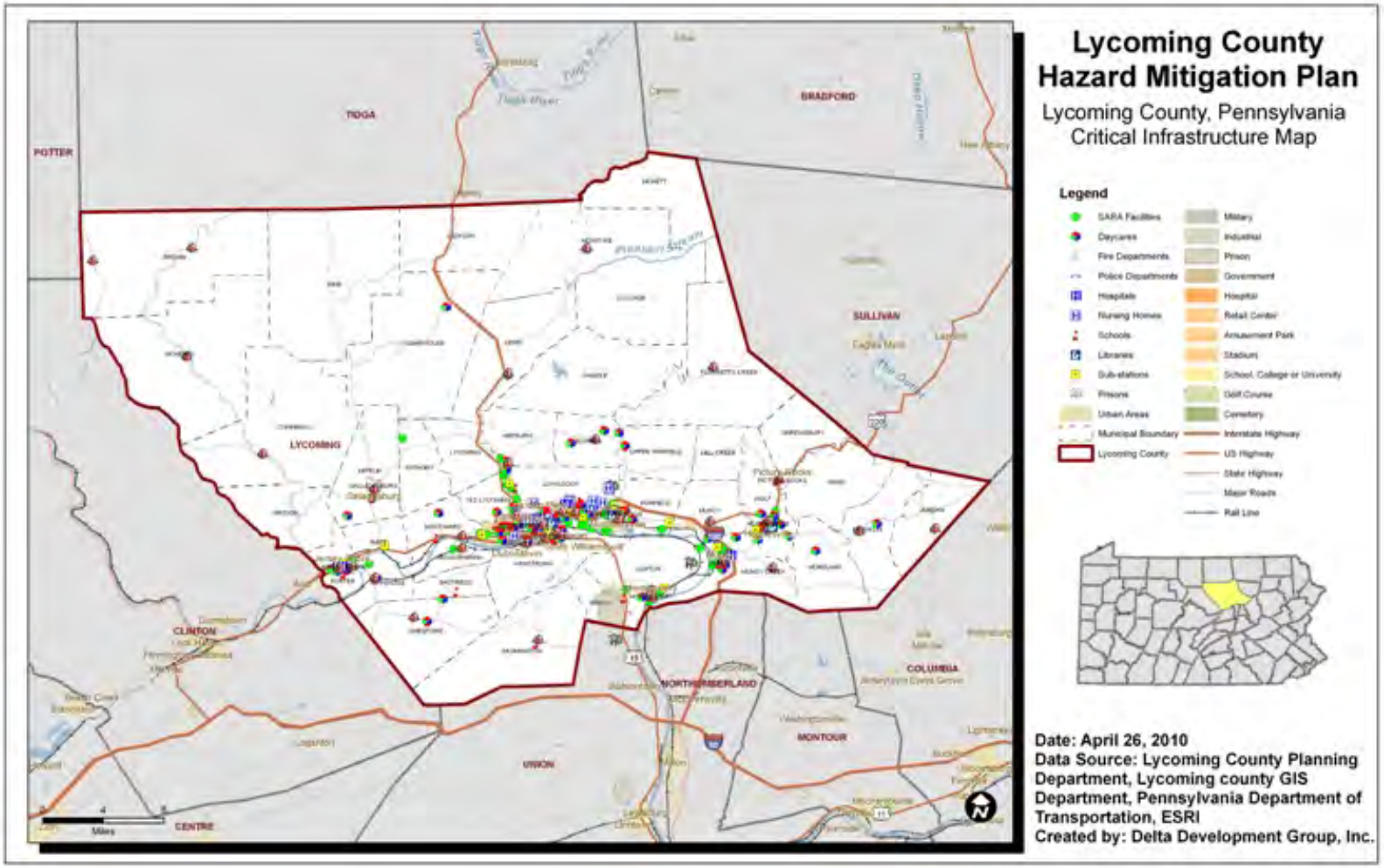
Five criteria were selected to ensure a systematic and comprehensive approach to hazard analysis:

- **Location and Extent**: The location and extent of the County's vulnerability to a certain hazard can vary throughout the County. The maximum threat or worst-case disaster should be considered for each hazard. However, secondary effects of many hazards can be just as devastating. These secondary effects cause many hazards to become regional hazards affecting many areas with differing impacts.
- **Range and Magnitude**: Each individual hazard poses certain threats to the County and its municipalities. It is important to identify what hazards pose the greatest threat and focus mitigation actions toward those hazards.
- **Past Occurrences**: A record of past events is particularly helpful to evaluate hazards. Past records of the County's hazards also offer valuable information when tempered with the knowledge of preventative efforts, changes in preventative efforts, and advancements in technology that may reduce the frequency or severity of such an event.
- **Future Occurrences**: The probability of an occurrence in the future is another important factor to consider when preparing for an all-hazards response. An event that occurs annually with relatively minor impact may deserve more emphasis than a major event that occurs once every 50 to 100 years.
- **Vulnerability Assessment**: The susceptibility of a community to destruction, injury, or death resulting from a hazard event defines the degree of vulnerability. The degree of vulnerability may be related to geographic location, as with floodplains, the type of facilities or structure, or the socioeconomics of a given area. Additionally, certain

population groups may be more vulnerable to some hazards because of immobility or their inability to take protective action. The vulnerability assessment section of each hazard profile lists the critical infrastructure within the respective hazard areas. Maps showing the locations of this infrastructure in the 1% chance floodplain are shown in Appendix D. A map showing the critical infrastructure throughout the county (i.e., the critical infrastructure in the vulnerable areas for hazards equally affecting the entire county) is shown below in Map 3. These hazards include the following:

- Winter storms
- Tornadoes and wind storms
- Thunderstorms and hail
- Droughts and water supply deficiencies
- Traffic accidents
- Power outages
- Terrorism
- Earthquakes

Map 3: Critical Infrastructure in Lycoming County



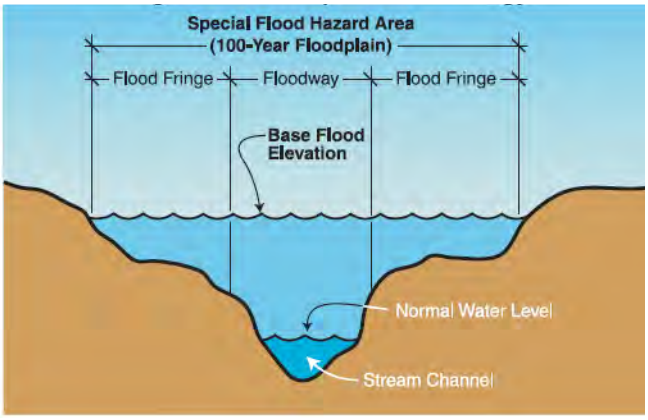
Lycoming County relied heavily on existing data sources developed by County departments, including the County Comprehensive Plan, the existing FEMA-approved County HMP, County Subdivision and Land Development Ordinances, and municipal ordinances obtained through the County Planning Commission. In addition, digital tax assessment data and GIS data were critical in analysis. Potential losses to flooding were analyzed with existing Lycoming County tax assessment data overlaid with the 1% chance floodplain.

Information was gathered from a variety of sources to develop hazard profiles. State agency sources included the Pennsylvania Department of Environmental Protection, the Pennsylvania Department of Conservation and Natural Resources (DCNR), and PEMA. Federal agency sources included the Bureau of Transportation Statistics, the Environmental Protection Agency, the National Climatic Data Center, and FEMA.

4.3.1. Floods, Flash Floods, and Ice Jams

A flood is a natural event for rivers and streams. For inland areas like northcentral Pennsylvania, excess water from snowmelt or rainfall accumulates and overflows onto the stream banks and adjacent floodplains. As illustrated in Figure 1, floodplains are lowlands, adjacent to rivers, streams, and creeks that are subject to recurring floods.

Figure 1: Floodplain Terminology



Floods are considered hazards when people and property are affected. Nationwide, hundreds of floods occur each year, making it one of the most common hazards in all 50 states and U.S. territories. In Pennsylvania, flooding occurs commonly and can occur during any season of the year from a variety of sources. Every two to three years, serious flooding occurs along one or more of Pennsylvania's major rivers or streams, and it is not unusual for this to occur several years in succession. Most injuries and deaths from flooding happen when people are swept away by flood currents and most property damage results from inundation by sediment-filled water.

Flooding remains one of the most prevalent, costly, and damaging of all hazards facing the American public: “This century alone floods have caused a greater loss of life and property, and

disrupted more families and communities than all other natural hazards combined."[1] Most communities in the United States are subject to periodic flooding, whether as a result of dam failure (there are no high-hazard dams in Lycoming County), excessive precipitation, or inadequate drainage.

Several factors determine the severity of floods, including rainfall intensity and duration, topography and ground cover. A large amount of rainfall over a short time span can result in flash flood conditions. A small amount of rain can also result in floods in locations where the soil is frozen or saturated from a previous wet period or if the rain is concentrated in an area of impermeable surfaces such as large parking lots, paved roadways, or other impervious developed areas.

In northcentral Pennsylvania, including Lycoming County, there are seasonal differences in the causes for floods. In the winter and early spring (February to April), major flooding has occurred as a result of heavy rainfall on dense snowpack throughout contributing watersheds, although the snowpack is generally moderate during most winters. Winter floods also have resulted from runoff of intense rainfall on frozen ground, and local flooding has been exacerbated by ice jams in rivers, streams, and creeks. Summer floods have occurred from intense rainfall on previously saturated soils. Summer thunderstorms that deposited large quantities of rainfall over a short period of time have also produced flash flooding. In addition, the Commonwealth occasionally receives intense rainfall from tropical storms in late summer and early fall.

4.3.1.1. *Location and Extent*

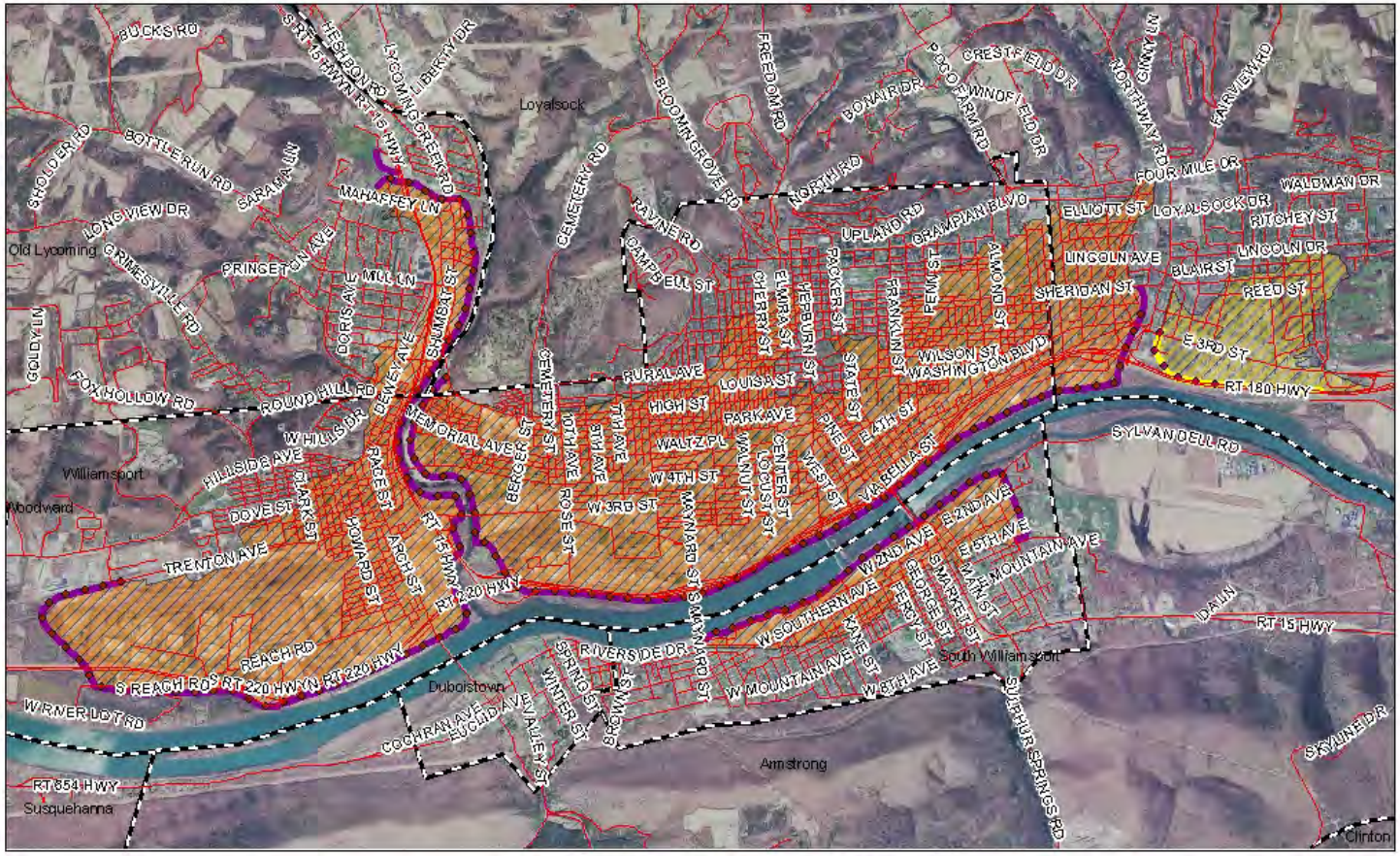
Pennsylvania has more stream miles than any other state, and many of its communities are located in floodplains. For waterfront communities, the level of risk constantly changes in response to unpredictable weather patterns and seasonal influences. Over 2,200 miles of stream traverse Lycoming County, more than any other county in Pennsylvania. Major flood-prone areas are communities located in low-lying valleys of major streams and tributaries. Unless protected by a dike or levee, most population concentrations along the Susquehanna River have a high possibility of flooding.

Maps depicting the 1% chance floodplain within Lycoming County and each municipality are shown in Appendix D. These maps are based on digitized floodplain information from the Pennsylvania Department of Environmental Protection (PA DEP), and take into account the protection offered by levees along the different waterways. The PA DEP created a digital floodplain map layer for the entire Commonwealth, including Lycoming County's 52 municipalities. Map 4 on the next page shows the Williamsport Levee System and the properties it protects.

[1] P. Michael Laub et al., *Report on the Costs and Benefits of Natural Hazard Mitigation* (Washington, DC: Government Printing Office, 1998).

The Bull Run Flood Protection System, which protects Loyalsock Township, keeps 72 properties (49 businesses and 23 residences) dry. In the Borough of South Williamsport, a levee runs from Maynard Street in the west to a spot near the northernmost boundary of the borough. The levee is 12,180 feet in length and was built by the Army Corps of Engineers in 1952. This levee protects 498 houses and 276 businesses from being inundated or destroyed by the Susquehanna River.

Map 4



Williamsport Levee System

Road
Municipal Boundarys
Williamsport Flood Protection System
Bull Run Flood Protection System

4.3.1.2. *Range of Magnitude*

Several factors determine the extent or "severity" of floods, including rainfall intensity and duration or volume and rate of snowmelt. The County also has conditions that may exacerbate the effects of floods:

- Topography and ground cover contribute to the location and severity of floods, e.g., water runoff is greater in areas with steep slopes and little or no vegetative ground cover.
  - Waterway confluence: As waterways in the County flow into each other, the flooding in one waterway may cause a backwater effect, resulting in flooding along another waterway.
  - Steep slopes: The County has sloping terrain that can contribute to increased flooding, since runoff reaches the receiving creeks, streams, and rivers more rapidly over steeper terrain. Extended periods of heavy rain can also result in landslides or mudslides along these steep slopes.
  - Paved surfaces: Urbanization leads to replacement of vegetative ground cover with asphalt and concrete, increasing surface runoff of stormwater. This effect may be exacerbated by poorly planned stormwater drainage systems.
- Transportation hazards: Flood waters may spill onto roadways, resulting in washouts, trapped vehicles, and road closures. Despite public information campaigns (e.g., the National Weather Service's "Turn Around Don't Drown" campaign), many drivers will attempt to drive through flooded sections of road.
- Hazardous materials facilities: Several facilities that handle or store hazardous materials are located in the 500-year floodplains, presenting potential sources of contamination during flood events.

During the winter of 1996, unseasonably high temperatures began to melt an immense snow pack that had accumulated during the "Blizzard of 1996." Accompanying heavy rainfall and high winds carried large volumes of runoff, overwhelming small and large watersheds. Before the week was over, all 67 of Pennsylvania's counties had been declared federal disaster areas. The Susquehanna River Basin was hit particularly hard. Ice jams on the Susquehanna River contributed to rapid water rises, the highest recorded in Harrisburg since 1890. Flood levels in the Lycoming Creek Basin reached 22.6 feet, two feet higher than flood stages recorded during tropical storm Agnes in 1972. Throughout Lycoming County, damage sustained from storms and floods exceeded $100 million. Six lives were lost in the Lycoming Creek Valley.

4.3.1.3. *Past Occurrence*

During the winter of 1996, unseasonably high temperatures began to melt an immense snow pack that had accumulated during the blizzard of 1996. Accompanying heavy rainfall and high winds carried large volumes of runoff, overwhelming small and large watersheds. Before the week was over, all 67 of Pennsylvania's counties had been declared federal disaster areas. The Susquehanna River Basin was hit particularly hard. Ice jams on the Susquehanna River

contributed to rapid water rises, the highest recorded in Harrisburg since 1890. Flood levels in the Lycoming Creek Basin reached 22.6 feet, two feet higher than flood stages recorded during tropical storm Agnes in 1972. Throughout Lycoming County, damage sustained from storms and floods exceeded $100 million. Six lives were lost in the Lycoming Creek Valley.

The following table contains information on flooding-related events since 1993 that impacted Lycoming County. These are the oldest floods for which data is available from the NCDC.

Table 10: History of Flooding in Lycoming County Since 1993

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
All Eastern Municipalities	11/28/1993	Flash Flood	0	0	0	0
Southeast Portion of County	7/24/1994	Flash Flood	0	0	0	0
County-wide	8/18/1994	Flash Flood	0	0	3,924,000	0
County-wide	10/21/1995	Flash Flood	0	0	0	0
County-wide	1/19/1996	Flash Flood	6	0	0	0
County-wide	1/19/1996	Flood	0	0	0	0
Western Section	11/8/1996	Flash Flood	0	0	0	0
Southeast	12/1/1996	Flash Flood	0	0	0	0
County-wide	12/13/1996	Flash Flood	0	0	0	0
County-wide	1/8/1998	Flash Flood	0	0	0	0
South Portion	2/18/1998	Flash Flood	0	0	0	0
Muncy	6/16/1998	Flash Flood	0	0	0	0
Southeast Portion	9/7/1999	Flash Flood	0	0	1,000,000	0
County-wide	9/16/1999	Flash Flood	0	0	20,000	0
County-wide	12/17/2000	Flash Flood	0	0	0	0
County-wide	3/26/2002	Flood	0	0	0	0
Montgomery	5/13/2002	Flash Flood	0	0	0	0
Elimsport	5/30/2002	Flash Flood	0	0	0	0
County-wide	3/20/2003	Flood	0	0	0	0
County-wide	11/20/2003	Flood	0	0	0	0
Southern Lycoming	3/7/2004	Flood	0	0	0	0

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Muncy	5/26/2004	Flash Flood	0	0	0	0
Hughesville	7/31/2004	Flash Flood	0	0	0	0
County-wide	9/8/2004	Flood	0	0	0	0
Southern Lycoming	9/10/2004	Flood	0	0	0	0
County-wide	9/17/2004	Flood	2	0	50,000,000	0
Southern Lycoming	9/18/2004	Flood	0	0	0	0
Southern Lycoming	1/15/2005	Flood	0	0	0	0
Southern Lycoming	3/29/2005	Flood	0	0	0	0
County-wide	3/29/2005	Flood	0	0	0	0
County-wide	4/2/2005	Flood	0	0	0	0
Southern Lycoming	4/3/2005	Flood	0	0	0	0
Southern Lycoming	11/30/2005	Flood	0	0	0	0
Southern Lycoming	12/1/2005	Flood	0	0	0	0
Muncy Creek Township	8/29/2006	Flash Flood	0	0	0	0
Muncy Creek Township	11/16/2006	Flash Flood	0	0	0	0
Muncy	11/16/2006	Flash Flood	0	0	0	0
Cedar Run	3/5/2008	Flood	0	0	0	0
County-wide	1/25/2010	Flood	0	0	589,100	0
		TOTALS:	8	0	$55,533,100	0

Source: National Climatic Data Center (NCDC)

4.3.1.4. *Future Occurrence*

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. The National Flood Insurance Program (NFIP) uses historical records to determine the probability of occurrence for different extents of flooding. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year.

A specific flood that is used for a number of purposes is called the “base flood,” which has a 1 percent chance of occurring in any particular year. The base flood is often referred to as the “100-year flood,” since its probability of occurrence suggests it should reoccur once every 100 years, although this is not the case in practice. The term “100-year flood” is a misnomer. Experiencing a 100-year flood does not mean a similar flood cannot happen for the next 99 years; rather, it reflects the probability that over a long period of time a flood of that magnitude has a 1 percent chance of occurring in any give year.

Smaller floods occur more often than larger (deeper and more widespread) floods. Thus, a “10-year” flood has a greater likelihood of occurring than a “100-year” flood. Table 11 shows a range of flood recurrence intervals and their probabilities of occurrence.

The extent of flooding associated with a 1 percent probability of occurrence – the base flood – is used as a regulatory boundary by a number of federal, state, and local agencies. Also referred to as the “special flood hazard area,” this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities, since many communities like Lycoming County have maps available that show the extent of the base flood and the likely depths that will be experienced.

Table 11: Flood Probability Terms

Flood Recurrence Intervals	Chance of Occurrence in Any Given Year (%)
10 years	10
50 years	2
100 years	1
500 years	0.2

Carved through glacial deposits and steep terrain, the Lycoming County tributaries of the Susquehanna River are characterized by high gradients and significant bedload movement. The steep slopes characteristic of the County’s northern landscape contribute to increased stormwater runoff, particularly during wet weather events. The potential for flooding constantly changes in response to a stream’s sediment load, discharge rates, and water levels. The back-water effect, in which the flooding of one waterway will result in flooding along waterways that join with it, is a common problem throughout the Susquehanna River’s watershed.

Based on previous events, Lycoming County can expect between two and three flood events per year.

4.3.1.5. *Vulnerability Assessment*

Despite the fact that all of Lycoming County’s 52 municipalities participate in the National Flood Insurance Program (NFIP), communities need to strengthen floodplain management by reviewing current codes and ordinances and by strongly enforcing their floodplain codes on new development to avoid aggravating further flooding.. Significant residential growth in the outlying

rural townships can increase opportunities for flash flooding if floodplain development and stormwater management are not properly regulated. Numerous times since the January 1996 floods, localized rainstorms that went undetected by the National Weather Service created surface flooding, which forced evacuations in several floodplain communities.

Throughout the years, stream improvement projects have been undertaken to reduce erosion and the threat to habitable structures along the creek. Approximately 100 properties within the floodplain have been acquired and cleared in Old Lycoming, Hepburn, Lewis, Lycoming, Loyalsock, and McIntyre Townships.

The flood hazard vulnerability assessment for the County focused on the community assets that are located in the 1% chance floodplain. While greater and smaller floods are possible, information about the extent and depth for the 1% chance floodplain is available in a similar format for all 52 Lycoming County municipalities, providing a consistent basis for analysis. This vulnerability assessment is followed by a similar analysis of the properties protected by levees.

The following table lists the Critical Infrastructure within the 1% chance floodplain. This vulnerable critical infrastructure includes several facilities storing hazardous materials, 13 fire stations, nine water or sewer facilities, and several day care facilities. Information on the numbers and types of buildings in the 1% chance floodplain can be found in Appendix E.

Table 12: Critical Infrastructure in the 1% Chance Floodplain

Municipality	Facility
Anthony Township	Jersey Shore Water Filtration Plant
Armstrong Township	Carlos R. Leffler Inc.
	Chemical Leaman Tank Lines Inc.
	Coastal Oil New York Inc.
	Gulf Oil
Clinton Township	Clinton Twp. Fire Dept.
	Interstate Battery Company
	Montgomery (69) Substation
	Ralph Styer Farm
Eldred Township	Eldred Twp. Fire Co.
	Ott Day Care
Fairfield Township	William Hiller Farm
Jersey Shore Borough	Coastal Mart #7004
	Hiller's Inc.
	Hope Preschool (Jersey Shore)
	Independent Fire Dept. (JS)
	Jersey Shore Borough Police
	Jersey Shore Pool
	Jersey Shore Sewage Treatment Plant
	Wonder Years Child & School

Municipality	Facility
Lewis Township	Trout Run Vol. Fire Co.
Loyalsock Township	Heshbon Storage Building
	Kwik Fill M0124
	Riverfront Park Maintenance Building
Lycoming Township	Creative Kinder Care
McIntyre Township	Lisa Clark Group Day Care
	Ralston Fire Dept
Montgomery Borough	Brodart Company
	Linear Dynamics Inc. - Montgomery
	Montgomery Sewage Treatment Plant
	Montgomery Vol. Fire Co.
Montoursville Borough	Coastal Mart #7003
	John Bower Farm 3 - Montoursville
	Montour Oil Service Co.
	Montoursville (20) Sub-station
	Montoursville Borough Police
	Montoursville Swimming Pool
	Montoursville Water Well #3
	Montoursville Water Well #4
	Montoursville Water Well #5
	Sunoco
Muncy Borough	Andritz Sprout-Bauer
	Automotive Service Inc.
	Dewald Family Day Care
	Keystone Hook & Ladder
	Muncy Borough Police
	Uni-Mart #04047
Muncy Creek Township	Larry Fry Farm Fields - Muncy Creek
	Muncy Sewage Treatment Plant
	Sunoco
	Thomas Styer Farm
Nippenose Township	Camerer Farms
Old Lycoming Township	American Lumber
	Richard Hall Farm
	Stroehmann Bakers Inc.
Salladasburg Borough	Larry's Creek Fire Dept.
South Williamsport Borough	First Ward Fire Co.

Municipality	Facility
Susquehanna Township	Dick Tebbs Farm #2 - Muncy Twp.
	Nisbet Fire Dept.
Williamsport, City of	High Steel Structures Inc.
	Linden (57) Substation
Wolf Township	Hughesville Well #101
	Hughesville Well #102
Woodward Township	Plastic Development Co.

The critical infrastructure protected by the levee systems includes eight fire stations, more than 30 child care or school facilities, and several personal care homes.

Table 13: Critical Infrastructure Protected by the Levee Systems

Municipality	Facility
Loyalsock Township	Faxon (72)
	Hills Day Care
Old Lycoming Township	Old Lycoming Township Fire Dept.
	Old Lycoming Twshp. Police
South Williamsport Borough	Citizen's Fire Co. #2 (S.W.)
	Indep. Fire Dept (S.W.)
	Messiah Lutheran
	Mountain View
	Mountain View - 7th Day Advent
	Paddington Station
	S.W. Borough Police
	S.W. United Methodist Church
	South Williamsport (38)
Williamsport, City of	Adams
	Birth to First Step
	Child Guidance
	Child Guidance Day Care
	Children's Learning Center
	City Kidz
	City of Wmspt. Police
	Dr. Max Miller Preschool (Hope Enterprises, Inc.)
	First Nursery School
	Golden Rule Day Care
	Greenview Tot Club
	Haswell
	Helisek Day Care

Municipality	Facility
	Hope Enterprises Day Care
	Insinger's Personal Care - Cam
	James V. Brown - Williamsport
	Lambert Day Care
	LCCS Children's Dev. Center
	LCCS Grace UMC
	LCCS Lose Elementary
	LCCS Sheridan Elementary
	LCCS St. Boniface School
	Little Lambs
	Little Starrs Day Care
	Lycoming Child Care Services
	Lycoming College
	Lycoming County Prison
	Lycoming County Sheriff
	Lycoming Nursery
	Marcy's Child Care
	Memorial Baptist
	Miller
	Ousley
	PCT Child Care Center
	Pennsylvania College of Technology
	Pine Street Nursery & Daycare
	Presbyterian Home
	Salvatori's Day Care
	Seagraves Day Care
	Sheridan
	St. Boniface
	St. John Newmann
	Sugar n Spice Day Care 1 & 2
	Titus
	West Branch
	West Branch School SACC
	West House Personal Care Home
	West Williamsport (35)
	Williamsport (37)
	Williamsport Bureau of Fire
	Williamsport Hospital
	Williamsport School of Commerce

Municipality	Facility
	Willow View Personal Care
	YMCA #4
	YMCA Child Care Cntr. 1 & 2

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

4.3.2. Winter Storms

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

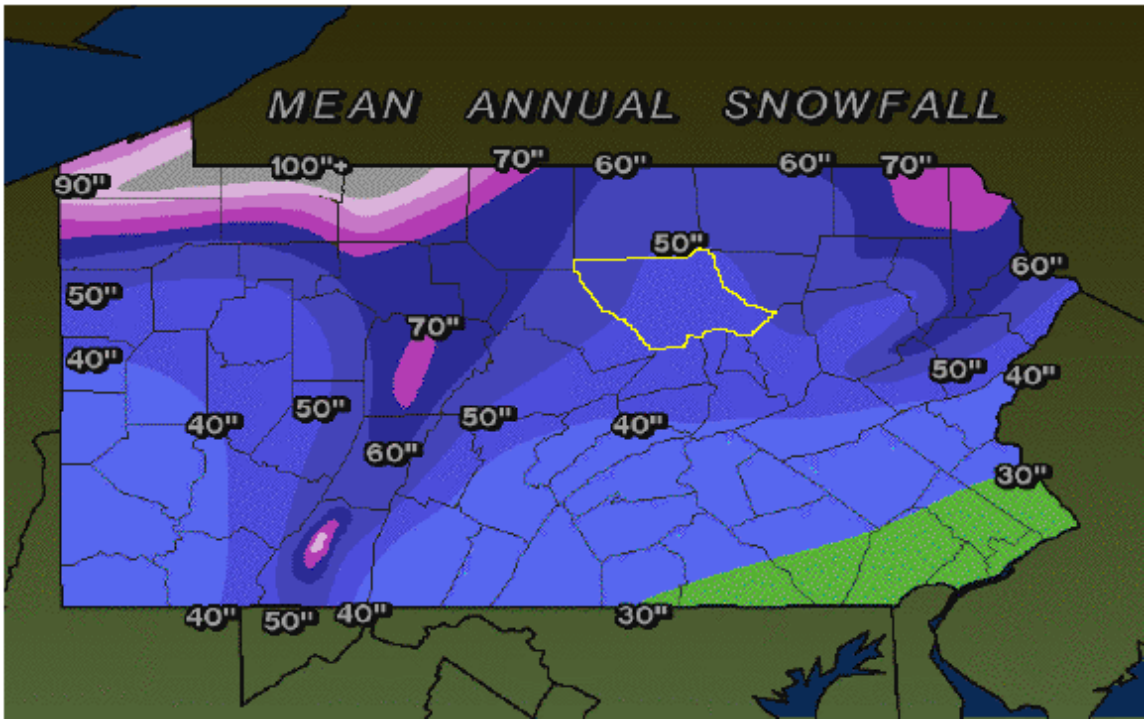
4.3.2.1. *Location and Extent*

Winter storms occur on the average of five times a year in Pennsylvania. Every county in the Commonwealth is subject to severe winter storms, although the northern tier, western counties, and mountainous regions tend to experience these storms more frequently and with greater severity.

Average annual snowfall in Lycoming County ranges from 50 to 60 inches, with the higher snowfall occurring in the northwest portion of the County. A map displaying annual snowfall totals throughout Pennsylvania is shown below.[2]

[2] National Weather Service State College Office, "Seasonal Snowfall Maps," http://www.erh.noaa.gov/ctp/features/snowmaps/index.php?tab=norms.

Map 5



4.3.2.2. *Range of Magnitude*

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

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

In Lycoming County, a devastating winter storm occurred in early January 1994. This storm caused record snowfall depths (in excess of 33 inches in some portions of the Commonwealth), strong winds, and sleet/freezing rains. Numerous storm-related power outages were reported, and as many as 600,000 residents were without electricity, in some cases for several days at a time. An intense ice storm followed that affected the Commonwealth and closed major arterial roads and downed trees and power lines. Utility crews from a five-state area were called to assist in power restoration repairs. Officials from PP&L stated that this was the worst winter storm in the history of the company, and related damage-repair costs exceeded $5,000,000.

4.3.2.3. *Past Occurrence*

Lycoming County has experienced many major winter storms. In January 1978 and February 1992, emergencies were declared statewide because of heavy snow. In February 1978, March 1989, and March 1993, emergencies were declared due to blizzard conditions – high winds with snow.

The Commonwealth of Pennsylvania has a long history of severe winter weather. In the winter of 1993-1994, the state was hit by a series of protracted winter storms. Lycoming County received approximately 80 inches of snow. The severity and nature of these storms combined with accompanying record-breaking frigid temperatures posed a major threat to the lives, safety, and well-being of Commonwealth residents and caused major disruptions to the activities of schools, businesses, hospitals, and nursing homes.

The first of these devastating winter storms occurred in early January 1994, with record snowfall depths (in excess of 33 inches in the southwest and southcentral portions of the Commonwealth), strong winds, and sleet/freezing rains. Numerous storm-related power outages were reported, and as many as 600,000 residents were without electricity, in some cases for several days at a time. An intense ice storm followed that affected the southeastern portion of the Commonwealth and closed major arterial roads and downed trees and power lines. Utility crews from a five-state area were called to assist in power restoration repairs. Officials from PP&L stated that this was the worst winter storm in the history of the company, and related damage-repair costs exceeded $5,000,000.

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

The record cold conditions resulted in numerous water-main breaks and interruptions of service to thousands of municipal and city water customers throughout the Commonwealth. Additionally, the extreme cold in conjunction with accumulations of frozen precipitation resulted

in acute shortages of road salt. As a result, trucks were dispatched to haul salt from New York to expedite deliveries to PennDOT storage sites.

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

In January 1996, several severe snowstorms prompted Governor Ridge to issue an Emergency Declaration for the entire state. Lycoming County documented its greatest snowfall in history that year: 87.7 inches. Included in these storms was the blizzard of 1996, which dumped as much as 40 inches of snow on some parts of Pennsylvania. Many communities could not maintain emergency corridors necessary to sustain operations at critical health and safety facilities. President Clinton included the state in a list of federally declared disaster areas to receive funding for emergency snow removal.

Table 14: History of Additional Winter Storms in Lycoming County from 2004-2009

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Lycoming	1/27/2004	Heavy Snow	0	0	0	0
Lycoming	2/3/2004	Heavy Snow	0	0	0	0
Lycoming	3/16/2004	Heavy Snow	0	0	0	0
Lycoming	1/5/2005	Winter Storm	0	0	0	0
Lycoming	1/8/2005	Ice Storm	0	0	0	0
Lycoming	1/22/2005	Winter Storm	0	0	0	0
Lycoming	2/21/2005	Winter Storm	0	0	0	0
Lycoming	3/1/2005	Heavy Snow	0	0	0	0
Lycoming	10/25/2005	Heavy Snow	0	0	0	0
Lycoming	12/9/2005	Heavy Snow	0	0	0	0
Lycoming	12/16/2005	Winter Storm	0	0	0	0
Lycoming	2/13/2007	Winter Storm	0	0	0	0
Lycoming	2/13/2007	Heavy Snow	0	0	0	0
Lycoming	3/16/2007	Heavy Snow	0	0	0	0
Lycoming	4/15/2007	Heavy Snow	0	0	0	0
Lycoming	12/2/2007	Ice Storm	0	0	0	0
Lycoming	12/9/2007	Ice Storm	0	0	0	0
Lycoming	12/13/2007	Winter Storm	0	1	0	0
Lycoming	2/1/2008	Winter Storm	0	0	0	0
Lycoming	2/12/2008	Ice Storm	0	0	0	0
Lycoming	12/11/2008	Winter Storm	0	0	0	0
Lycoming	12/19/2008	Winter Storm	0	0	0	0

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Lycoming	12/23/2008	Ice Storm	0	0	0	0
Lycoming	1/6/2009	Ice Storm	0	0	0	0
Lycoming	1/10/2009	Winter Storm	0	0	0	0
Lycoming	1/27/2009	Winter Storm	0	0	0	0
		TOTALS:	**0**	**1**	**0**	**0**

Source: National Climatic Data Center

4.3.2.4. *Future Occurrence*

The severity and frequency of major winter storms is expected to remain fairly constant. However, due to increased dependence on various modes of transportation and use of public utilities for light, heat, and power, the disruption from these storms is more significant today than in the past.

The future occurrence of climatic events cannot be predicted exactly. As noted in the table above, the County has been affected by three to eight winter storm events each year from 2004 to 2009. Given this record of reported events, it is safe for planning purposes to assume that in an average year the County can expect to experience five winter storm events.

4.3.2.5. *Vulnerability Assessment*

In Lycoming County, wintertime snow accumulations are expected and normal. The most common, but potentially serious, effects of very heavy snowstorms with accumulations exceeding six or more inches in a 12-hour period are snow drifts causing road closures, traffic accidents, interruptions in power supply and communications, and the failure of inadequately designed and/or maintained roofing systems. Some rural areas of the County are susceptible to isolation due to the loss of telephone communications and road closings. Power failure and interruption of water supplies are common from ice storms, heavy snow, and blizzard conditions. All critical facilities in Lycoming County are vulnerable to winter storms. Vulnerability to the effects of winter storms on buildings is dependent on the age of the building (and what building codes may have been in effect at the time), type of construction, and condition of the structure (i.e., how well the structure has been maintained).

4.3.3. Tornadoes and Windstorms

Straight-line winds are the movement of air from areas of higher pressure to areas of lower pressure – the greater the difference in pressure, the stronger the winds. Windstorms are generally defined as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration.

A tornado, a violently rotating funnel-like vortex, is an extraordinary feature of severe thunderstorms. A condensation funnel does not need to reach to the ground for a tornado to be present; a debris cloud beneath a thunderstorm is all that is needed to confirm the presence of a

tornado, even in the total absence of a funnel. While the extent of tornado damage is usually localized, the extreme winds of this vortex can be among the most destructive on earth when they move through populated, developed areas.

The Enhanced Fujita Tornado Scale (or the “EF-Scale”) classifies U.S. tornadoes into six intensity categories, named EF0 to EF5, based on the damage caused and the associated estimated maximum winds occurring within the funnel. The EF-Scale has subsequently become the definitive metric for estimating wind speeds within tornadoes based upon the damage done to buildings and structures.

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

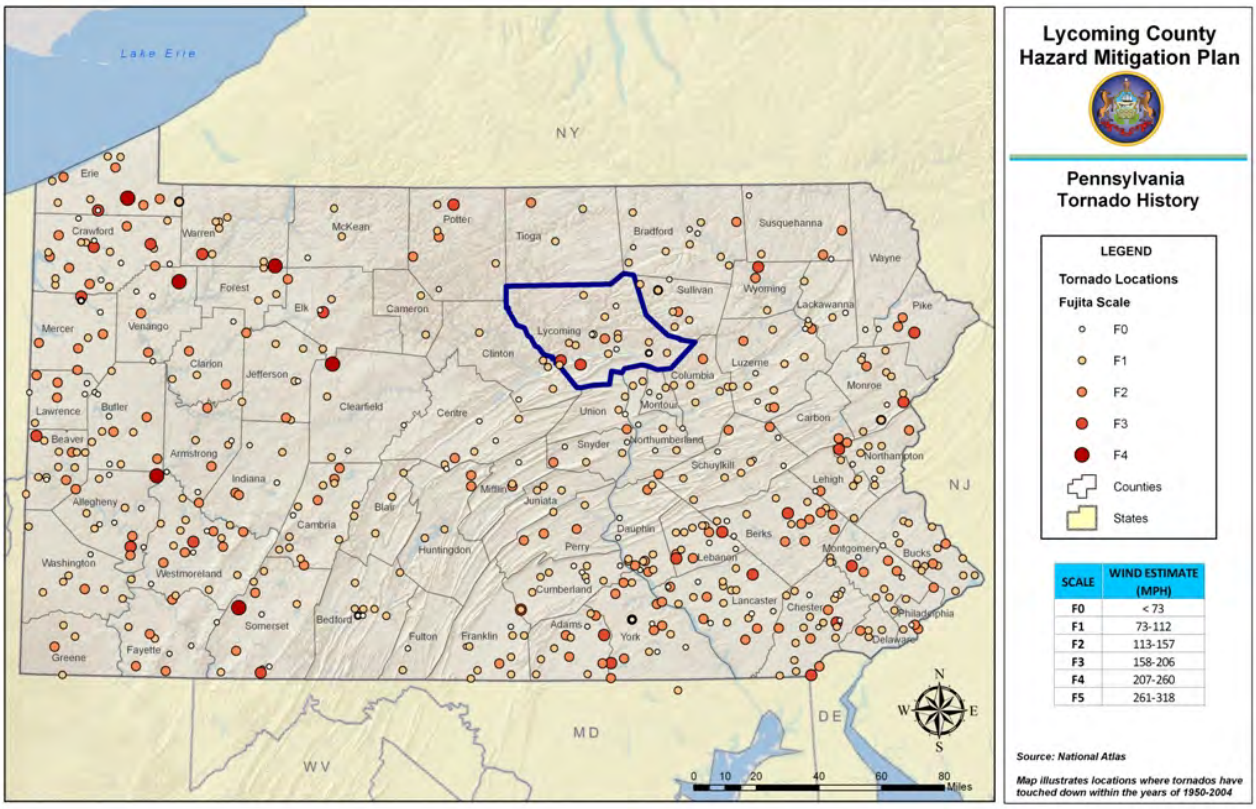
The forward motion of the tornado path can be a few hundred yards or several hundred miles in length. The width of tornadoes can vary greatly, but generally range in size from less than 100 feet to over a mile in width. Some tornadoes never touch the ground and are short-lived, while others may touch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

4.3.3.1. *Location and Extent*

Tornadoes have occurred in every state, but they frequently occur in the Midwest, southeast, and southwest. Although tornado season runs from March through August, tornadoes can occur any time, often accompanying tropical storms and hurricanes as they move onto land. The National Weather Service estimates that about 43 people are killed because of tornadoes each year. Areas in the Commonwealth most prone to tornadoes and windstorms are the southeast, southwest, and northwest sectors. Tornado events are not limited to any particular geographic or physiographic area of the County, and neither the duration of the storm nor the extent of area affected by such an occurrence can be predicted.

High winds and tornadoes can affect any area of the County. A map of tornadoes that have affected the Commonwealth is shown below.

Map 6



4.3.3.2. *Range of Magnitude*

Windstorms are generally defined as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration. A tornado's magnitude is classified using the Enhanced Fujita Scale is shown in Table 15.

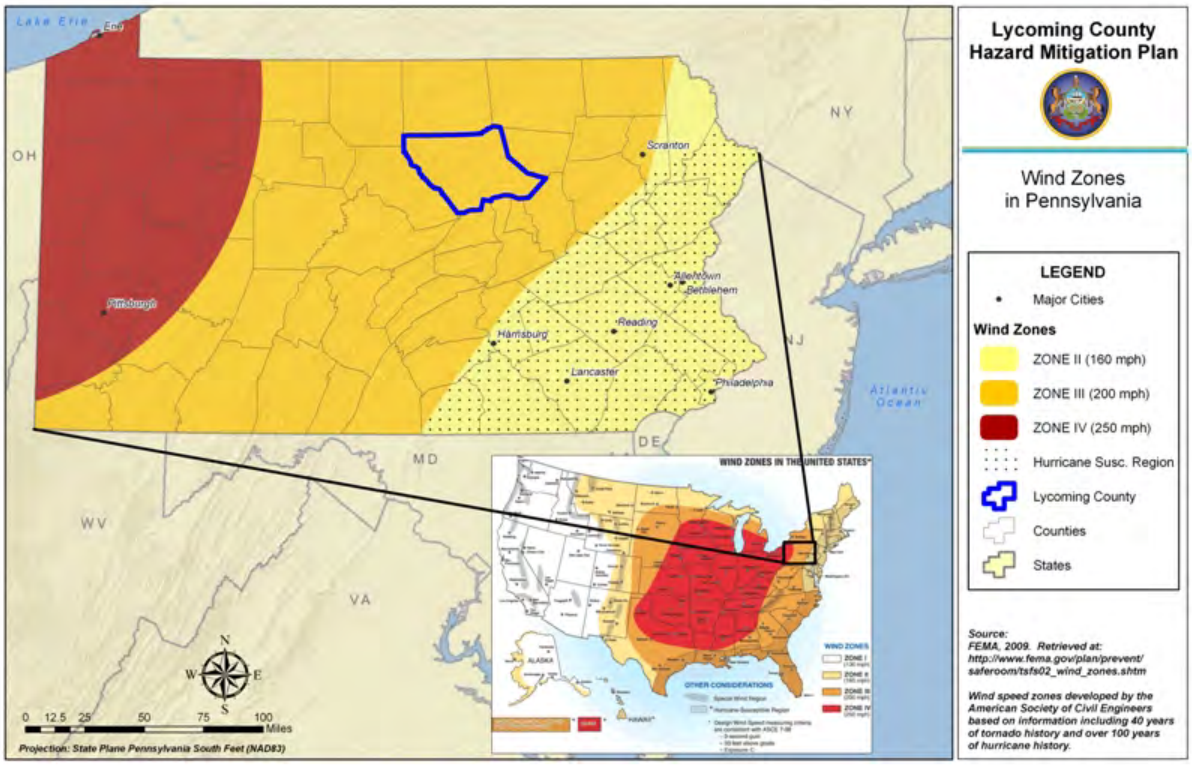
Table 15: Enhanced Fujita Scale and Associated Damage

Tornado EF-Scale	Wind Speed, mph	Expected Damage
EF0	65-85	Light damage: Some damage to chimneys; branches break from trees; shallow-rooted trees pushed over; damage to sign boards.
EF1	86-110	Moderate damage: Peel surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off road.
EF2	111-135	Considerable damage: Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.

Tornado EF-Scale	Wind Speed, mph	Expected Damage
EF3	136-165	Severe damage: Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
EF4	166-200	Devastating damage: Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	Over 200	Incredible damage: Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100 yards; trees debarked; incredible phenomena will occur.

As shown in the following map, Lycoming County can expect winds up to 200 miles per hour, and should implement construction regulations requiring that structures be designed to withstand winds of that magnitude.

Map 7



This map is based on the map of design winds speeds, developed by the American Society of Civil Engineers, and identifies wind speeds that could occur in different parts of the United States, to be used as the basis for design and evaluation of the structural integrity of shelters and critical facilities.

In May 1998, a tornado swept through Lycoming County, touching down in Mifflin Township, Wolf Township, the Williamsport Regional Airport, and Jackson Township, where it tore the roof off a lumberyard, downed power lines, and destroyed trees in the Village of Buttonwood. At the airport, $1 million in structural and airplane damages was reported. In the City of Williamsport, downed trees, malfunctioning traffic signals, debris-filled streets, snapped power lines, and vehicular and property damage was observed. In Muncy, damage to street signs and billboards was observed. In Hughesville, a tornado destroyed one residential trailer and blew another off its foundation. While no immediate reports of injuries were made, a tornado poses a significant life safety threat to the community, particularly while traveling in vehicles or sheltering in a poorly constructed building.

4.3.3.3. *Past Occurrence*

Historically, between 1950 and 2000, there were 19 tornadoes in Lycoming County. According to the National Oceanic Atmospheric Administration (NOAA), there were two deaths and 20 injuries in Lycoming County resulting from a tornado on May 31, 1985. Additionally, associated winds have damaged power lines, uprooting trees, structures, motor vehicles, and crops.

In the past 35 years, several tornadoes have swept through Lycoming County: Susquehanna Township (1976), Washington Township (1985), Shrewsbury Township (1985), Hughesville Borough (1994), and the Village of Loyalsockville (1996). “A series of tornadoes in May 1985 caused the president to declare 13 northwestern and central Pennsylvania counties major disaster areas. Damages were estimated at $282 million.”[3] In May 1998, a tornado swept through Lycoming County, touching down in Mifflin Township, Wolf Township, the Williamsport Regional Airport, and Jackson Township, where it tore the roof off a lumberyard, downed power lines, and destroyed trees in the Village of Buttonwood. The following June, there were two confirmed tornadoes in the forested area near the Borough of Picture Rocks. On July 1, 1999, a tornado touched down in Kellyburg, and on June 16, 2000, another tornado did some minor damage to homes and uprooted several trees in the Village of Farragut.

As can be seen from the table below, the magnitude of reported and confirmed tornadoes in the County over the last five years is in the F0 to F1 range. While this is the lowest range to be classified as a tornado, such events can nevertheless be devastating to human life and property in the affected areas.

Table 16: Additional Lycoming County Tornado and Wind Events from 2004-2009

Location	Date	Type	Mag	Deaths	Injuries	Property Damage	Crop Damage
Buttonwood	6/14/2004	Wind	50 kts.	0	0	0	0
Williamsport	6/17/2004	Wind	50 kts.	0	0	0	0
Trout Run	11/25/2004	Wind	50 kts.	0	0	0	0

[3] Barry Evans et al., *Commonwealth of Pennsylvania Multi-Hazard Identification and Risk Assessment* (University Park, PA: The Pennsylvania State University, 2000).

Location	Date	Type	Mag	Deaths	Injuries	Property Damage	Crop Damage
Jersey Shr	11/25/2004	Wind	50 kts.	0	0	0	0
Montoursville	6/6/2005	Tornado	F1	0	0	0	0
Picture Rocks	6/6/2005	Wind	50 kts.	0	0	0	0
Lairdsville	7/13/2005	Wind	50 kts.	0	0	0	0
Trout Run	7/26/2005	Wind	50 kts.	0	0	0	0
Montgomery	8/2/2005	Wind	50 kts.	0	0	0	0
Loyalsockville	8/13/2005	Wind	50 kts.	0	0	0	0
Lairdsville	8/13/2005	Wind	50 kts.	0	0	0	0
Barbours	8/31/2005	Tornado	F1	0	0	0	0
Williamsport	9/29/2005	Wind	50 kts.	0	0	0	0
Waterville	11/6/2005	Wind	50 kts.	0	0	0	0
Williamsport	11/6/2005	Wind	50 kts.	0	0	0	0
Hughesville	11/6/2005	Wind	50 kts.	0	0	0	0
County-wide	2/17/2006	Wind	53 kts.	0	0	20,000	0
Williamsport	5/30/2006	Wind	50 kts.	0	0	0	0
Williamsport	5/30/2006	Wind	50 kts.	0	0	0	0
Montgomery	5/30/2006	Wind	50 kts.	0	0	0	0
Jersey Shr	6/9/2006	Wind	50 kts.	0	0	0	0
Williamsport	6/22/2006	Wind	50 kts.	0	0	0	0
Williamsport	6/22/2006	Wind	50 kts.	0	0	0	0
Montoursville	6/22/2006	Wind	50 kts.	0	0	0	0
Loyalsockville	6/22/2006	Wind	50 kts.	0	0	0	0
Hughesville	6/29/2006	Wind	50 kts.	0	0	0	0
Williamsport	7/2/2006	Wind	50 kts.	0	0	0	0
Williamsport	8/3/2006	Wind	50 kts.	0	0	0	0
Lairdsville	8/25/2006	Wind	50 kts.	0	0	0	0
Muncy	11/16/2006	Wind	50 kts.	0	0	0	0
County-wide	12/1/2006	Wind	45 kts.	0	0	0	0
Newberry	6/8/2007	Wind	50 kts.	0	0	0	0
Muncy	6/19/2007	Tornado	F0	0	0	0	0
Farragut	6/19/2007	Wind	50 kts.	0	0	0	0
Muncy	8/3/2007	Wind	50 kts.	0	0	0	0
Muncy	8/3/2007	Wind	50 kts.	0	0	0	0
Jersey Shr	9/27/2007	Wind	50 kts.	0	0	0	0
Jersey Shr	6/16/2008	Wind	50 kts.	0	0	0	0
Lairdsville	7/18/2008	Wind	50 kts.	0	0	0	0
County-wide	9/14/2008	Wind	50 kts.	0	0	0	0
County-wide	2/12/2009	Wind	50 kts.	0	0	50,000	0
			TOTALS:	**0**	**0**	**$70,000**	**0**

Source: National Climatic Data Center

4.3.3.4. *Future Occurrence*

The probability of the County and its municipalities experiencing severe winds is difficult to quantify, but is considered high. The County experiences strong winds on frequent basis, and when those winds do strike, it can result in significant property damage, trees down, and utility outages.

The probability of a tornado striking the County is relatively high compared to the rest of the Commonwealth, with 22 occurring since 1950. Those that have occurred were relatively weak and caused little destruction, though there have been notable exceptions (described above). Most of Pennsylvania is susceptible to tornadoes of a magnitude of at most an EF-3. It can reasonably be assumed that future tornadoes will be similar in nature to those that have affected the County in the past, and will strike the County once every two years.

4.3.3.5. *Vulnerability Assessment*

All critical facilities in Lycoming County are at least somewhat vulnerable to tornadoes and windstorms. Since high wind events may affect the entire County, it is important to identify specific critical facilities and assets that are most vulnerable to the hazard. Evaluation criteria include age of the building (and what building codes may have been in effect at the time), type of construction, and condition of the structure (i.e., how well has the structure been maintained). Individual structure data was not available for this study, so it was difficult to determine the exact number and types of structures within Lycoming County that have heightened vulnerability to wind hazards. However, mobile homes and commercial trailers are extremely vulnerable to high winds (especially if they are not well anchored).

4.3.4. Thunderstorms and Hail

Thunderstorms are created when cold air masses collide with warmer, moist air masses. This collision pushes the warm, wet air upwards, where the water vapor condenses, resulting in precipitation. As the precipitation falls, a downdraft is created. The friction caused by the combination of the updrafts and downdrafts causes a significant difference in the electrical charge of the clouds compared to the ground or other clouds. When the difference is large enough, the charge travels from the ground to the clouds or between the clouds as a lightning bolt. The pressure caused by the superheating of the air in a split second by the lightning is perceived as thunder.

Hail is produced when an ice crystal collects additional water in the lower part of the storm but is pushed upwards by the storm's updraft. The liquid water freezes in the upper regions of the storm, making the ice crystal (i.e., hailstone) larger. The hail will continue to grow in this manner until its weight exceeds the force of the updraft.

Severe thunderstorms are those that produce winds in excess of 58 mph and hail larger than three-quarters of an inch in diameter.

4.3.4.1. *Location and Extent*

Thunderstorms are not limited to any particular geographic or physiographic area of the County, and neither the duration of the storm nor the extent of area affected by such an occurrence can be predicted.

4.3.4.2. *Range of Magnitude*

Thunderstorms that have affected Lycoming County have associated wind speeds up to 53 knots (about 60 miles per hour), and hail measuring from 0.75″ to 1.75″. In August 2007, a thunderstorm producing golf ball-sized hail caused approximately $350,000 in damages to private homes, businesses, crops, and vehicles across southern and southeastern Lycoming County. The storm also produced very high winds that knocked down trees and power lines in its path. Since preliminary weather forecasts did not point toward the potential for severe thunderstorms, followers and players at the 2007 Little League World Series (LLWS) would have been "surprised" by a severe weather event. Fortunately, the storm's path took it north of the LLWS stadium in South Williamsport. Had this storm dropped hail onto unprotected spectators, mild to moderate physical injuries certainly would have been sustained by many attendees.

4.3.4.3. *Past Occurrence*

The following tables list the occurrences of thunderstorms and hail in Lycoming County.

Table 17: History of Thunderstorms in Lycoming County

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
County-wide	8/16/1966	Thunderstorm	0	0	0	0
County-wide	6/17/1967	Thunderstorm	0	0	0	0
County-wide	7/1/1968	Thunderstorm	0	0	0	0
County-wide	6/2/1969	Thunderstorm	0	0	0	0
County-wide	7/26/1969	Thunderstorm	0	0	0	0
County-wide	6/4/1973	Thunderstorm	0	0	0	0
County-wide	7/28/1973	Thunderstorm	0	0	0	0
County-wide	9/1/1973	Thunderstorm	0	0	0	0
County-wide	4/14/1974	Thunderstorm	0	0	0	0
County-wide	6/30/1974	Thunderstorm	0	0	0	0
County-wide	6/24/1975	Thunderstorm	0	0	0	0
County-wide	8/26/1975	Thunderstorm	0	0	0	0
County-wide	7/8/1976	Thunderstorm	0	0	0	0
County-wide	8/26/1976	Thunderstorm	0	0	0	0
County-wide	6/21/1978	Thunderstorm	0	0	0	0
County-wide	7/5/1980	Thunderstorm	0	0	0	0
County-wide	7/21/1980	Thunderstorm	0	0	0	0
County-wide	6/14/1981	Thunderstorm	0	0	0	0
County-wide	3/31/1982	Thunderstorm	0	0	0	0
County-wide	7/21/1983	Thunderstorm	0	0	0	0
County-wide	6/8/1987	Thunderstorm	0	0	0	0
County-wide	7/11/1987	Thunderstorm	0	0	0	0

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
County-wide	7/16/1988	Thunderstorm	0	0	0	0
County-wide	7/30/1988	Thunderstorm	0	0	0	0
County-wide	6/27/1989	Thunderstorm	0	0	0	0
County-wide	8/6/1989	Thunderstorm	0	0	0	0
County-wide	11/20/1989	Thunderstorm	0	0	0	0
County-wide	5/13/1990	Thunderstorm	0	0	0	0
County-wide	5/17/1990	Thunderstorm	0	0	0	0
County-wide	7/20/1990	Thunderstorm	0	0	0	0
County-wide	8/13/1990	Thunderstorm	0	0	0	0
County-wide	8/28/1990	Thunderstorm	0	0	0	0
County-wide	9/14/1990	Thunderstorm	0	0	0	0
County-wide	5/9/1991	Thunderstorm	0	0	0	0
County-wide	5/29/1991	Thunderstorm	0	0	0	0
County-wide	7/23/1991	Thunderstorm	0	0	0	0
County-wide	12/14/1991	Thunderstorm	0	0	0	0
County-wide	7/10/1992	Thunderstorm	0	0	0	0
County-wide	7/20/1992	Thunderstorm	0	0	0	0
County-wide	8/28/1992	Thunderstorm	0	0	0	0
County-wide	9/10/1992	Thunderstorm	0	0	0	0
County-wide	4/16/1993	Thunderstorm	0	0	550K	0
Clarkstown	6/12/1994	Thunderstorm	0	0	0	0
Barbours	6/13/1994	Thunderstorm	0	0	0	0
Waterville	7/5/1994	Thunderstorm	0	0	0	0
Trout Run	7/6/1994	Thunderstorm	0	0	0	0
Muncy	7/24/1994	Thunderstorm	0	0	0	0
Barbours	4/4/1995	Thunderstorm	0	0	0	0
Lairdsville	6/7/1995	Thunderstorm	0	0	0	0
Jersey Shore	7/6/1995	Thunderstorm	0	0	0	0
Hughesville	7/17/1995	Thunderstorm	0	0	0	0
Jersey Shore	8/2/1995	Thunderstorm	0	0	0	0
Montoursville	11/11/1995	Thunderstorm	0	0	0	0
Loyalsockville	3/25/1996	Thunderstorm	0	0	0	0
English Center	4/12/1996	Thunderstorm	0	0	0	0
Lairdesville	4/23/1996	Thunderstorm	0	0	0	0
Williamsport	6/8/1996	Thunderstorm	0	0	0	0
Haneyville	6/11/1996	Thunderstorm	0	0	0	0
Hughesville	6/14/1996	Thunderstorm	0	0	0	0
Williamsport	6/20/1996	Thunderstorm	0	0	10K	0K
Loyalsockville	7/8/1996	Thunderstorm	0	0	0	0
Williamsport	5/3/1997	Thunderstorm	0	0	0	0
Duboistown	5/6/1997	Thunderstorm	0	0	0	0
Williamsport	5/19/1997	Thunderstorm	0	0	0	0
Williamsport	7/18/1997	Thunderstorm	0	0	0	0
Muncy	8/16/1997	Thunderstorm	0	0	0	0
Muncy	8/28/1997	Thunderstorm	0	0	0	0
Williamsport	5/29/1998	Thunderstorm	0	0	0	0
Muncy	5/31/1998	Thunderstorm	0	0	0	0
Glen Mawr	6/16/1998	Thunderstorm	0	0	0	0
Jersey Shr	6/30/1998	Thunderstorm	0	2	0	0
Jersey Shr	9/27/1998	Thunderstorm	0	0	0	0

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Unityville	1/18/1999	Thunderstorm	0	0	10K	0
Williamsport	5/24/1999	Thunderstorm	0	0	20K	0
Trout Run	6/2/1999	Thunderstorm	0	0	10K	0
Jersey Shr	7/6/1999	Thunderstorm	0	0	15K	0
Jersey Shr	7/9/1999	Thunderstorm	0	0	15K	0
Jersey Shr	8/13/1999	Thunderstorm	0	0	10K	0
Williamsport	10/13/1999	Thunderstorm	0	0	10K	0
Slate Run	3/25/2000	Thunderstorm	0	0	2K	0
Barbours	5/10/2000	Thunderstorm	0	0	4K	0
Picture Rocks	5/13/2000	Thunderstorm	0	0	1K	0
Muncy	5/18/2000	Thunderstorm	0	0	2K	0
Muncy	6/2/2000	Thunderstorm	0	0	60K	0
Jersey Shr	6/11/2000	Thunderstorm	0	0	2K	0
Montoursville	6/16/2000	Thunderstorm	0	0	7K	0
Montoursville	6/21/2000	Thunderstorm	0	0	5K	0
Salladasburg	7/14/2000	Thunderstorm	0	0	2K	0
Calvert	4/9/2001	Thunderstorm	0	0	0	0
Muncy	6/20/2001	Thunderstorm	0	0	1K	0
Williamsport	7/1/2001	Thunderstorm	0	0	0	0
Waterville	8/16/2001	Thunderstorm	0	0	0	0
Trout Run	8/19/2001	Thunderstorm	0	0	0	0
Muncy	8/28/2001	Thunderstorm	0	0	4K	0
Williamsport	8/31/2001	Thunderstorm	0	0	0	0
Picture Rocks	9/13/2001	Thunderstorm	0	0	0	0
Jersey Shr	9/24/2001	Thunderstorm	0	0	0	0
Williamsport	10/16/2001	Thunderstorm	0	0	0	0
Hughesville	3/9/2002	Thunderstorm	0	0	0	0
Montgomery	4/28/2002	Thunderstorm	0	0	5K	0
Williamsport	5/31/2002	Thunderstorm	0	0	0	0
Williamsport	6/5/2002	Thunderstorm	0	0	4K	0
Williamsport	7/28/2002	Thunderstorm	0	0	0	0
Hughesville	5/11/2003	Thunderstorm	0	0	0	0
Jersey Shr	7/18/2003	Thunderstorm	0	0	0	0
Hughesville	7/21/2003	Thunderstorm	0	0	5K	0
Jersey Shr	7/27/2003	Thunderstorm	0	0	0	0
Trout Run	8/16/2003	Thunderstorm	0	0	0	0
Picture Rocks	8/29/2003	Thunderstorm	0	0	0	0
Buttonwood	6/14/2004	Thunderstorm	0	0	0	0
Williamsport	6/17/2004	Thunderstorm	0	0	0	0
Jersey Shr	11/25/2004	Thunderstorm	0	0	0	0
Picture Rocks	6/6/2005	Thunderstorm	0	0	0	0
Lairdsville	7/13/2005	Thunderstorm	0	0	0	0
Trout Run	7/26/2005	Thunderstorm	0	0	0	0
Montgomery	8/2/2005	Thunderstorm	0	0	0	0
Loyalsockville	8/13/2005	Thunderstorm	0	0	0	0
Williamsport	9/29/2005	Thunderstorm	0	0	0	0
Waterville	11/6/2005	Thunderstorm	0	0	0	0
County-wide	2/17/2006	Thunderstorm	0	0	20K	0
Williamsport	5/30/2006	Thunderstorm	0	0	0	0
Jersey Shr	6/9/2006	Thunderstorm	0	0	0	0

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Williamsport	6/22/2006	Thunderstorm	0	0	0	0
Hughesville	6/29/2006	Thunderstorm	0	0	0	0
Williamsport	7/2/2006	Thunderstorm	0	0	0	0
Williamsport	8/3/2006	Thunderstorm	0	0	0	0
Lairdsville	8/25/2006	Thunderstorm	0	0	0	0
Muncy	11/16/2006	Thunderstorm	0	0	0	0
Newberry	6/8/2007	Thunderstorm	0	0	0	0
Farragut	6/19/2007	Thunderstorm	0	0	0	0
Jordan Township	6/27/2007	Thunderstorm	0	0	0	0
Muncy	8/3/2007	Thunderstorm	0	0	0	0
Jersey Shr	9/27/2007	Thunderstorm	0	0	0	0
Jersey Shr	6/16/2008	Thunderstorm	0	0	0	0
Lairdsville	7/18/2008	Thunderstorm	0	0	0	0
		TOTALS:	**0**	**2**	**$774,000**	**0**
Source: National Climatic Data Center						

The NCDC report contains several references to hail as a reported incident in the County from 1956 to 2009. Thirty-two incidents were listed.

Table 18: History of Hailstorms in Lycoming County from 1956-2009

Location	Date	Type	Mag	Deaths	Injuries	Property Damage	Crop Damage
County-wide	6/23/1956	Hail	0.75 in.	0	0	0	0
County-wide	6/7/1964	Hail	1.00 in.	0	0	0	0
County-wide	6/17/1967	Hail	0.00 in.	0	0	0	0
County-wide	7/26/1969	Hail	1.75 in.	0	0	0	0
County-wide	6/18/1970	Hail	1.00 in.	0	0	0	0
County-wide	6/5/1973	Hail	0.88 in.	0	0	0	0
County-wide	7/28/1973	Hail	1.00 in.	0	0	0	0
County-wide	4/14/1974	Hail	3.00 in.	0	0	0	0
County-wide	4/14/1974	Hail	2.00 in.	0	0	0	0
County-wide	6/2/1978	Hail	1.00 in.	0	0	0	0
County-wide	7/11/1980	Hail	1.00 in.	0	0	0	0
County-wide	5/31/1985	Hail	1.75 in.	0	0	0	0
County-wide	5/31/1986	Hail	0.75 in.	0	0	0	0
County-wide	5/31/1986	Hail	1.00 in.	0	0	0	0
County-wide	5/31/1986	Hail	1.75 in.	0	0	0	0
County-wide	5/31/1986	Hail	1.75 in.	0	0	0	0
County-wide	4/25/1990	Hail	0.75 in.	0	0	0	0
County-wide	8/15/1991	Hail	0.75 in.	0	0	0	0
County-wide	8/15/1991	Hail	1.00 in.	0	0	0	0
County-wide	7/10/1992	Hail	1.00 in.	0	0	0	0
Danville	6/12/1994	Hail	0.75 in.	0	0	0	0
Williamsport	8/27/1994	Hail	1.00 in.	0	0	0	0
Warrensville	7/8/1996	Hail	0.85 in.	0	0	0	0
Williamsport	7/8/1996	Hail	0.15 in.	0	0	0	0
Picture Rocks	7/8/1996	Hail	0.75 in.	0	0	0	0
Hepburnville	7/7/1997	Hail	0.75 in.	0	0	0	0
Cedar Run	5/31/1998	Hail	1.00 in.	0	0	0	0

Location	Date	Type	Mag	Deaths	Injuries	Property Damage	Crop Damage
Buttonwood	5/31/1998	Hail	1.00 in.	0	0	0	0
Williamsport	9/7/1998	Hail	0.75 in.	0	0	0	0
Muncy	9/7/1998	Hail	2.25 in.	0	0	0	0
Montgomery	5/8/1999	Hail	0.75 in.	0	0	0	0
Montoursville	7/30/1999	Hail	0.75 in.	0	0	0	0
Williamsport	7/30/1999	Hail	1.00 in.	0	0	0	0
Montgomery	7/30/1999	Hail	1.00 in.	0	0	0	0
Warrensville	7/30/1999	Hail	1.75 in.	0	0	0	0
Williamsport	7/30/1999	Hail	1.75 in.	0	0	0	0
Montgomery	7/30/1999	Hail	1.75 in.	0	0	0	0
Jersey Shr	7/30/1999	Hail	1.00 in.	0	0	0	500K
Oval	7/30/1999	Hail	1.00 in.	0	0	0	0
Montgomery	3/25/2000	Hail	0.75 in.	0	0	0	0
Warrensville	5/10/2000	Hail	1.00 in.	0	0	0	0
Cogan House	5/12/2000	Hail	1.00 in.	0	0	0	0
Williamsport	5/12/2000	Hail	1.25 in.	0	0	0	0
Williamsport	7/11/2001	Hail	1.00 in.	0	0	0	0
Barbours	9/13/2001	Hail	1.00 in.	0	0	0	0
Hughesville	9/13/2001	Hail	1.00 in.	0	0	0	0
Williamsport	9/13/2001	Hail	0.75 in.	0	0	0	0
Unityville	9/13/2001	Hail	1.75 in.	0	0	0	0
Williamsport	6/5/2002	Hail	1.00 in.	0	0	0	0
Muncy	8/20/2004	Hail	0.88 in.	0	0	0	0
Montoursville	6/6/2005	Hail	1.00 in.	0	0	0	0
Williamsport	6/6/2005	Hail	1.00 in.	0	0	0	0
Montoursville	6/6/2005	Hail	0.75 in.	0	0	0	0
Williamsport	5/30/2006	Hail	0.75 in.	0	0	0	0
Williamsport	5/30/2006	Hail	1.00 in.	0	0	0	0
Williamsport	6/9/2006	Hail	0.88 in.	0	0	0	0
Montoursville	6/9/2006	Hail	0.88 in.	0	0	0	0
Quiggleville	7/9/2006	Hail	0.75 in.	0	0	0	0
Williamsport	7/9/2006	Hail	0.75 in.	0	0	0	0
Williamsport	8/3/2006	Hail	0.75 in.	0	0	0	0
Balls Mills	5/10/2007	Hail	1.00 in.	0	0	0	0
Hughesville	6/12/2007	Hail	1.00 in.	0	0	0	0
Lairdsville	6/13/2007	Hail	0.88 in.	0	0	0	0
Pennsdale	6/13/2007	Hail	0.88 in.	0	0	0	0
Williamsport	6/19/2007	Hail	0.75 in.	0	0	0	0
Muncy	6/19/2007	Hail	0.75 in.	0	0	0	0
Muncy	8/3/2007	Hail	0.88 in.	0	0	0	0
Garden View	8/17/2007	Hail	0.88 in.	0	0	0	0
Newberry	8/17/2007	Hail	1.00 in.	0	0	0	0
Loyalsockville	8/17/2007	Hail	0.88 in.	0	0	0	0
Montgomery	8/17/2007	Hail	1.50 in.	0	0	0	0
Muncy	8/17/2007	Hail	0.88 in.	0	0	0	0
Muncy	8/17/2007	Hail	1.75 in.	0	0	350,000	0
Trout Run	8/30/2007	Hail	0.75 in.	0	0	0	0
Balls Mills	9/27/2007	Hail	1.00 in.	0	0	0	0
Hughesville	2/6/2008	Hail	0.88 in.	0	0	0	0
Buttonwood	6/16/2008	Hail	0.88 in.	0	0	0	0

Location	Date	Type	Mag	Deaths	Injuries	Property Damage	Crop Damage
Salladasburg	6/16/2008	Hail	0.88 in.	0	0	0	0
Jersey Shr	6/16/2008	Hail	0.88 in.	0	0	0	0
Richards Grove	6/20/2008	Hail	0.88 in.	0	0	0	0
Pennsdale	7/26/2008	Hail	0.88 in.	0	0	0	0
TOTALS:				0	0	$350,000	$500,000

Source: National Climatic Data Center

4.3.4.4. *Future Occurrence*

Just as the probability of a thunderstorm cannot be predicted, neither can the probability of any such thunderstorm producing hail. The past occurrences in the County described above, however, indicate that this event is one that can and will continue to happen several times in any given year, most likely during the summer months. Based on prior occurrences, the County can expect thunderstorms several times each year, notably in the summer, and up to seven recordable hailstorms each year.

4.3.4.5. *Vulnerability Assessment*

All of Lycoming County, including all critical infrastructure, is vulnerable to the effects of thunderstorms and hail, as the storm cells that produce these hazards are spread over a large (multi-county) area. The area of damage due to these storms is relatively small, in that a single storm does not cause widespread devastation, but may cause damage in a focused area of the storm.

There are a few main hazards associated with thunderstorms: wind, lightning, hail, and flash flooding. Damages caused by wind and flash floods are discussed in 4.3.3 and 4.3.1, respectively. Lightning can damage and/or ignite trees and structures, which may in turn cause power outages or fires.

Hail can cause serious damage to automobiles, aircraft, skylights, livestock, and crops – most notably corn and soybeans. The National Weather Service reports that hail causes $1 billion in damage to property and crops each year.

4.3.5. Droughts and Water Supply Deficiencies

For layman's purposes, a drought is defined as a prolonged period of insufficient precipitation. However, drought conditions are qualified in different ways, depending upon the group impacted. A soil moisture deficit that inhibits crop production is typically referred to as an "agricultural drought." Whereas agricultural droughts may result from a rapid depletion of soil moisture, hydrological droughts often take months to fully materialize, as groundwater levels slowly decline and water storage decreases. Clearly, operational definitions are necessary to develop a common understanding of drought and its impacts. Operational definitions help hydrologists determine the onset, severity, and impact of droughts, which vary with the type of moisture deficit. Although climate is a primary contributor to hydrological drought, the construction of dams, deforestation, and land degradation all affect the hydrological system.

Drought can be broadly defined as a time period of prolonged dryness that contributes to the depletion of ground and surface water. There are three types:

Meteorological Drought – A deficiency in moisture in the atmosphere. This will have very little effect on the crops and water supply, depending on the preceding conditions.

Agricultural Drought – Inhibits the growth of crops, because of a moisture deficiency in the soil. This type of drought, if persistent, can lead to a hydrologic drought.

Hydrologic Drought – A prolonged period of time without rainfall that 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.

Droughts have several effects:

- Depletion of consumable water supply
- Depletion of agricultural water supply
- Depletion of forest water and water used to fight forest fires
- Depletion of water for navigational and recreational purposes
- Depletion of water for natural irrigation (besides crops and forests)
- Poor water quality

Droughts can have adverse effects on farms and other water-dependent industries. This can result in a local economic loss. From a citizen's perspective, public safety is an issue in terms of consumable water not being available, as well as water for fire protection and emergency services.

4.3.5.1. *Location and Extent*

Droughts are regional in nature and will affect the entire County or several counties, as opposed to individual municipalities. Areas along waterways will show drought conditions later than those areas away from waterways.

4.3.5.2. *Range of Magnitude*

A drought is a period of prolonged dryness that contributes to depletion of groundwater and surface-water yields. When droughts occur, they can have significant adverse consequences for the following:

- Public water supplies for human consumption
- Rural water supplies for livestock consumption and agricultural operations
- Water quality
- Natural soil water or irrigation water for agriculture
- Water for forests and for fighting forest fires
- Water for navigation and recreation

Drought preparation includes three phases: drought watch, drought warning, and drought emergency.

- Drought Watch: A period to alert government agencies, public water suppliers, industrial water users, and the public regarding the potential for future drought-related problems. The focus is on increased monitoring, awareness, and preparation for response if conditions worsen. A request for voluntary water conservation is made. The objective of voluntary water conservation measures during a drought watch is to reduce water use by 5 percent in the affected areas. Because of varying conditions, individual water suppliers or municipalities may ask for more stringent conservation actions.
- Drought Warning: This phase involves a coordinated response to imminent drought conditions and potential water supply shortages through concerted voluntary conservation measures to avoid or reduce shortages, relieve stressed sources, develop new sources, and if possible, forestall the need to impose mandatory water use restrictions. The objective of voluntary water conservation measures during a drought warning is to reduce overall water use by 10 to 15 percent in the affected areas. Because of varying conditions, individual water suppliers or municipalities may ask for more stringent conservation actions.
- Drought Emergency: This stage is a phase of concerted management operations to marshal all available resources to respond to actual emergency conditions, to avoid depletion of water sources, to assure at least minimum water supplies to protect public health and safety, to support essential and high-priority water uses, and to avoid unnecessary economic dislocations. It is possible during this phase to impose mandatory restrictions on nonessential water uses as provided for in 4 Pa. Code Chapter 119, if deemed necessary and if ordered by the governor. The objective of water use restrictions (mandatory or voluntary) and other conservation measures during this phase is to reduce consumptive water use in the affected areas by 15 percent, and to reduce total use to the extent necessary to preserve public water system supplies, to avoid or mitigate local or area shortages, and to assure equitable sharing of limited supplies.
- Local Water Rationing: Although not a drought phase, local municipalities may, with the approval of the Pennsylvania Emergency Management Council, implement local water rationing to share a rapidly dwindling or severely depleted water supply in designated water supply service areas. These individual water rationing plans, authorized through provisions of 4 Pa. Code Chapter 120, will require specific limits on individual water consumption to achieve significant reductions in use. Under both mandatory restrictions imposed by the Commonwealth and local water rationing, procedures are provided for granting of variances to consider individual hardships and economic dislocations.

The drought of 1999 had a significant impact on Lycoming County's agricultural production. According to the Pennsylvania Agricultural Statistics Service, there are 145,500 acres of land under active farm use in Lycoming County. During the drought, Lycoming County farmers felt the negative impact. Although few public water companies in Pennsylvania instituted water rationing plans, Lycoming County faced mandatory nonessential water use restrictions. It demonstrated that drought is as much a social phenomena as a climatic one. For instance,

communities under a drought warning that do not comply with voluntary conservation measures (e.g. taking shorter showers, refraining from washing cars or watering lawns) may worsen drought conditions and force state officials to impose mandatory water use restrictions.

4.3.5.3. *Past Occurrence*

Pennsylvania's most devastating drought in recent history began in the winter of 1999 and continued through the spring, summer, and fall months. What began as an agricultural drought advanced to a hydrologic drought, a more severe drought due to the period of time and water uses that were impacted. Throughout the summer of 1999, most of the Mid-Atlantic region was experiencing drought conditions. This drought was the worst to hit Pennsylvania in 10 years. A winter season of little snowfall, followed by a dry spring and summer, left stream and groundwater levels at an all-time low. Many of the state's groundwater observation wells were at emergency levels. The situation was so severe that Governor Ridge declared a drought emergency in 55 Pennsylvania counties, allowing mandatory water use restrictions to be enforced and public water suppliers to implement local water rationing plans. Although residential users were affected by the drought, Pennsylvania farmers suffered the greatest financial loss. A sustained period of low soil moisture stunted the growth of many cash grains throughout Pennsylvania. By September, the drought emergency declaration included all 67 counties and had introduced $5.3 million in interim assistance for Pennsylvania farmers. The U.S. Department of Agriculture followed suit, declaring Pennsylvania an agricultural disaster area and offering emergency loans through county farm service agencies.

From 2004 to 2009, Lycoming County did not have any severe droughts. According to DEP's Watershed Management Drought Information Center, the County only had six drought watches in that time period, and suffered no drought warnings or emergencies. A burn ban was issued for Lycoming County on April 16, 2006 due to extremely dry weather conditions.

Table 19: Additional History of Drought in Lycoming County from 2004-2009

Date	Drought Status
April 11, 2006 - June 30, 2006	Watch
Aug 8, 2007 - Sept 5, 2007	Watch
Sept 5, 2007 - Oct 5, 2007	Watch
Oct 5, 2007 - Jan 11, 2008	Watch
Jan 11, 2008 - Feb 15, 2008	Watch
Nov 7, 2008 - Jan 26, 2009	Watch

Source: PA Department of Environmental Protection
Watershed Management Drought Information Center

Table 20 displays the crop loss insurance payments due to drought since 1952.

Table 20: Crop Loss Insurance Claims Due to Drought

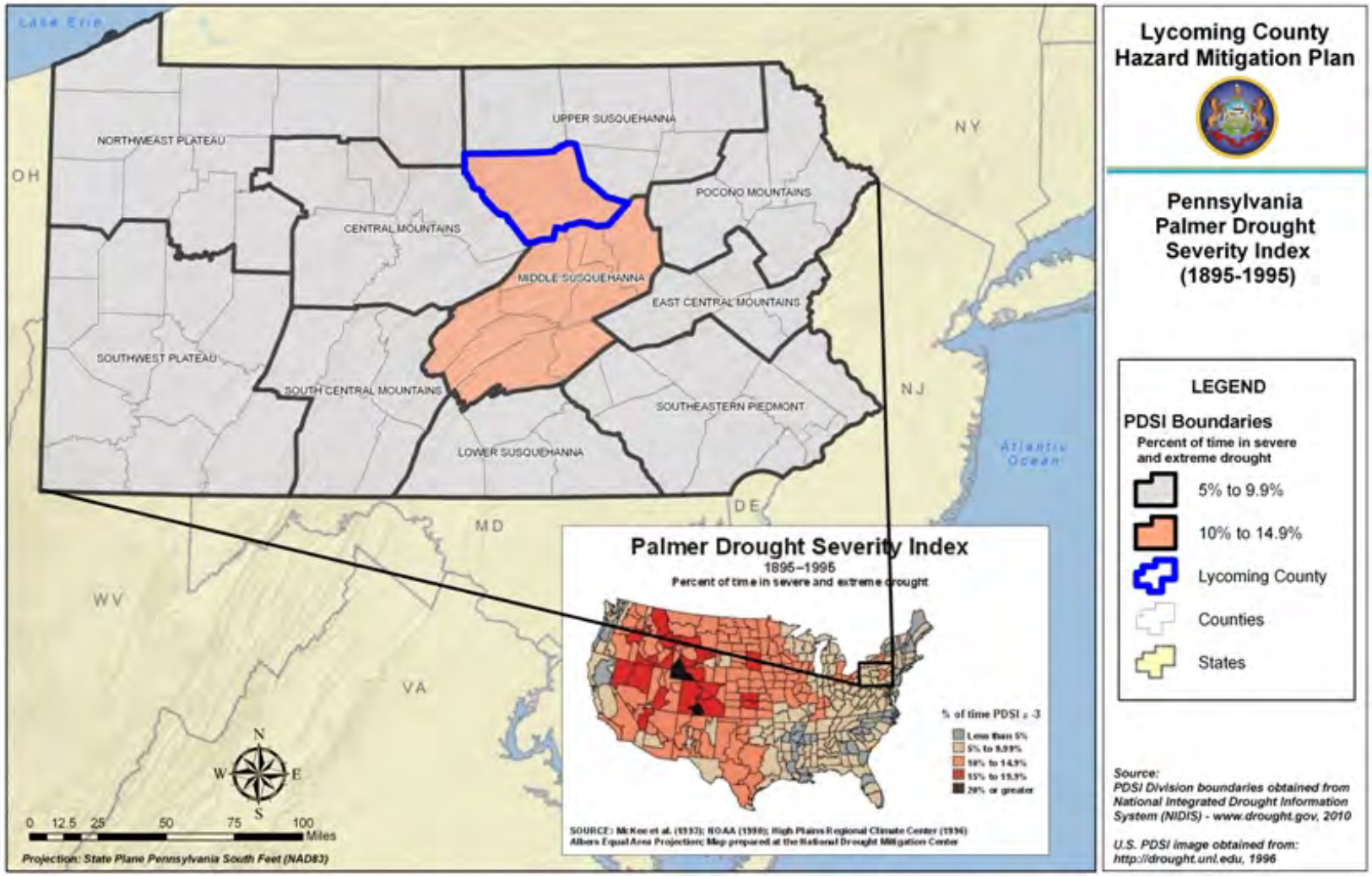
Crop Year	Amount ($)	Crop Year	Amount ($)
1952	262	1997	26,319
1982	15,498	1998	258
1983	13,420	1999	16,357
1984	284	2001	8,230
1986	145	2002	173,910
1988	81	2005	13,096
1989	1,882	2006	1,084
1991	36,842	2007	169,913
1993	43,514	2008	3,111
1995	42,370		
		Total	**566,576**

Source: U.S. Department of Agriculture Risk Management Agency

One way to measure the magnitude of a drought is through the Palmer Drought Severity Index. This index is based on several meteorological and hydrological factors, including temperature and soil moisture levels, and is computed weekly by the National Weather Service's Climate Prediction Center. The index compares precipitation received against the average amount expected during that period. Droughts are expressed as negative numbers. Palmer values of -2.00 to -2.99 indicate a watch status; values of -3.00 to -3.99 indicate a warning; and values of -4.00 and less indicate an emergency.

According to the Palmer Drought Severity Index map on the next page, Lycoming County spent 10% to 14.9% of the time between 1895 and 1995 in a severe and extreme drought (i.e., Palmer values less than or equal to -3).

Map 8: Pennsylvania Palmer Drought Severity Index (1895-1995) Highlighting Lycoming County



4.3.5.4. *Future Occurrence*

The potential for a drought to occur in Lycoming County is high. Given the frequency of drought watches being issued for Lycoming County and its municipalities, the County can reasonably expect one to two drought watch periods each year. As stated above, Lycoming County spent 10% to 14.9% of the time between 1895 and 1995 in a severe and extreme drought; it can be assumed that the County will spend 10% to 14.9% of the future in these same drought conditions. While some form of drought condition frequently exists in Lycoming County, the impact depends on the duration of the event, severity of conditions, and area affected.

4.3.5.5. *Vulnerability Assessment*

Drought vulnerability depends on 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.

Extended periods of drought can lead to lowered stream levels, altering the delicate balance of riverine ecosystems. Certain tree species are susceptible to fungal infections during prolonged periods of soil moisture deficit. Fall droughts pose a particular threat because groundwater levels are typically at their lowest following the height of the summer growing season.

Wildfire is the most severe secondary effect associated with drought. Wildfires can devastate wooded and agricultural areas, threatening natural resources and farm production facilities. Prolonged drought conditions can cause major ecological changes, such as increases in scrub growth, flash flooding, and soil erosion.

Long-term water shortages can have a high impact on agribusinesses, hydropower-dependent utilities, and other industries reliant on water for production services; all critical infrastructure in Lycoming County is vulnerable to the effects of a drought. Drought can cause municipalities to enforce water rationing and distribution. This strains the availability of consumable water for the community. It also increases Lycoming County's vulnerability to other hazards such as severe weather, extreme heat, and public health emergencies. The special needs population of any county also must be considered during drought conditions.

4.3.6. Traffic Accidents

4.3.6.1. *Location and Extent*

Several major corridors run through Lycoming County, making it susceptible to traffic and roadway hazards. U.S. Route 15 runs north/south, bisecting the County in the middle. Duboistown, South Williamsport, and Williamsport make up the area where three major roadways intersect: Interstate 180, U.S. Route 15, and U.S. Route 220.

U.S. Route 15, which runs north/south from South Carolina into New York, is a major transportation corridor on the East Coast of the United States. Because of this, many commercial vehicles pass through the County on a daily basis.

Lycoming County, as a whole, is at high risk for traffic accidents of all degrees. Being an educational epicenter, home to several higher educational facilities makes the annual influx of drivers a fluid number rather than a fixed statistic.

The Williamsport area has many attractions that also bring an influx of drivers, beyond the normal day-to-day numbers. The Little League World Series and Hall of Fame bring in varying annual numbers of visitors from around the world.

4.3.6.2. *Range of Magnitude*

Traffic accidents are measured two ways. First, insurance companies look at the level of damage sustained to the vehicle. They identify them as undamaged, damage has occurred that is cost effective to repair, or the vehicle is considered a complete loss, as it would cost more to fix than it is currently worth. Secondly, deaths or injuries that have occurred as a result of the event must be considered. For the purpose of this community-oriented analysis, consideration of what damage has occurred to the motor vehicle is not included. Secondary impacts such as environmental damage or property damage other than the automobiles involved are included, because these types of problems will involve the community and may require a wider community response.

Lycoming County is a hub of many major transportation routes and Williamsport has become a base of intermodal transportation in the region. In the city, over 27,000 vehicles traverse the Market Street Bridge on a daily basis. An accident involving multiple vehicles would impact the local transportation infrastructure, as well as the freight and manufacturing industry, and will force road closures for an undetermined period of time. A large number of casualties should be anticipated by emergency responders. Upon notification of a multi-vehicle accident (particularly when entrapment is reported), county hospitals should enact their medical surge capacity plans. During the road closure, vehicular traffic will be rerouted through secondary streets, increasing local traffic in the area.

4.3.6.3. *Past Occurrence*

The table below reflects several identified accident incidents in the County from 2004 to 2009, as reported by PEMA PEIRS. Data for accidents that occurred prior to this time period was not available.

Table 21: History of Traffic Accidents in Lycoming County from 2004-2009

Location	Date	Event	Comments	Deaths	Injuries
Cogan House Township	1/8/2004	Vehicle Accident	Single-vehicle accident. Vehicle went over embankment and occupant is trapped. RT 15 SB closed in Tioga County.	0	0
Nippenose Township	2/5/2004	Vehicle Accident	Multi-vehicle accident closed RT 44 between RT 880 and State St.	1	1

Location	Date	Event	Comments	Deaths	Injuries
Pine Township	2/6/2004	Vehicle Accident	RT 287 closed between RTs 284 and 414 due to multi-vehicle accidents.	2	1
Williamsport	2/21/2004	T/T Accident	T/T accident overturned on I-180 ramp onto RT 15 SB at Hepburn St. Unknown amount of diesel spilled onto interstate.	0	0
Limestone Township	3/16/2004	Vehicle Accident	Vehicle accident downed power lines closing Middle Rd between Shed and Van Buren Rds overnight.	0	0
Shrewsbury Township	3/28/2004	Vehicle Accident	Overturned pickup truck, involving 2 entrapments.	0	2
Clinton Township	5/22/2004	Vehicle Accident	Vehicle struck Utility pole and downed wires, closing RT 15.	0	0
Brady Township	7/14/2004	Downed Power Lines	Single-vehicle accident involving downed power wires and utility pole.	0	0
Porter Township	8/1/2004	Vehicle Accident	Vehicle sank into Pine Creek. Oil slick formed on Pine Creek.	0	0
Muncy Creek Township	8/21/2004	Vehicle Accident	Steamroller driven off road I-180, at Muncy Creek. Unknown amount of oil spilled into Muncy Creek.	0	0
Fairfield Township	9/6/2004	Vehicle Accident	Vehicle accident involving camper on I-180 EB. All EB lanes closed for clean-up.	0	0
Clinton Township	9/10/2004	Vehicle Accident	Single-motorcycle accident closed RT 15 between Clinton Twp and South Williamsport.	1	0
South Williamsport	10/11/2004	Vehicle Accident	Dump truck rolled over spilling unknown amount of diesel fuel. Some fuel entered Hackermans Creek.	0	0
Jackson Township	10/13/2004	T/T Accident	T/T accident involving passenger car and unknown amount of diesel fuel spilled. RT 15 SB closed.	1	0
Franklin Township	10/28/2004	T/T Accident	T/T accident closed RT 118. No spills/ injuries reported.	0	0
Cogan House Township	11/4/2004	T/T Accident	Single T/T accident closed RT 15 NB between RT 184 and Buttonwood.	1	0
Muncy Township	11/5/2004	Vehicle Accident	Vehicle accident on 1000 block of Rabbit Town Road.	1	0
Jackson Township	11/11/2004	T/T Accident	T/T accident closed RT 15 in both directions.	0	1
Shrewsbury Township	11/12/2004	Vehicle Accident	Dump truck left highway (RT 220) struck 2 facilities (private residence, Tivoli Tavern)	0	0
Muncy Township	11/28/2004	T/T Accident	Multi-vehicle accident involving T/T close I-180 EB. No spills or injuries reported.	0	0

Location	Date	Event	Comments	Deaths	Injuries
Loyalsock Township	12/12/2004	T/T Accident	T/T accident on I-180 WB. Unknown amount of diesel fuel spilled. Interstate closed at Faxon Exit.	0	1
Jackson Township	12/22/2004	Vehicle Accident	Multiple vehicle accidents: (1) RT 287, 2 miles north of Morris, 2 fatalities; (2) RT 155 closed, 6-vehicle accident, 5 injuries; (3) vehicle accident, 2 fatalities.	4	5
Susquehanna Township	1/21/2005	Vehicle Accident	Section of RT 654 between Bastress and Nisbet closed due to vehicle accident.	0	1
Clinton Township	2/4/2005	Vehicle Accident	Multi-vehicle accident occurred on RT 15.	3	1
Woodward Township	2/6/2005	Vehicle Accident	RT 220 SB closed due to passenger vehicle accident involving entrapment.	0	UNK
Lewis Township	2/24/2005	T/T Accident	Multi-T/T accident closed RT 15 at RT 14 in Lewis Township.	0	0
Cogan House Township	2/28/2005	Vehicle Accident	Multi-vehicle accident closed RT 15 NB.	0	0
County-wide	3/12/2005	Vehicle Accident	Multiple vehicle accidents occurred.	0	0
Williamsport	6/24/2005	Vehicle Accident	RT 15 NB closed off I-180 as result of vehicle accident.	0	1
Woodward Township	6/29/2005	Vehicle Accident	RT 220 NB closed due to fatal pedestrian/ vehicle accident.	1	0
South Williamsport Township	7/7/2005	Vehicle Accident	Multi-vehicle accident occurred on RT 15 in both directions.	0	4
Wolf Township	8/14/2005	Vehicle Accident	Truck hauling trailer overturned blocking Wolf Run Bridge	0	0
Wolf Township	10/13/2005	Vehicle Accident	RT 118 closed at Clarkstown Rd due to fatal vehicle accident.	1	0
Wolf Township	10/19/2005	Vehicle Accident	Vehicle accident resulting in fire and multiple fatalities occurred on Wolf Run Road.	2	0
Jackson Township	10/30/2005	T/T Accident	T/T carrying hay caught fire on RT 15 SB at MM 182.1	0	0
Lewis Township	11/18/2005	Vehicle Accident	Single-vehicle accident involving ejection closed RT 15 NB 1/4 north of Trout Run.	0	1
County-wide	11/23/2005	Vehicle Accident	Several vehicle accidents occurred between South Williamsport and Clinton Township for approximately 5 miles.	0	0
Williamsport	11/29/2005	Vehicle Accident	Vehicle accident closed I-180 EB and RT 15 off ramp.	0	1
Loyalsock Township	11/30/2005	Vehicle Accident	Multi-vehicle accident closed I-180 WB. Both vehicles on fire.	0	3

Location	Date	Event	Comments	Deaths	Injuries
Lewis Township	12/2/2005	T/T Accident	Intersection of RT 15 in both directions closed at RT 6 in Mansfield Township due to snow cover. Difficulty getting plows in to free T/T.	0	0
Armstrong Township	1/27/2006	Vehicle Accident	Multi-vehicle accident closed RT 15 NB.	0	3
Williamsport	4/1/2006	Vehicle Accident	City bus involved in accident on Memorial.	0	0
Jackson Township	4/19/2006	T/T Accident	Multi-vehicle accident involving T/T closed RT 15 SB for several hours.	2	0
Loyalsock Township	5/24/2006	Vehicle Accident	Vehicle accident on 4 Mile Dr.	0	1
Jordan Township	5/26/2006	Vehicle Accident	RT 118 closed between RTs 42 and 239 due to single vehicle accident.	1	0
Woodward Township	6/7/2006	Vehicle Accident	RT 220 SB closed due to vehicle accident.	1	0
Hepburn Township	6/9/2006	Vehicle Accident	Vehicle struck utility pole and downed wires, closing RT 973 WB.	0	0
Woodward Township	6/11/2006	Vehicle Accident	Multi vehicle accident involving SUV (with fire) and a motorcycle closed RT 220 NB. One SB lane was closed for clean-up.	5	0
Armstrong Township	6/15/2006	T/T Accident	RTs 15 and 54 closed in both directions due to multi vehicle accident involving T/T. Possible diesel fuel in headwaters of the Montour water supply.	1	3
Old Lycoming Township	7/15/2006	T/T Accident	RT 15 NB closed at Foy Ave and Heburnville Exit. T/T struck barrier and lost load. No injuries reported.	0	0
Woodward Township	7/18/2006	Vehicle Accident	Multi-vehicle accident on RT 220 SB at Pine Run Rd.	0	2
Williamsport	8/2/2006	T/T Accident	RT 15 NB closed at Market Street Bridge due to T/T hauling mobile home, becoming lodged under bridge.	0	0
Lewis Township	9/26/2006	T/T Accident	T/T overturned, leaving load (cat food) all over RT 15 SB. Driver confined to cab, no injuries reported.	0	0
Jackson Township	11/23/2006	Vehicle Accident	RT 15 closed due to multi-vehicle accident due to icy conditions	0	3
Woodward Township	12/15/2006	Vehicle Accident	RT 220 SB closed due to vehicle accident.	0	2
Armstrong Township	12/15/2006	Vehicle Accident	RT 15 SB south of Williamsport to intersection of SR 54 closed due to fatal vehicle accident.	1	0

Location	Date	Event	Comments	Deaths	Injuries
Piatt Township	1/15/2007	Vehicle Accident	Multi-vehicle accident closed RT 220 in both directions.	0	4
Hepburn Township	2/3/2007	Vehicle Accident	RT 15 SB closed due to fatal vehicle accident.	1	0
South Williamsport	2/9/2007	Vehicle Accident	Vehicle accident on Maynard Street Bridge. Bridge closed for clean-up and removal. Small amount of fuel spilled into Susquehanna River.	0	2
Muncy Township	2/12/2007	T/T Accident	T/T accident closing RT 220 between Middle Rd and Rabbit Town Rd.	1	0
Bastress Township	2/22/2007	Vehicle Accident	Vehicle accident involving downed power wires.	0	0
Lycoming Township	3/7/2007	T/T Accident	T/T accident involving PennDOT truck, closing RT 15 SB at Trout Run and NB at Hepburnville.	0	0
Williamsport	4/2/2007	T/T Accident	T/T overturned closing RT 15 NB at RT 220.	0	0
Armstrong Township	4/20/2007	Vehicle Accident	RT 15 at RT 54 closed in Clinton Twp and RT 15 at Old 15 closed in Armstrong Twp. Single vehicle accident involving downed power lines.	0	1
Williamsport	4/24/2007	T/T Accident	Overturned T/T closed RT 802	0	1
Shrewsbury Township	4/27/2007	Vehicle Accident	Vehicle struck/sheared PPL Electric utility pole blocking RT 220 in both directions. SB traffic is rerouted onto RT 42 in Davidson Township, Sullivan County.	0	0
McHenry Township	5/25/2007	Vehicle Accident	RT 414 closed due to a multi-vehicle accident.	0	3
Fairfield Township	7/9/2007	T/T Accident	Municipal waste T/T overturned and fell down a 75' embankment on I-180 WB. T/T landed on trailer park court. Unknown amount diesel spilled.	0	1
Jordan Township	7/18/2007	Vehicle Accident	Fatal motorcycle accident closed RT 118.	1	0
Lewis Township	8/11/2007	Vehicle Accident	RT 14 closed in both directions due to vehicle accident.	1	2
Armstrong Township	8/27/2007	Vehicle Accident	RT 15 closed in both directions due to multi-vehicle collision.	1	1
Williamsport	10/1/2007	Vehicle Accident	Multi-vehicle accident occurred on the 3300 block of W 4th Street. Life Flight was called for evacuation.	1	3
Eldred Township	10/15/2007	T/T Accident	Auto accident involving T/T through a guard rail. No injuries/fuel spills reported.	0	0

Location	Date	Event	Comments	Deaths	Injuries
Lewis Township	11/14/2007	T/T Accident	Multi-vehicle accident involving T/T closed RT 14.	1	0
Plunkett's Creek Township	12/29/2007	T/T Accident	T/T accident closed RT 87. Approximately 100 gallons of diesel fuel spilled.	0	0
Jackson Township	2/1/2008	T/T Accident	Multi-vehicle accident involving T/T closed RT 15 NB.	0	2
Old Lycoming Township	2/23/2008	Vehicle Accident	Single-vehicle accident closed RT 15 to remove vehicle down a 100' embankment.	0	0
Loyalsock Township	3/17/2008	Vehicle Accident	Single-vehicle accident on I-80 EB between exits 23-25.	1	0
Wolf Township	3/22/2008	Vehicle Accident	Single vehicle accident on RT 220 at Beaver Road.	1	1
Loyalsock Township	4/14/2008	Vehicle Accident	Single vehicle struck utility pole on SR 2029 trapping occupant.	0	0
Penn Township	4/16/2008	T/T Accident	T/T sheared off utility pole downing power lines. Incident closed RT 220. Approximately 200-300 PPL Electric customers were affected.	0	0
Cogan House Township	4/22/2008	T/T Accident	NB lane of RT 15 was blocked due to overturned T/T hauling seeds.	0	0
Lycoming Township	5/1/2008	T/T Accident	T/T takes down telephone pole in RT 973.	0	0
Jersey Shore	5/27/2008	Vehicle Accident	Vehicle struck motorcycle and ran into residential dwelling on Alleghany Street.	0	2
Franklin Township	6/29/2008	Vehicle Accident	Single vehicle accident involving telephone pole with wires down across RT 422/Sulky Rd.	0	1
Piatt Township	7/29/2008	T/T Accident	T/T accident. No injuries or spills reported.	0	0
Lewis Township	8/5/2008	T/T Accident	Accident involving T/T carrying 500-lb pallets of carbon disulfide. No spills or injuries reported.	0	0
Bastress Township	9/8/2008	Vehicle Accident	Vehicle accident closed RT 654 in both directions.	1	0
Shrewsbury Township	9/10/2008	T/T Accident	Modular home became dislodged from T/T. Roadway is blocked and power outages occurred affecting 89 PPL Electric customers.	0	0
South Williamsport Township	9/11/2008	T/T Accident	T/T accident closed RT 15 SB.	0	1
Muncy Township	10/20/2008	Vehicle Accident	Vehicle accident closed RT 220.	0	1

Location	Date	Event	Comments	Deaths	Injuries
Penn Township	10/21/2008	Vehicle Accident	Vehicle accident closed RT 220 near Borough of Hughesville.	0	1
Muncy Township	10/22/2008	Vehicle Accident	Multi-vehicle accident with injuries closed RT 220 at Rabbittown Rd intersection.	1	1
Cogan House Township	11/6/2008	Vehicle Accident	Vehicle accident causing RT 15 SB closure approximately 2 miles south of SR 184.	0	1
Upper Fairfield Township	11/16/2008	Vehicle Accident	RT 87 closed in both directions due to vehicle accident.	1	0
Loyalsock Township	11/19/2008	Vehicle Accident	Vehicle accident involving entrapment occurred at the 25000 block of I-80 EB. Accident occurred in construction zone causing lane restriction.	0	1
McIntyre Township	12/24/2008	Vehicle Accident	Multi-vehicle accident involving entrapment. RT 14 closed at RT 15 in Lycoming County on the south end, and Canton Borough in Tioga County on the north end.	0	3
Woodward Township	1/9/2009	T/T Accident	T/T disabled. Closed RT 220 NB.	0	0
Watson Township	1/19/2009	Vehicle Accident	Vehicle accident involving entrapment. RT 44 closed in both directions.	0	3
Clinton Township	1/23/2009	T/T Accident	T/T and vehicle accident closed RT 15.	0	1
Jackson Township	1/25/2009	Vehicle Accident	Single vehicle accident closed RT 15 SB, south of Liberty Exit.	2	6
Armstrong Township	1/30/2009	Vehicle Accident	Delivery van overturned closing RT 15.	0	0
Shrewsbury Township	2/19/2009	T/T Accident	T/T accident involving ruptured saddle tank, spilling approximately 50 gallons of diesel fuel.	0	0
Old Lycoming Township	2/26/2009	Vehicle Accident	Vehicle accident on RT 15.	0	1
Piatt Township	6/14/2009	Vehicle Accident	Multi-vehicle accident with injuries closed RT 287.	0	2
Clinton Township	6/17/2009	Vehicle Accident	Vehicle accident involving entrapment and ejection. RT 15 closed in both directions.	1	1
Williamsport	6/24/2009	Vehicle Accident	Vehicle accident involving a car and motorcycle. No injuries were reported.	0	0

4.3.6.4. *Future Occurrence*

Motor vehicle accidents are difficult to predict. While some roads or intersections may gain a reputation as being dangerous, and others are quantitatively shown to be so, this does not necessarily mean an accident will occur with any frequency or guarantee. It represents an elevation in the probability that an accident may occur. As such, it can be said with certainty that if no changes occur in the County then motor vehicle accidents are as likely to occur in the future as they were in the past. Based on the last five years, the County can expect between 10 and 22 major accidents each year, with an average of 18.

It must also be taken into account that with the increase in development in Lycoming County, there will be more motor vehicles using its road network. This increase in traffic will also cause an increase in motor vehicle accidents. The areas with the greatest level of development, and those along major transportation routes, are likely to see an increase in both traffic and motor vehicle accidents as a secondary effect of that development.

4.3.6.5. *Vulnerability Assessment*

Lycoming County's future population growth and land use will be significantly impacted by the safety and capacity of the transportation systems traversing the County. Most residents, visitors, and tourists will use automobiles as their primary transportation throughout the community. Immigration and commercial development are also largely dependent on motor vehicle transportation systems.

All critical infrastructure within Lycoming County is vulnerable to traffic accidents, in that facility operators may be injured or delayed in performing their duties due to traffic accidents. Transportation infrastructure may be directly affected by being damaged during the accident.

Given the importance of motor vehicle traffic to the future of Lycoming County, traffic and road infrastructure planning must be a high priority for community planners and development officials. Given the opportunity to establish long-term traffic planning programs and mitigate accidents by improving safety at dangerous intersections, Lycoming County can greatly enhance the safety of its residents and visitors alike. Furthermore, taking the opportunity to learn from other high-growth areas, Lycoming County can take steps now to promote the proper balance between development and road infrastructure growth, to mitigate future problems.

4.3.7. Power Outages

Electrical failures are commonly a secondary effect of hazards such as severe weather and flooding. High winds, along with heavy snow, ice, and rain, can affect an electrical system's ability to function. Worker strikes at power generation facilities have also been known to cause minor power failures. Other causes of power outages include falling tree limbs, vehicular accidents, and small animals that destroy wiring. When power outages occur, they are typically on a regional scale.

4.3.7.1. *Location and Extent*

Power outages can happen anywhere that power is supplied. The causes for outages are usually downed power wires or utility poles as a result of inclement weather or vehicle accidents. Additionally, outages can be caused by blown transformers or tripped circuit breakers. Most often, there is no cause reported and power is restored within the hour.

4.3.7.2. *Range of Magnitude*

Fourteen incidents that affected more than 150 residents were reported in the last five years. Of these incidents, half of them affected between 1,300 and 5,000 residents. An outage in Montgomery, Lycoming County, in July 2005 knocked out power for nearly 5,000 people in that area. The source of the outage was attributed to an individual who felled a tree, causing it to strike three electrical transmission lines. While no direct human casualties were reported to be associated with this event, it took some time before power was restored to customers.

4.3.7.3. *Past Occurrence*

Power outages have been caused by winter storms, wind, vehicle accidents, and other factors. The table below lists power outage incidents in the County from 2004 to 2009.

Table 22: History of Power Outages in Lycoming County from 2004-2009

Location	Date	Event	Comments
Franklin Township	3/21/2004	Power Outage	Power outage due to a pole fire. PPL Electric responsible for outage. Power to pole was cut off so repairs can be conducted. Approximately 1,000 customers were affected.
Williamsport	12/23/2004	Power Outage	Transformer caught fire, causing 1,800 PPL Electric customers in the City of Williamsport to be without power.
Eldred & Hepburn Township	3/8/2005	Power Outage	Power outage from SR 87 at Warrensville to SR 973E to Hepburn Township. Approximately 1,300 PPL Electric customers were affected. No critical facilities affected.
Loyalsock Township	3/23/2005	Power Outage	Fallen trees and limbs affected unknown number of PPL Electric Company customers. Substation lost transformer. Lycoming County Communications on backup generator.
Jersey Shore Borough	4/22/2005	Power Outage	T/T knocked down power lines on Culver Street. Outage affected approximately 3,000 PPL Electric customers.

Location	Date	Event	Comments
Clinton Township	6/28/2005	Power Outage	Power outage at SCI-Muncy due to failed power lines that feed prison. PPL Electric able to quickly restore one line. No security measures were compromised.
Williamsport	6/29/2005	Power Outage	Power outage at Center City Building. Possible source is a sparking electrical panel in the basement. 68 residents were evacuated.
Lewis Township	7/7/2005	Power Outage	Unknown number of PENNELEC customers without power.
Montgomery	7/20/2005	Power Outage	Individual takes down tree, hits three phase line. Estimated 3,000-5,000 without power.
Lewis Township	12/10/2005	Power Outage	Power outage affecting unknown number of First Energy customers in Lewis Township, Macintyre, Trout Run, Ralston areas, and Shriver's Tower Site. Tower is on back-up generator.
Countywide	2/25/2006	Power Outage	Power outage affecting northwest part of Lycoming County. Approximately 109 residents were affected.
Bown Township	6/26/2006	Power Outage	Power and phones down across township, possibly from severe weather.
Williamsport	8/3/2006	Power Outage	Power outage in Linden Area affecting 527 PPL Electric customers. Woodward FD shelter as a precaution.
Williamsport	8/3/2006	Power Outage	Center City Apartments reporting internal electrical disruptions. Old Lycoming FD as shelter for displaced residents.
Pine Township	12/12/2006	Power Outage	Power outage in English Center. Unknown number of affected customers.
Muncy Creek Township	3/10/2007	Power Outage	Vehicle struck telephone pole on RT 422. 900 PPL Electric customers are without power.
Shrewsbury Township	6/11/2007	Power Outage	Rural Electric Substation lost feed and caused a power outage for Lycoming and Sullivan Counties.
Williamsport	6/25/2007	Power Outage	Problem at substation caused power outage. Occurred in eastern end of Williamsport and Loyalsock Township.
Muncy Township	7/15/2007	Power Outage	PPL Electric substation between Muncy and Montoursville reported transformer fire. Residential homes and traffic lights are affected.
Lycoming Township	11/13/2007	Power Outage	Unknown number of power outages were reported. 9-1-1 center on generator.

Location	Date	Event	Comments
Cogan House Township	12/5/2007	Power Outage	Tri County Electric power outage. Unknown number of customers affected.
Muncy Township	12/11/2007	Power Outage	Power outage in Muncy Borough, Muncy Township, and Muncy Creek. 1,720 PPL Electric customers were affected. Muncy Valley Hospital was affected.
Pine Township	12/24/2007	Power Outage	Power outage affected unknown number Tri County REC in English Center Area of Pine Township.
Cummings Township	1/2/2008	Power Outage	Alleghany Power reported a fallen tree on lines in the Waterville Area.
Lewis Township	1/2/2008	Power Outage	Power outage affected one relay tower in county. First Energy responded.
Countywide	1/30/2008	Power Outage	Multiple power outages reported in Black Forest area.
Muncy Township	4/22/2008	Power Outage	Blown transformer at a substation. Muncy Valley Hospital was most likely affected.
Muncy and Wolf Townships	5/3/2008	Power Outage	Power outage affected 119 PPL Electric customers. No critical facilities were affected.
Cogan House and Pine Townships	5/21/2008	Power Outage	Power outage affecting unknown number of Tri-County customers in Cogan House and Pine Townships.
Countywide	6/29/2008	Power Outage	Severe weather caused a phone/power outage in the northwest part of Lycoming County. Power outage is coming from Germania sub-station.
Williamsport	7/16/2008	Power Outage	Power outage triggered automatic fire alarm in a high-rise building on Lycoming Street. During cause investigation, a gas meter was charged at Williamsport Manor. This did not cause fire alarm or power outage. Both the high-rise and Williamsport Manor were evacuated.
Pine Township	8/2/2008	Power Outage	Power outage affecting approximately 400 Tri-County customers.
Williamsport	8/11/2008	Power Outage	Power outage affecting 80 homes in West Williamsport, no critical facilities reported.
Williamsport	8/15/2008	Power Outage	Power outage affecting 162 PPL Electric customers.
Williamsport	8/21/2008	Power Outage	Power outage affecting an unknown number of PPL Electric customers.
Muncy Creek Township	9/6/2008	Power Outage	Unknown source of power outage at Lycoming Mall Drive and John Brady Drive.

Location	Date	Event	Comments
Muncy Creek Township	9/7/2008	Power Outage	Blown fuse on a utility box at Box Croft Trailer Park. 60 mobile homes affected.
Williamsport	10/10/2008	Power Outage	Power outage affecting approximately 358 PPL Electric customers.
Williamsport	10/22/2008	Power Outage	Approximately 2,888 PPL Electric customers without power. Williamsport Hospital and Williamsport Housing Authority 4 Elderly housing high-rise buildings affected.
Montoursville	10/25/2008	Power Outage	Blown transformer resulting in power outages for unknown number of PPL Electric customers.
Eldred Township	11/24/2008	Power Outage	Reported power outage for approximately 44 PPL Electric customers.
Cogan House Township	11/30/2008	Power Outage	Approximately 16 outages were reported in Cogan House Township and surrounding areas.
Old Lycoming Township	12/7/2008	Power Outage	209 PPL Electric customers without power.
McHenry Township	12/12/2008	Power Outage	Power outage in Waterville area, affecting Waterville Tower site.
Williamsport	12/30/2008	Power Outage	Large tree fell, downing 3 telephone poles with wires and transformers. Williamsport Hospital running on generators. Presbyterian Nursing Home was without power and required evacuation.
Pine Township	12/31/2008	Power Outage	Power outage in Pine Township, no reported accidents, critical facilities affected. Unknown number of affected individuals.
Williamsport	1/28/2009	Power Outage	A tripped circuit breaker caused a power outage in Williamsport. Unknown number of PPL Electric customers were affected.
Clinton & Montgomery Townships	2/23/2009	Power Outage	Unknown number of PPL Electric Utility customers were affected. No cause reported, no critical facilities affected.
Pine Township	4/8/2009	Power Outage	Unknown number of Tri-County Rural Electric customers were affected. No cause reported.
Loyalsock Township	4/20/2009	Power Outage	Wires from a utility pole were removed to repair damage caused by earlier fire. Approximately 650 people were without power. Two nursing homes (The Meadows and Valley View on Warrensville Rd) were affected.
Mifflin Township	4/21/2009	Power Outage	Broken utility pole that housed transformer and wires. Approximately 900 people were without power.

Location	Date	Event	Comments
Muncy Creek Township	4/25/2009	Power Outage	Approximately 3,000 PPL customers were without power. No cause was reported.
Lewis Township	5/27/2009	Power Outage	1,091 customers were affected for approximately 6 hours.

Source: PEMA PEIRS

4.3.7.4. *Future Occurrence*

Power outages can be expected at any time of year, on a nearly monthly basis. Iced power lines; falling tree limbs due to ice, wind, or lightning strikes; and vehicle accidents damaging power lines or their support poles can all be reasons for power outages. Based on data from the last five years, the County can expect between two and 23 major power outages each year, with an annual average of nine.

4.3.7.5. *Vulnerability Assessment*

Power outages pose a maximum threat to the special needs population in Lycoming County. Resources such as electricity, communications, gas, and water supply are critical to ensure the health, safety, and general welfare of the citizenry. All critical infrastructure is vulnerable to the effects of a power outage. The special needs population can be vulnerable to loss of heat or air conditioning during extreme heat; likewise they can be vulnerable to periods of severe cold if they use electric heat and there is a power outage. The County checks on its special needs population during times of extended power outage.

4.3.8. Terrorism

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

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

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

these general categories, however, there are many variations. Particularly in the area of biological and chemical weapons, there is a wide variety of agents and ways for them to be disseminated.

Terrorist methods can take many forms:

- Agriterrorism
- Arson/incendiary attack
- Armed attack
- Biological agent
- Chemical agent
- Cyberterrorism
- Conventional bomb or bomb threat
- Hazardous material release (intentional)
- Nuclear bomb
- Radiological agent

4.3.8.1. *Location and Extent*

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

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

4.3.8.2. *Range of Magnitude*

Three types of terrorist activity have potential relevance to Lycoming County: agriterrorism, intentional hazardous materials releases, and bomb threats. Agriterrorism is direct, intentional, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops, livestock, or forestland. Lycoming County is semi-rural with the majority of its land area dedicated to forests. The County also has a number of SARA Title III facilities and major transportation routes that traverse the County, making intentional hazardous materials release a potential threat to citizens and the environment. Bomb threats represent a simple way to disrupt activities at critical infrastructure facilities, major events, financial institutions, and schools.

Lycoming County has a long, storied history with the Little League World Series (LLWS) making it an inviting terrorist target. Despite no reported incidents of terrorism in this County, these events can occur in any location. The LLWS is a well-attended and publicized event with a single game attendance record of 45,000 spectators. A terrorist attack, such as the detonation of a vehicle-borne improvised explosive device, may cause hundreds and/or thousands of injuries and/or deaths. First responder services (such as EMS, fire, and police) may be delayed for an indefinite period of time due to ingress and egress challenges, resource availability and capabilities, emergency response coordination, and communication challenges. The willingness of terrorists to attack a family-oriented event will cause worldwide psychosocial and political ramifications. Lycoming County will suffer long-term economic consequences due to decreased attendance. Annually, the LLWS injects nearly $20 million in revenue into the local economy. The hospitality industry – lodging, restaurants, transportation, and fuel services – will experience negative economic effects resulting from a terror event.

4.3.8.3. *Past Occurrence*

The only terrorist events experienced by Lycoming County were bomb threats. In 2001, one terrorist incident (i.e., bomb threat) was reported to PEMA. In 2002, five were reported. Since then, there were no bomb threats reported in 2003, four in 2004, five in 2005, one in 2006, four in 2007, and two in 2008.

4.3.8.4. *Future Occurrence*

The probability of terrorism occurring cannot be quantified with as great a level of accuracy as that of many natural hazards. Furthermore, these incidents generally occur at a specific location, such as a government building, rather than encompassing an area such as a floodplain. Thus, planning should be asset-specific, identifying potentially at-risk critical facilities and systems in the community. Once a comprehensive list of critical assets has been developed, it should be prioritized so that efforts can be directed to protect the most important assets first. Then, beginning with the highest-priority assets, the vulnerabilities of each facility or system to each type of hazard should be assessed.

For the purpose of developing a realistic prioritization of terrorism hazard mitigation projects, three elements should be considered in concert:

- Relative importance of the various facilities and systems in the asset inventory
- Vulnerabilities of those facilities (see Section 4.3.6.5)
- Threats that are known to exist

Critical assets and infrastructures are systems whose incapacity or destruction would have a debilitating effect on the county:

- Government services
- Emergency services

- Water supply systems
- Transportation networks
- Telecommunications infrastructure
- Electrical power systems
- Gas and oil facilities

Lycoming County has many notable local landmarks and one major landmark of national significance: the site of the Little League World Series. The site has international significance, notably to children involved in Little League. In 2003, over 330,000 people visited the site during the 10-day Little League World Series. The symbolism of the site and the vulnerability of its users make it a possible target for future terrorist activity. Each year, federal, state, and local law enforcement and intelligence agencies collaborate to ensure that the site remains safe from terrorist attacks.

Additionally, the burgeoning Marcellus Shale natural gas drilling industry includes many gas well sites within Lycoming County. Any of these sites could be a potential target for terrorism, especially by groups opposing the petroleum industry or natural conservation groups (e.g., the Earth Liberation Front, or ELF).

4.3.8.5. *Vulnerability Assessment*

With the exception of the Little League World Series site and Marcellus Shale gas drilling sites described above, Lycoming County does not have facilities, buildings, or landmarks of national importance that are more likely to be terrorism targets than other areas in the United States. Notable County landmarks are of a local historical interest. Of greater concern to the community may be agriterrorism and intentional hazardous material releases. Intentional hazardous material releases are possible at the SARA Title III facilities found throughout the County and along the major transportation routes that traverse the County. These releases would affect population centers as well as water supply areas.

All critical infrastructure is vulnerable to acts of terrorism, especially those acts committed by local groups that know the communities' dependence on that infrastructure. Each critical facility must be individually assessed for its vulnerability to a terrorist or criminal event. The following checklist provides guidance on areas for examination in determining a facility's vulnerability to attack.

Assessing Terrorism Vulnerability

Inherent vulnerability for each critical asset is based on the following:

Visibility: How aware is the public of the existence of the facility?

Utility: How valuable might the place be in meeting the objectives of a potential terrorist?

Accessibility: How accessible is the place to the public?

Asset mobility: Is the asset's location fixed or mobile?

Presence of hazardous materials: Are flammable, explosive, biological, chemical, and/or radiological materials present on-site? If so, are they secured?

Potential for collateral damage: What are the potential consequences for the surrounding area if the asset is attacked or damaged?

Occupancy: What is the potential for mass casualties based on the maximum number of individuals on-site at a given time?

Tactical vulnerability of each asset is based on the following:

Site perimeter

Site planning and landscape design: Is the facility designed with security in mind — both site-specific and with regard to adjacent land uses?

Parking security: Are vehicle access and parking managed in a way that separates vehicles and structures?

Building envelope

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

Facility interior

Architectural and interior space planning: Does security screening cover all public and private areas? Are public and private activities separated? Are critical building systems and activities separated?

Mechanical engineering: Are utilities and HVAC systems protected and/or backed up with redundant systems?

Electrical engineering: Are emergency power and telecommunications available? Are alarm systems operational? Is lighting sufficient?

Fire protection engineering: Are the building's water supply and fire suppression systems adequate, code-compliant, and protected? Are on-site personnel trained appropriately? Are local first responders aware of the nature of the operations at the facility?

Electronic and organized security: Are systems and personnel in place to monitor and protect the facility?

4.3.9. Fixed Nuclear Facility Incidents

Following the accident at the Three Mile Island Nuclear Generating Station in 1979, the Nuclear Regulatory Commission (NRC) reexamined the role of emergency planning for protection of the public in the vicinity of nuclear power plants. The NRC issued regulations requiring that before a plant could be licensed to operate, the NRC must have "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency." The regulations set forth 16 emergency planning standards and define the responsibilities of the licensee, and the state and local organizations involved in emergency response. The added feature of emergency planning to the NRC's "defense-in-depth" philosophy provides that, even in the unlikely event of a release of radioactive materials to the environment, there is reasonable assurance that actions can be taken to protect the population around nuclear power plants.

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

A separate MOU, dated October 22, 1980, deals with NRC and FEMA cooperation and responsibilities in response to an actual or potential radiological emergency. Operations Response Procedures have been developed that implement the provisions of the Incident Response MOU. These documents are intended to be consistent with the Federal Radiological Emergency Response Plan, which describes the relationships, roles, and responsibilities of federal agencies for responding to accidents involving peacetime radiological emergencies.[4]

4.3.9.1. *Location and Extent*

Portions of Lycoming County are within the Ingestion Exposure Pathway Emergency Planning Zone (EPZ) (within 50 miles) of the Susquehanna Steam Electric Station (SSES) in Luzerne County, as shown in Map 9. The other four nuclear plants in Pennsylvania are more than 50 miles away from Lycoming County; this distance exceeds the Plume Exposure and Ingestion Exposure Pathway EPZs for radiological emergencies, so these other facilities are considered a minimal threat to the County.

[4] Nuclear Regulatory Commission, online at www.nrc.gov.

Map 9: Map of Plume Exposure Pathway and Ingestion Exposure Pathway EPZs[5]

4.3.9.2. *Range of Magnitude*

Nuclear facilities must notify the appropriate authorities in the event of an accident. The federally recognized emergency classification levels (ELCs) are Unusual Event, Alert, Site Area Emergency, and General Emergency.

Table 23: Emergency Classification Levels for Nuclear Facilities

Notification of Unusual Event	This is the least serious of the four levels. The event poses no threat to the nearby population or plant employees, but emergency officials are notified. No action by the public is necessary.
Alert	An alert is declared when an event has occurred that could reduce the plant's level of safety, but backup systems still work. Emergency agencies are notified and kept informed, but no action by the public is necessary.
Site Area Emergency	A Site Area Emergency is declared when an event involving major problems with the plant's safety systems has progressed to the point that a release of some radioactivity into the air or water is possible, but is not expected to exceed Environmental Protection Agency Protective Action Guidelines (PAGs) beyond the site boundary. Thus, no action by the public is necessary.

[5] Lycoming County Emergency Management Agency, *Nuclear/Radiological Incident Plan to* [sic] *the County Emergency Operations Plan, County Support Procedures for Nuclear Power Plant Incidents,* April 1994.

General Emergency	This is the most serious of the four classifications and is declared when an event at the plant has caused a loss of safety systems. If such an event occurs, radiation could be released that would travel beyond the site boundary. State and local authorities will take action to protect the residents living near the plant. The alert and notification system will be sounded.

The Susquehanna Steam Electric Station (SSES) is the closest nuclear facility to Lycoming County. Parts of Lycoming County, including the City of Williamsport, fall within the "ingestion exposure pathway," which is the 50-mile radius around a plant that may receive some contamination in very small amounts in the event of a radioactive release. Thousands of County residents reside within this zone. It is a remote possibility that Lycoming County could suffer the effects of radiological contamination as a result of being located within the 50-mile ingestion exposure pathway. In the event of a release, national-level repercussions may produce anti-nuclear activism, widespread concern over public health, and a moratorium on new or renewed nuclear facilities around the nation.

4.3.9.3. *Past Occurrence*

Pennsylvania is home to the worst nuclear facility accident in the history of the nation at the Three Mile Island Nuclear Generating Station (TMI). As the only nuclear facility to reach the General Emergency ECL, its indirect effects were felt nationwide- after the accident at TMI, state, county, and municipal entities designed plans for handling future accidents so that safety could be ensured for all residents. The incident had no direct impact on Lycoming County.

4.3.9.4. *Future Occurrence*

The frequency of radiological accidents above the "Alert" level in the United States is extremely low, with a frequency of occurrence approximately once every 30 years or less. Likewise, the likelihood of an incident at the Susquehanna Steam Electric Station is low.

4.3.9.5. *Vulnerability Assessment*

The effects and impacts of a radiological threat depend on the type of radiation released, the duration of the release, the volume of the release, and the existing weather conditions, such as wind speed and direction. Should a radiological incident occur, the greatest threat and highest impact would be to the health and safety of the citizens. Additionally, the potential exists for catastrophic impacts on property, facilities, infrastructure, essential services, the environment, and the County's economy.

Radionuclide contamination could have lasting impacts on structures, facilities, and infrastructure in the affected areas, primarily in urban and residential areas. Radionuclide ingestion by domesticated farm animals could force agricultural product embargos, placing severe strain on the economy. Radiological particulate contamination of the environment could

impact natural resources, disrupt service delivery, and cause work cessation and evacuations. Other response measures that result from the event could damage the local economy.

In the wake of an accident, the primary radiological exposure for the immediate area around a nuclear power plant can last from hours to months. The health of the citizens in the surrounding area is the primary, immediate concern; the next concern is the long-term impact on the environment. Livestock, livestock by-products, and crops can be contaminated for many years after a nuclear incident. The health effects reported from the psychological stress of individuals living in the immediate area will strain stress management and disaster psychology resources to the limit.

Power failure is the most common secondary effect of a nuclear incident. More serious secondary effects would include public health emergencies, resulting from widespread radionuclide ingestion.

Map 10 shows the 50-mile ingestion exposure pathway emergency planning zone. The following municipalities lie within 50 miles of the Susquehanna Steam Electric Station (SSES):

- Armstrong Township
- Bastress Township
- Brady Township
- Cascade Township
- Clinton Township
- Duboistown Borough
- Eldred Township
- Fairfield Township
- Franklin Township
- Gamble Township
- Hepburn Township
- Hughesville Borough
- Jordan Township
- Lewis Township
- Limestone Township
- Loyalsock Township
- Lycoming Township
- McIntyre Township
- McNett Township
- Mill Creek Township
- Montgomery Borough
- Montoursville Borough
- Moreland Township
- Muncy Creek Township
- Muncy Borough
- Muncy Township
- Old Lycoming Township
- Penn Township
- Picture Rocks Borough
- Plunketts Creek Township
- Shrewsbury Township
- South Williamsport Borough
- Susquehanna Township
- Upper Fairfield Township
- Washington Township
- Williamsport, City of
- Wolf Township

Numerous day care facilities, fire stations, police stations, and other critical infrastructure is vulnerable to incidents at the SSES. The following table lists the critical infrastructure within 50 miles of the SSES:

Table 24: Critical Infrastructure Vulnerable to Incidents at the SSES

Municipality	Facility
Armstrong Township	Carlos R Leffler Inc.
	Chemical Leaman Tank Lines Inc
	Coastal Oil New York, Inc.
	Gulf Oil
Clinton Township	Brodart Company
	Clinton Township Police
	Clinton Twp. Fire Dept.
	Interstate Battery Company
	Montgomery (69)
	Montgomery Elementary
	Montgomery Junior/Senior
	Muncy Prison
	New Covenant
	Penn College Earth Science Ctr
	Ralph Styer Farm
Duboistown Borough	Caschera Day Care
	Duboistown Borough Police
	Duboistown Fire Dept.
Eldred Township	Beck
	Eldred Twp. Fire Co.
	Metzger
	Ott Day Care
Fairfield Township	Bostleys Learning Center
	Fairfield (07)
	Fairfield Academy
	William Hiller Farm
Franklin Township	Harris Day Care
	Lairdsville Fire Dept.
	Renn
Hepburn Township	Hepburn Twp. Fire Dept.
	Hepburn-Lycoming Elementary
	LCCS Hepburn-Lycoming Elem
Hughesville Borough	Barto Day Care
	D & K's Youngland
	Hedgehodge Montessori D.C.

Municipality	Facility
	Hughesville
	Hughesville Borough Police
	Hughesville Fire Dept.
	Hughesville Middle/Senior
	LCCS Ashkar Elementary
Jordan Township	Unityville Fire Dept.
Loyalsock Township	American Lumber
	Donald Schick
	Elmcroft of Loyalsock Assisted
	Faxon (72)
	Folk Day Care
	Hepburn (68)
	Heshbon Storage Building
	Hills Day Care
	Hillside Assisted Living Commu
	Kenmar (12)
	Kwik Fill M0124
	LCCS Faxon Kenmar UMC
	LCCS Four Mile Elementary
	Little Day Care
	Loyalsock Comm. Center
	Loyalsock Middle
	Loyalsock Senior
	Loyalsock Vol. Fire Co.
	Lycoming Co. Pre-Release
	Lycoming Valley
	Lyons Day Care
	Magic Years
	Manorcare Nursing Home (N)
	Manorcare Nursing Home (S)
	Meadows Assisted Living Commun
	Reis
	Riverfront Park Maintenance Bu
	St. Ann's
	Sycamore Manor
	Valley View Nursing Home
	Wee Care Learning Center 1
	Wee Care Learning Center 2

Municipality	Facility
	Williamsport Christian School
	Williamsport Home
Lycoming Township	Creative Kinder Care
Montgomery Borough	Linear Dynamics Inc. - Montgo*
	Montgomery
	Montgomery Borough Police
	Montgomery Sewage Treatment P*
	Montgomery Vol. Fire Co.
	Moorhead
Montoursville Borough	Bardo
	Basics Christian Day Care
	Bostleys Learning Center
	Cillo's Child Care
	Coastal Mart #7003
	John Bower Farm 3 - Montoursv*
	LCCS Lyter Elementary
	Lyter
	McCall
	Montour Oil Service Co.
	Montoursville (20)
	Montoursville Borough Police
	Montoursville Fire Dept.
	Montoursville Senior
	Montoursville Swimming Pool
	Montoursville Water Well #3
	Montoursville Water Well #4
	Montoursville Water Well #5
	PA State Police
	Penn College Aviation Center
	Reimans Day Care
	Sunoco
	W B Konkle - Montoursville
	Wmspt. Airport Fire Dept.
Moreland Township	Ryder
Muncy Borough	Andritz Sprout-Bauer
	Automotive Service Inc.
	Dewald
	Keystone Hook & Ladder

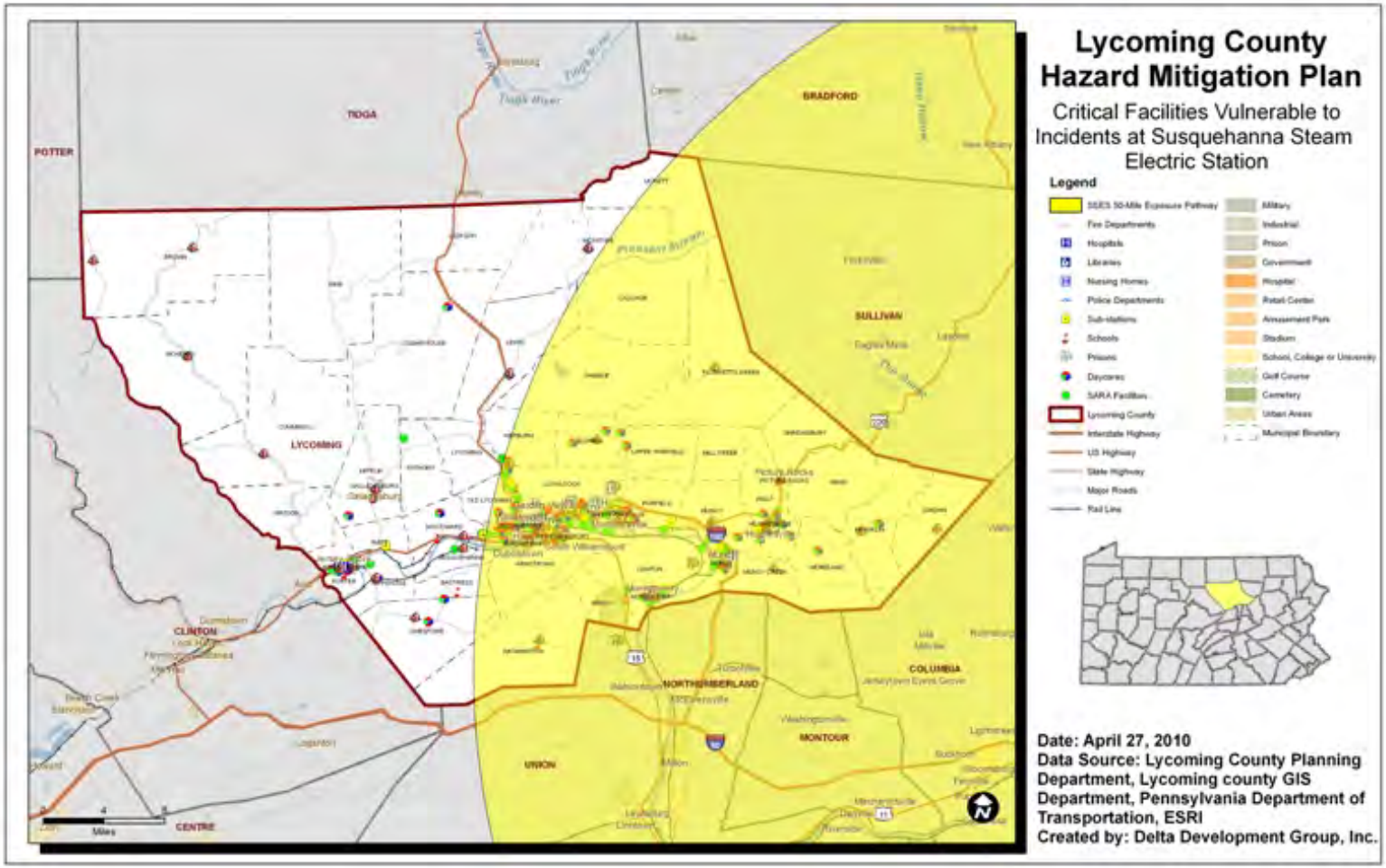
Municipality	Facility
	LCCS Myers Elementary
	Muncy
	Muncy Borough Police
	Muncy Junior/Senior
	Muncy Sewage Treatment Plant
	Myers
	Resurrection Early Childhood
	Uni-Mart #04047
Muncy Creek Township	Chippewa
	Clarkstown Fire Dept.
	Larry Fry Farm Fields - Muncy*
	Muncy (47)
	Muncy Valley Hospital
	Sunoco
	Thomas Styer Farm
Muncy Township	Little Tykes
	Muncy Township Police
	Muncy Twp. Fire Dept.
Old Lycoming Township	Bostleys Learning Center
	LCCS Round Hills Elementary
	Mitchley Day Care
	Old Lycoming Twp. Fire Dept.
	Old Lycoming Twshp. Police
	Ray Day Care
	Richard Hall Farm
	Round Hills
	Route 15 Texaco Service Statio
	Stroehmann Bakers Inc.
Picture Rocks Borough	Ferrell
	Picture Rocks Vol. Fire Co
Plunketts Creek Township	Plunketts Cr. Twp. Fire Co.
South Williamsport Borough	Banzhof Day Care
	Central
	Citizen's Fire Co. #2 (SW)
	First Ward Fire Co.
	Indep. Fire Dept (S. W.)
	Insinger's Personal Care - Sou
	LCCS S.W. Middle School

Municipality	Facility
	Messiah Lutheran
	Mountain View
	Mountain View - 7th Day Advent
	Paddington Station
	Rommelt
	S. Wmspt. Borough Police
	S.W. United Methodist Church
	Seyler Day Care
	South Williamsport (38)
	South Williamsport Junion/Seni
Upper Fairfield Township	LCCS Loyalsock Valley Elem.
	Loyalsock Valley
Washington Township	Elimsport Elementary
	Washington Twp. Fire Dept.
Williamsport, City of	Adams
	Beiter Day Care
	Berninger Day Care
	Birth to First Step
	Child Guidance
	Child Guidance Day Care
	Childrens Learnig Center
	City Kidz
	City of Wmspt. Police
	Cochran
	Curtain
	Divine Providence Hospital
	DPH Child Care
	Dr. Max Miller Preschool (Hope
	First Nursery School
	Golden Rule Day Care
	Greenview Tot Club
	Haswell
	Helisek Day Care
	High Steel Structures Inc.
	Hope Enterprises Day Care
	Insinger's Personal Care - Cam
	Jackson
	James V. Brown - Williamsport

Municipality	Facility
	Lambert Day Care
	LCCCS Childrens Dev. Cntr.
	LCCS Cochran Elementary
	LCCS Grace UMC
	LCCS Jackson Elementary
	LCCS Lose Elementary
	LCCS Sheridan Elementary
	LCCS St. Boniface School
	Little Lambs
	Little Starrs Day Care
	Lycoming Child Care Services
	Lycoming College
	Lycoming County Prison
	Lycoming County Sheriff
	Lycoming Nursery
	Marcy's Child Care
	Memorial Baptist
	Miller
	Ousley
	PCT Child Care Center
	Pennsylvania College of Techno
	Pine Street Nursery & Daycare
	Presbyterian Home
	Ridley
	Roosevelt
	Rose View Center
	Rose View Court Assised Living
	Salvatori's Day Care
	Seagraves Day Care
	Sheridan
	St. Boniface
	St. John Newmann
	Stevens
	Sugar n Spice Day Care 1 & 2
	Tilburg's Personal Carre
	Titus
	West Branch
	West Branch School SACC

Municipality	Facility
	West House Personal Care Home
	West Williamsport (35)
	Williamsport (37)
	Williamsport Bureau of Fire
	Williamsport Hospital
	Williamsport School of Commerc
	Williamsport Senior
	Willow View Personal Care
	Womack
	YMCA # 4
	YMCA Child Care Cntr. 1 & 2
Wolf Township	Ashkar
	Bostleys Learning Center
	Brown Day Care
	Hughesville (70)
	Hughesville Well 101
	Hughesville Well 102
	Montgomery Day Care
	Robin's Nest Day Care
	South Day Care
	Stover Day Care

Map 10: Critical Facilities Vulnerable to Incidents at the Susquehanna Steam Electric Station



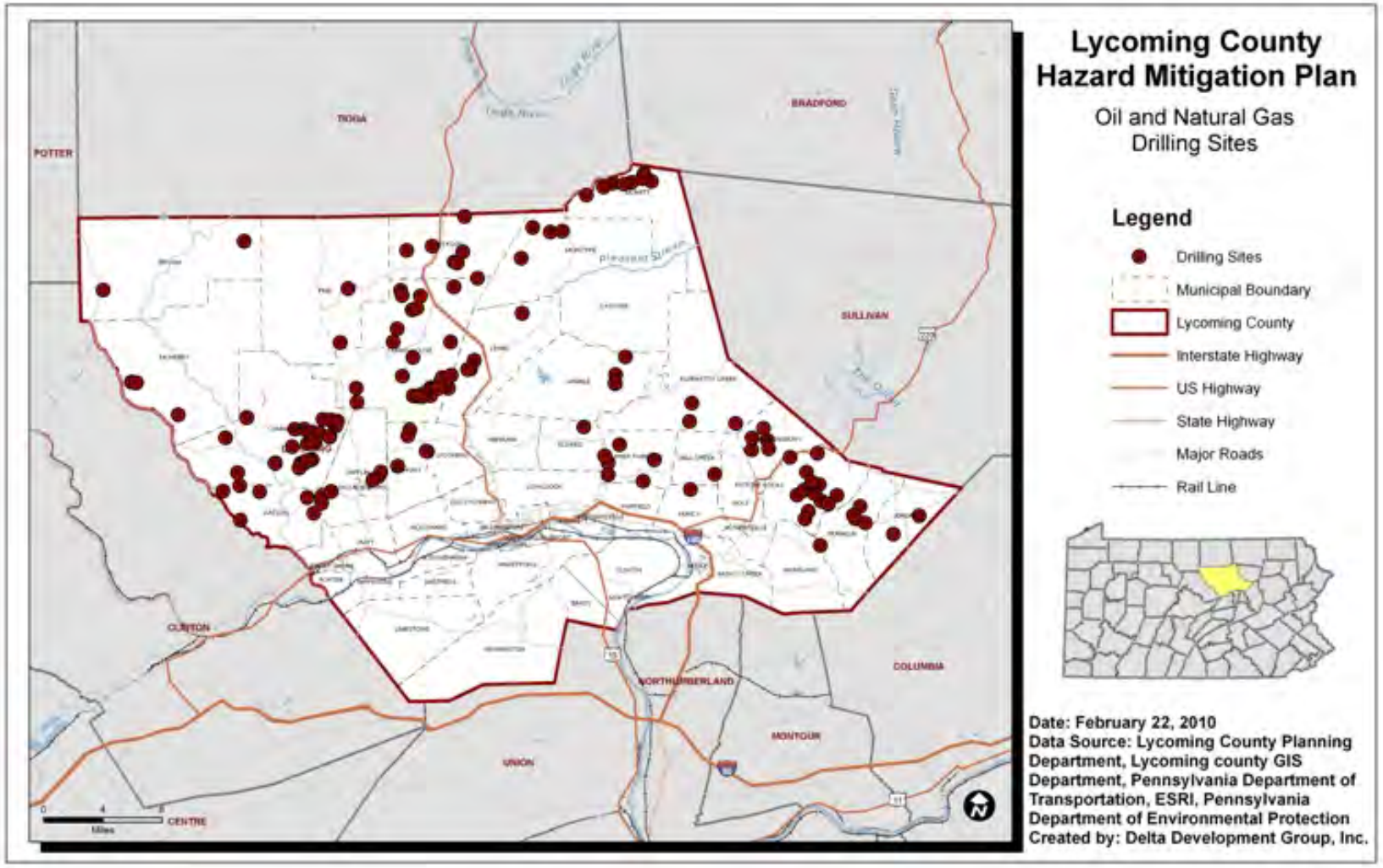
4.3.10. Natural Gas Drilling Incidents

With more than 50 natural gas drilling sites, and approximately another 180 active well permits for sites that have not yet been drilled (as of March 2010) in the County, the release and combustion of a large quantity of natural gas is of particular concern, especially as this industry is in its infancy in Lycoming County. The industry is highly regulated by the Pennsylvania DEP, and local response agencies have been trained to deal with accidents at the sites, but the threat of releases, fire, and explosions remains.

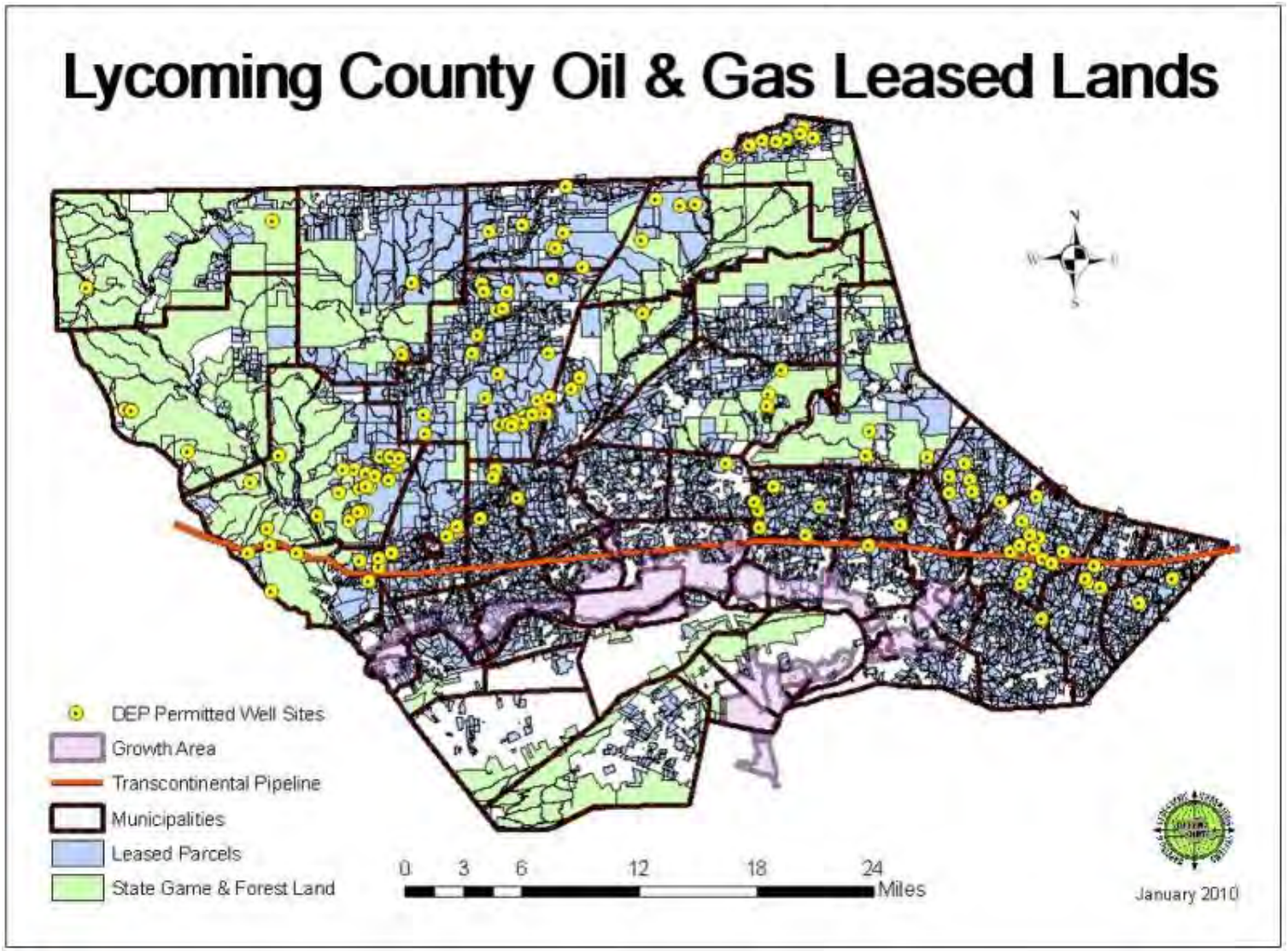
4.3.10.1. *Location and Extent*

Map 11 on the next page shows the location of the gas wells and active permits in Lycoming County. Map 12 on page 109 shows the locations of sites that have been permitted for drilling, but on which drilling has not commenced.

Map 11


Lycoming County
Hazard Mitigation Plan
Oil and Natural Gas
Drilling Sites
Legend
Drilling Sites
Municipal Boundary
Lycoming County
Interstate Highway
US Highway
State Highway
Major Roads
Rail Line
Date: February 22, 2010
Data Source: Lycoming County Planning Department, Lycoming county GIS Department, Pennsylvania Department of Transportation, ESRI, Pennsylvania Department of Environmental Protection
Created by: Delta Development Group, Inc.
POTTER
TIOGA
BRADFORD
SULLIVAN
CLINTON
COLUMBIA
NORTHUMBERLAND
MONTOUR
UNION
CENTRE

Map 12


Lycoming County Oil & Gas Leased Lands
N
W
E
S
DEP Permitted Well Sites
Growth Area
Transcontinental Pipeline
Municipalities
Leased Parcels
State Game & Forest Land
0 3 6 12 18 24
Miles
January 2010

4.3.10.2. *Range of Magnitude*

With a natural gas release, whether accidental or intentional, there are several potentially exacerbating or mitigating circumstances that will affect its severity or impact. Exacerbating conditions are characteristics that can enhance or magnify the effects of a hazard. Mitigating conditions, on the other hand, are characteristics of the target and its physical environment that can reduce the effects of a hazard. These conditions include the following:

- Weather conditions – affect how the hazard develops
- Micro-meteorological effects of buildings and terrain – alter the dispersion of materials
- Shielding in the form of sheltering-in-place – protects people and property from harmful effects
- Non-compliance with applicable codes (e.g., fire and building codes) and maintenance failures (e.g., fire protection and containment features) – can substantially increase the damage to the facility itself and to surrounding buildings

The severity of the incident varies with concentration of natural gas released and the distance and related response time for emergency response teams. The areas within closest proximity to the releases are generally at greatest risk, yet a release can travel great distances, resulting in far-reaching effects on people and the environment.

Impacts of incidents at natural gas drilling sites can vary from relatively minor to catastrophic. On July 28, 2009, a gas well in McNett Township leaked natural gas into the water table, where it spread into the Lycoming Creek, some smaller streams, and into the water supplies of four residents. No injuries or damage were reported. If a large volume of natural gas escapes from a well at the surface, it will expand and spread over a large area. The potential for a major explosion of the gas exists; this explosion could kill hundreds of people, destroy property, spark wildland and urban fires, overwhelm the local EMS services and hospitals with the influx of casualties, force evacuations, close roads, cause utility outages (if a power or telephone transmission line is damaged), etc.

4.3.10.3. *Past Occurrence*

On July 28, 2009, a gas well in McNett Township leaked natural gas into the water table, where it spread into the Lycoming Creek, some smaller streams, and into the water supplies of four residents. No injuries or damage were reported.

4.3.10.4. *Future Occurrence*

The likelihood of an emergency at a natural gas drilling site in Lycoming County cannot be determined at this time, as there is no historical data to analyze. However, other counties throughout the United States have reported in their risk assessments that an incident of this type can be expected approximately every five years.

The likelihood of an incident within the County is expected to increase with the dramatic increase in the number of well sites. According to PA DEP, nearly 2,000 drilling permits were issued throughout Pennsylvania in 2009. Over 1,200 of these were in the eastern region of the state. Unofficial PA DEP estimates indicate that 5,000 permits will be issued in 2010.

Future emergencies will occur at well sites as well as along the natural gas transportation network. As of March 2010, I-180 and US-220 are experiencing increased truck traffic due to the natural gas industry. The following table illustrates the increase in truck traffic from a single well.

Table 25: Total Truck Loads for One Gas Well

Total Truck Loads for One Gas Well

Type of Vehicle	No. of Axles	Loaded Weight	Empty Weight	One Way Trips	Comments
Drilling Operations					
Rock Hauler	5	84,000	35,000	70	Pad Construction
Rig (install)	5	100,000	n/a	2	Rig Set-up
Rig (removal)	5	100,000	n/a	2	Rig Removal
Bob-Tail	5	50,000	20,000	20	Equipment
Bob-Tail	5	50,000	20,000	20	Equipment
Bob-Tail	5	50,000	20,000	8	Drilling Pipe
Bob-Tail	5	50,000	20,000	6	Cement
Bob-Tail	5	50,000	20,000	9	Drilling Mud
Fracing Operations					
Work-over Rig	5	80,000	n/a	2	Rig Set-up
Work-over Rig	5	80,000	n/a	2	Rig Removal
Tank Truck	5	80,000	35,000	70	Frac Tanks
Water Tanker	3	80,000	35,000	685	Water for Fracing
Water Tanker	3	80,000	35,000	214	Frac Water Removal (25%)
Bob-Tail	5	80,000	35,000	24	Equipment
Production					
Tank Truck	5	80,000	35,000	353	Empty Dehydration Tanks

1,134 Heavy Truck Loads Plus 353 Trucks / Yr (Maint.) / Well Head

As more permits are issued, this traffic will increase further. Also, the County will face an increased risk of pipeline emergencies as the related infrastructure is put in place.

4.3.10.5. *Vulnerability Assessment*

The hazard area around a natural gas drilling site encompasses an area with a radius of one-half mile, the initial downwind evacuation distance for large spills of compressed natural gas. The following tables list the vulnerable facilities and population within one-half mile of any natural gas drilling sites in Lycoming County (with nearly 250 drilling sites in the County, it is

impractical to list this data for each site individually). Only the Loyalsock Elementary School in Upper Fairfield Township is within one-half mile of a drilling site. A map showing the vulnerability areas around each drilling site and the County's critical infrastructure follows the tables. Because specific population data was not available for each household, the population estimates presented in the second table below represent the number of households in each municipality multiplied by the average household size (2.37) in Lycoming County.

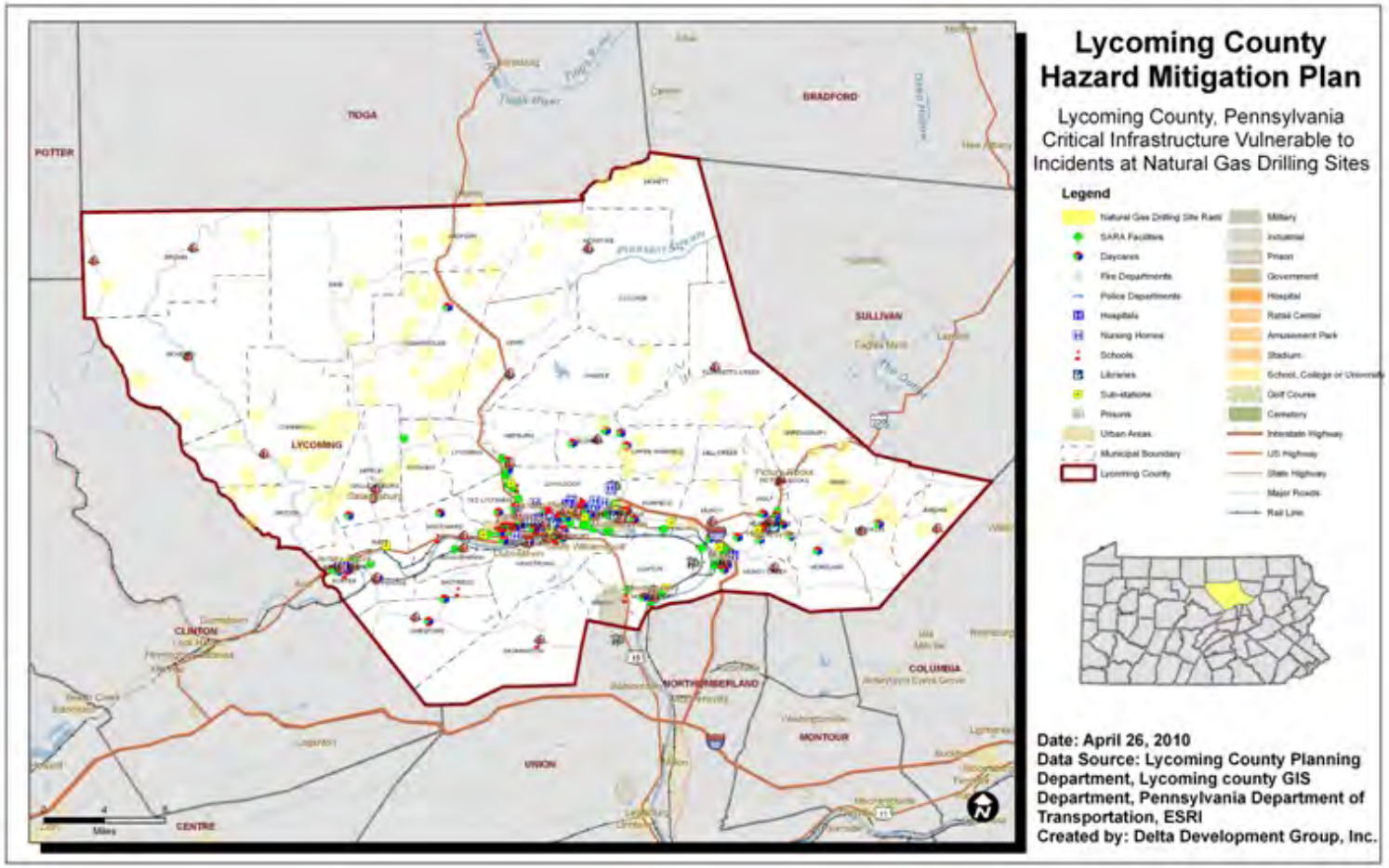
Table 26: Critical Infrastructure within One-Half Mile of Natural Gas Drilling Sites

Municipality	Facility
Upper Fairfield Township	Loyalsock Elementary School

Table 27: Population within One-Half Mile of Natural Gas Drilling Sites, by Municipality

Municipality	Households	2009 Population Estimate
Anthony Township	41	97
Brown Township	7	17
Cascade Township	5	12
Cogan House Township	122	289
Cummings Township	24	57
Eldred Township	46	109
Fairfield Township	14	33
Franklin Township	88	209
Gamble Township	13	31
Jackson Township	39	92
Jordan Township	41	97
Lewis Township	49	116
Lycoming Township	18	43
McHenry Township	16	38
McIntyre Township	4	9
McNett Township	69	164
Mifflin Township	103	244
Mill Creek Township	18	43
Moreland Township	13	31
Muncy Township	15	36
Penn Township	119	282
Pine Township	15	36
Plunketts Creek Township	9	21
Salladasburg Borough	4	9
Shrewsbury Township	74	175
Upper Fairfield Township	276	654
Watson Township	64	152
Wolf Township	3	7
Total	**1,309**	**3,102**

Map 13: Natural Gas Drilling Site Vulnerability Areas



4.3.11. Earthquakes

4.3.11.1. *Location and Extent*

Earthquake events in Pennsylvania, including Lycoming County, are mild. When events occur, they impact very small areas less than 100 kilometers in diameter.

4.3.11.2. *Range of Magnitude*

Earthquake magnitude is often measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake. Table 28 summarizes Richter Scale magnitudes as they relate to the spatial extent of impacted areas. Based on historical events, earthquakes in the Pennsylvania region do not exceed magnitudes greater than 6.0. The worst-case earthquake in Lycoming County would therefore only result in trees swaying and objects falling off walls.

Table 28: Richter Scale Magnitudes

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

The impact an earthquake event has on an area is typically measured in terms of earthquake intensity. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. A detailed description of the MMI Scale is shown in Table 29. The earthquakes that occur in Pennsylvania originate deep within the earth's crust, not on an active fault. Therefore, little or no damage is expected. No injury or severe damage from earthquake events has been reported in Lycoming County.

Table 29: Modified Mercalli Intensity Scale with Associated Impacts

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	Instrumental	Detected only on seismographs	<4.2
II	Feeble	Some people feel it	
III	Slight	Felt by people resting; like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves	<5.4
VII	Very Strong	Mild alarm, walls crack, plaster falls	<6.1
VIII	Destructive	Moving cars uncontrollable, masonry fractures, poorly constructed buildings damaged	<6.9
IX	Ruinous	Some houses collapse, ground cracks, pipes break open	
X	Disastrous	Ground cracks profusely, many buildings destroyed, liquefaction and landslides widespread	<7.3
XI	Very Disastrous	Most buildings and bridges collapse, roads, railways, pipes, and cables destroyed, general triggering of other hazards	<8.1
XII	Catastrophic	Total destruction, trees fall, ground rises and falls in waves	>8.1

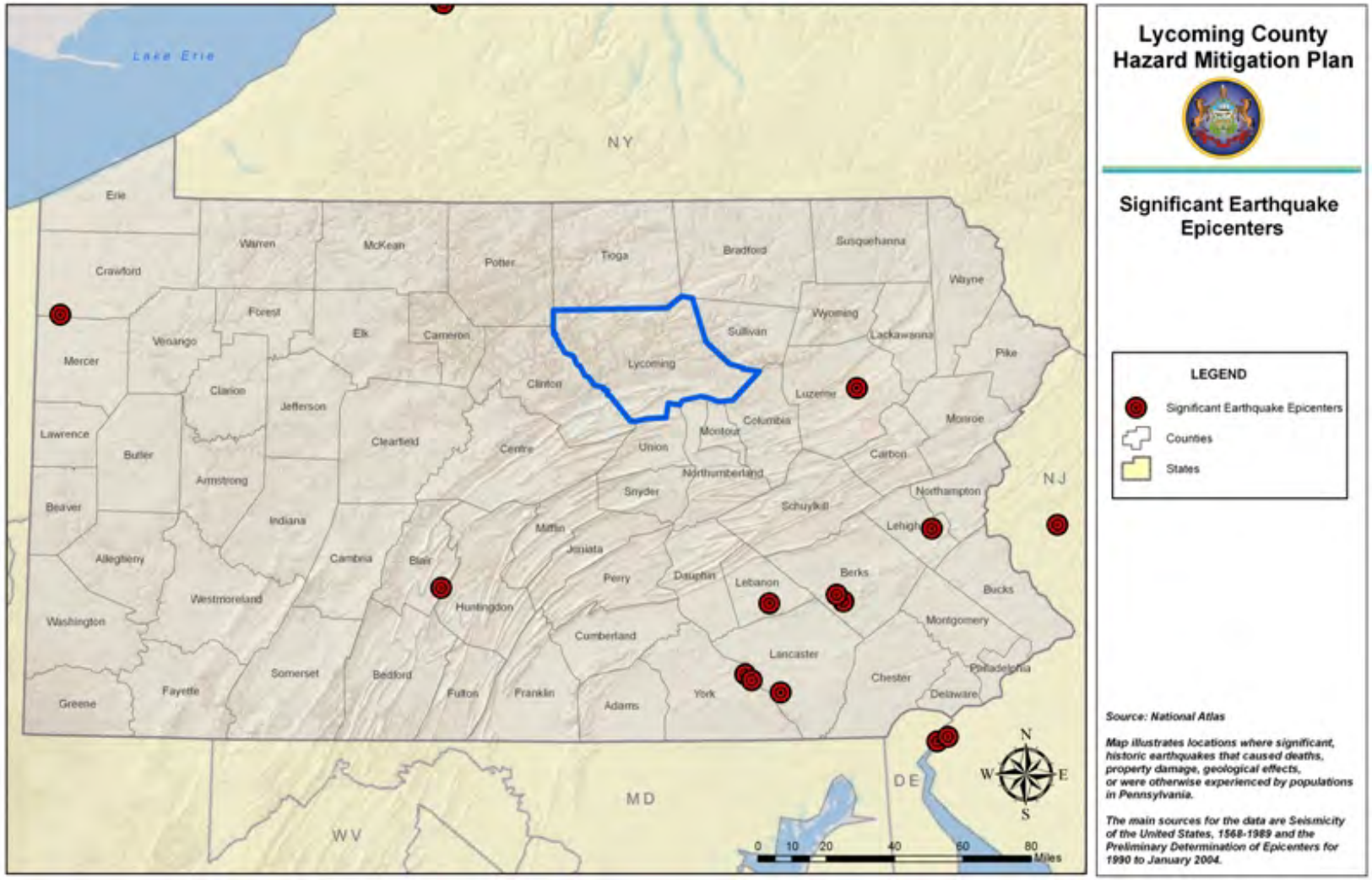
Environmental impacts of earthquakes can be numerous, widespread, and devastating, particularly if indirect impacts are considered. Some examples are shown below but are unlikely to occur in Lycoming County:

- Induced tsunamis and flooding or landslides and avalanches
- Poor water quality
- Damage to vegetation
- Breakage in sewage or toxic material containments

4.3.11.3. *Past Occurrence*

No earthquake epicenters have been measured in Lycoming County. Map 14 shows recorded earthquake events in Pennsylvania between 1990 and 2006. Earthquake events are shown in other areas of Pennsylvania, with a particular concentration of events occurring in the eastern part of the Commonwealth between Lancaster and Reading. One event is shown in nearby Luzerne County. Prior to 1960, an earthquake event occurred on the eastern border of York County that had a magnitude measured greater than four on the Richter Scale.

Map 14: Significant Earthquake Epicenters in Pennsylvania



4.3.11.4. *Future Occurrence*

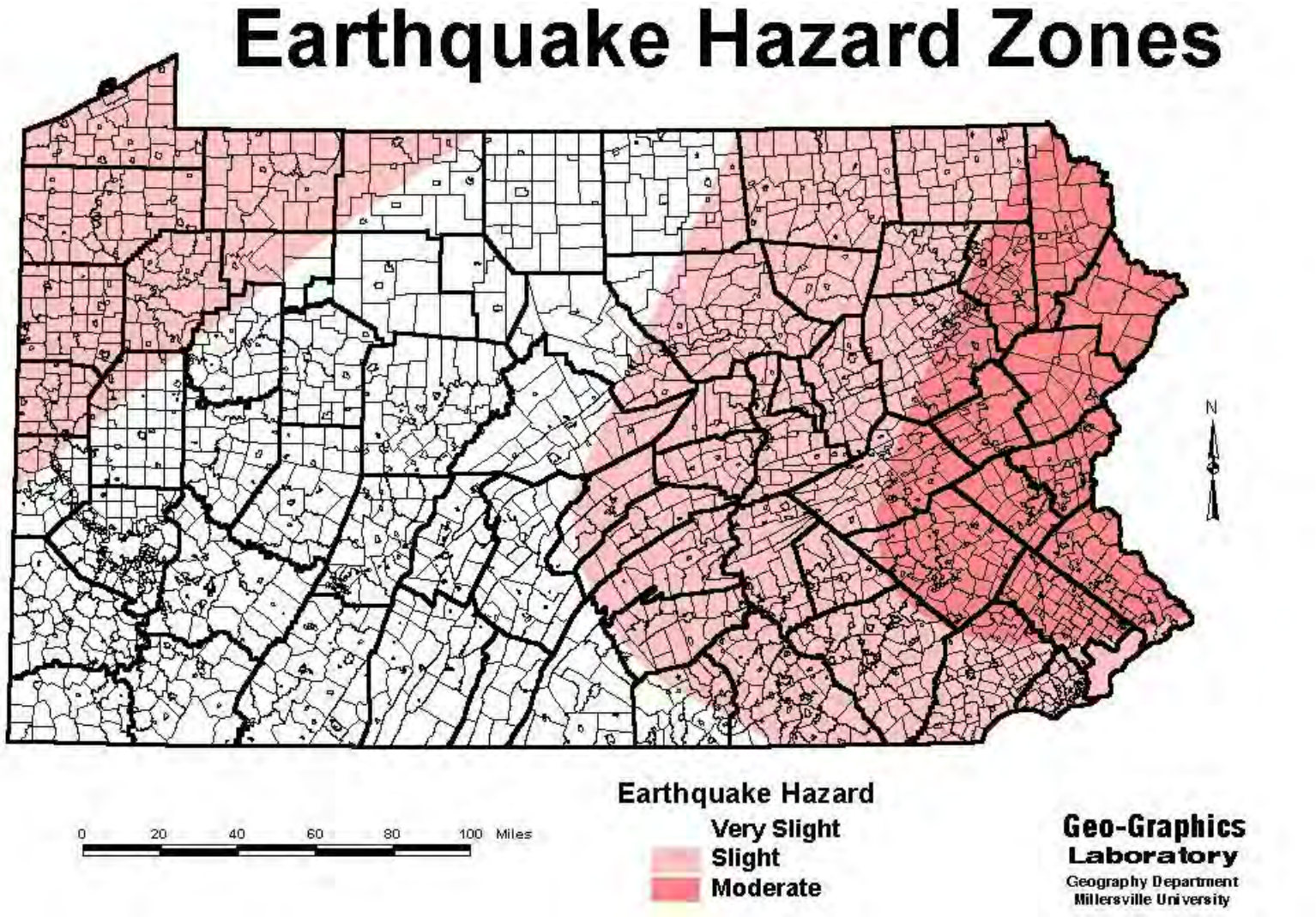
One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak ground acceleration (PGA) measures the strength of ground movements in this manner. PGA represents the rate in change of motion of the earth's surface during an earthquake as a percentage of the established rate of acceleration due to gravity.

Map 15 shows the relative earthquake hazard zones in Pennsylvania identified by the Department of Earth Sciences at Millersville University. According to this map, earthquake hazards are “very slight” or “slight” for all of Lycoming County, meaning the PGA of 10% probability of being exceeded over a 50-year period equals 4-8 PGA. In general, ground acceleration must exceed 15 PGA for significant damage to occur, although soil conditions at local sites are extremely important in controlling how much damage will occur as a consequence of a given amount of ground acceleration.

4.3.11.5. *Vulnerability Assessment*

Lycoming County is located in a zone where minor earthquake damage is expected. No damage or casualties have been reported from earthquake events. Therefore, it is reasonable to state that Lycoming County is not vulnerable to the effects of earthquakes.

Map 15: Pennsylvania Earthquake Hazard Zones



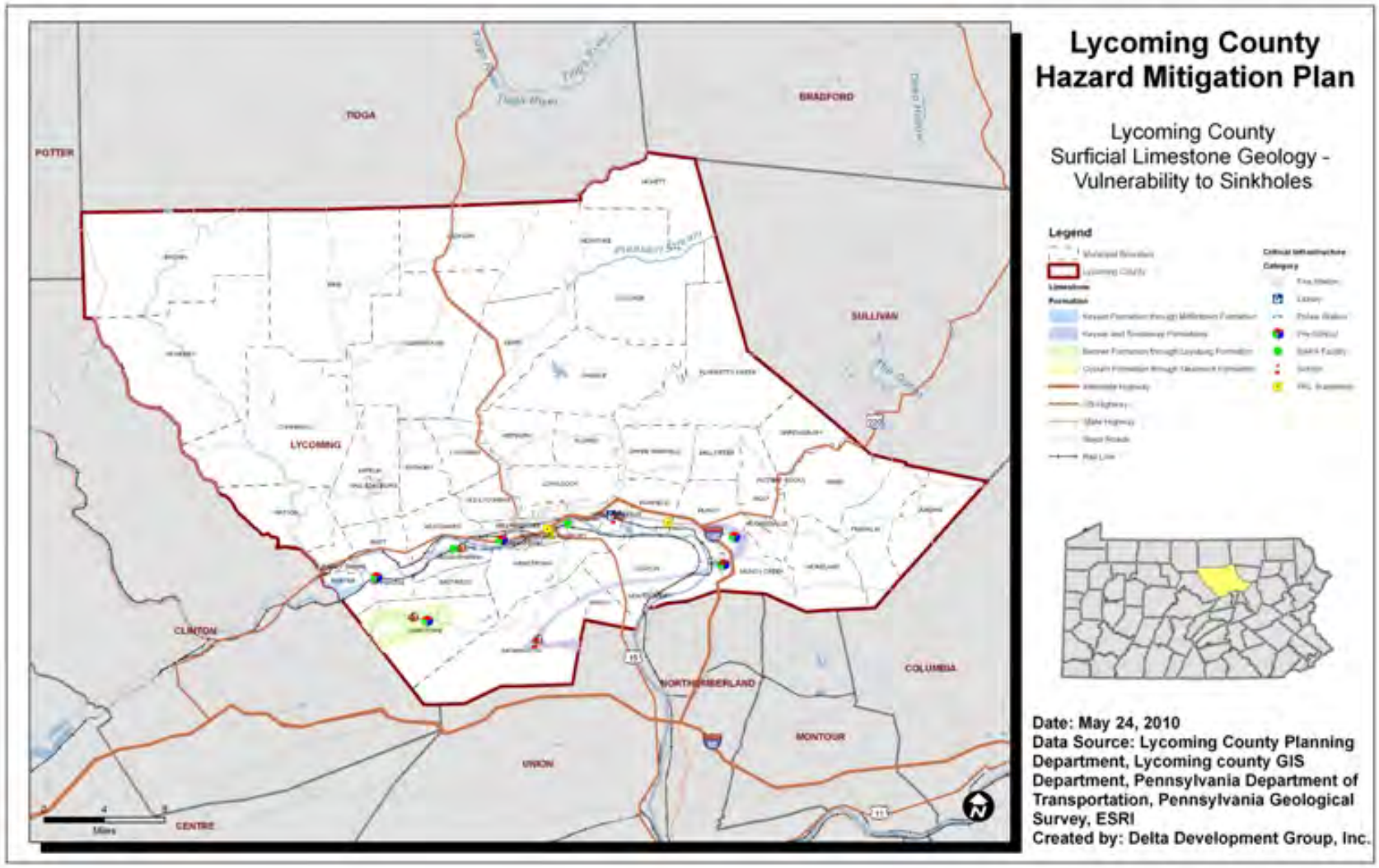
4.3.12. Subsidence and Sinkholes

4.3.12.1. *Location and Extent*

Subsidence potential in Lycoming County is primarily associated with the solution of carbonate bedrock, such as limestone and dolomite, by water. Water passing through naturally occurring fractures and bedding planes dissolves the bedrock, leaving voids below the surface. Eventually, overburden on top of the voids collapses, leaving surface depressions resulting in karst topography. Characteristic structures associated with karst topography include sinkholes, linear depressions, and caves. Often, sub-surface solution of limestone will not result in the immediate formation of karst features. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material. Abrupt or long-term changes in the ground surface may also occur following sub-surface fluid extraction (e.g., natural gas, water, oil). Map 16 shows that a small portion of Lycoming County lies in an area of Pennsylvania where limestone, dolomite, or both are present near ground surface, thus making it slightly susceptible to natural sinkhole development. The following municipalities have identified near-surface limestone:

- Armstrong Township
- Brady Township
- Clinton Township
- Duboistown Borough
- Fairfield Township
- Limestone Township
- Montoursville Borough
- Muncy Borough
- Muncy Creek Township
- Muncy Township
- Nippenose Township
- Piatt Township
- Porter Township
- South Williamsport Borough
- Susquehanna Township
- Washington Township
- Williamsport, City of
- Wolf Township
- Woodward Township

Map 16: Area Vulnerable to Subsidence



4.3.12.2. *Range of Magnitude*

Based on the geologic formations underlying parts of Lycoming County, subsidence and sinkhole events may occur gradually or abruptly. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result. While the photograph shown in Figure 2 was taken at a location outside of Lycoming County, it provides an example of the severe damage sinkholes can inflict on buildings. General recommendations have been published for site investigations prior to construction of buildings due to the potential for karst subsidence. These recommendations vary depending on the rock type immediately underlying soil cover. The recommendations include thorough geotechnical investigations to identify un-collapsed karst features and potential excavation to solid rock prior to construction.

Figure 2: Sinkhole at Corporate Plaza Building in Allentown, Lehigh County, PA, in February 1994 (Photograph by William E. Kochanov - DCNR, 2009)

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

The worst case scenario for sinkholes in Lycoming County would be a series of large sinkholes opening in Muncy Township. Though the geographic minority of the township is vulnerable to sinkholes, a series of sinkholes in this township could cut off access to I-180 and US-220, both

major roads in the County. In addition, Muncy Township has the highest value of property within the vulnerable area: over $264 million. In addition, this series of sinkholes could close secondary roads, cause power outages, prevent the delivery of emergency services, and cause injuries or death to the township's residents.

4.3.12.3. *Past Occurrence*

According to the Pennsylvania Department of Conservation and Natural Resources' Sinkhole Inventory Online Database (http://www.dcnr.state.pa.us/topogeo/hazards/sinkhole/default.asp), there have been no recorded sinkholes in Lycoming County.

4.3.12.4. *Future Occurrence*

Based on geological conditions, subsidence events may possibly occur in the future for the areas of Lycoming County underlain by carbonate rock such as limestone. That none have occurred makes accurate prediction of the likelihood of future events difficult.

4.3.12.5. *Vulnerability Assessment*

The following municipalities have identified near-surface limestone, and are therefore vulnerable to sinkholes:

- Armstrong Township
- Brady Township
- Clinton Township
- Duboistown Borough
- Fairfield Township
- Limestone Township
- Montoursville Borough
- Muncy Borough
- Muncy Creek Township
- Muncy Township
- Nippenose Township
- Piatt Township
- Porter Township
- South Williamsport Borough
- Susquehanna Township
- Washington Township
- Williamsport, City of
- Wolf Township
- Woodward Township

The critical infrastructure vulnerable to sinkholes is shown in the following table. It includes six fire departments, three schools, two daycare facilities, five industrial sites, and a Pennsylvania State Police facility.

Table 30: Critical Infrastructure Vulnerable to Sinkholes

Municipality	Facility
Fairfield Township	Fairfield (07)
Limestone Township	LCCS Nippenose Val. Elem.
Limestone Township	Nippenose Val. Fire Dept.
Limestone Township	Nippenose Valley
Montoursville Borough	Chemical Leaman Tank Lines Inc
Montoursville Borough	Montoursville Fire Dept.

Municipality	Facility
Montoursville Borough	PA State Police
Montoursville Borough	Penn College Aviation Center
Montoursville Borough	W B Konkle - Montoursville
Muncy Borough	LCCS Myers Elementary
Muncy Borough	Myers
Muncy Creek Township	Chippewa
Muncy Township	Dick Tebbs Farm #2 - Muncy Tw*
Nippenose Township	Riggle Day Care
South Williamsport Borough	South Williamsport (38)
Susquehanna Township	Nisbet Fire Dept.
Washington Township	Elimsport Elementary
Washington Township	Washington Twp. Fire Dept.
Williamsport, City of	Hope Enterprises Day Care
Williamsport, City of	Williamsport (37)

4.3.13. Wildfires

A wildfire is an uncontrolled fire spreading 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. A wildland fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines, and similar facilities. An urban-wildland interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

The U.S. Fire Administration (USFA) collects data from a variety of sources to provide a statistical analysis of fire incidents nationwide. According to the USFA, the number of fires, fire casualties, and economic losses has continued to decline over the last several years. From 1992 to 2001, fires per million population declined 204 percent, deaths per million declined 30 percent, and dollar loss per capita declined 6 percent. This data is confirmed by comparing it with the National Fire Protection Administration's (NFPA) data on national fire trends from 1977 to 2004. The NFPA data shows that in 1977, there was a total of 3,264,000 fires nationwide, resulting in 7,395 civilian deaths and 31,190 civilian injuries. In 2004, this number dropped to a total of 1,550,500 fires, 3,900 civilian deaths, and 17,785 civilian injuries nationwide. A 2001 study by the USFA showed the largest number of fires were classified as "outside/other" and accounted for 41 percent of all fires, while residential fires resulted in the highest percentage of fire deaths (77%), fire injuries (73%), and dollar loss (54%). Nonresidential properties, such as industrial and commercial establishments, institutions, and educational facilities, accounted for only 8 percent of all fires, but 28 percent of total dollar loss.

From 1992 to 2001, Pennsylvania had an average fire death rate above the national average, with an average between 11 to 17 per million population. This is due primarily to the state's high population density. In 2001, Pennsylvania averaged 3.01 civilian deaths per 1,000 fires and $22,609 in property loss per fire. In 2003, the USFA recorded a fire death rate of 15.9 per

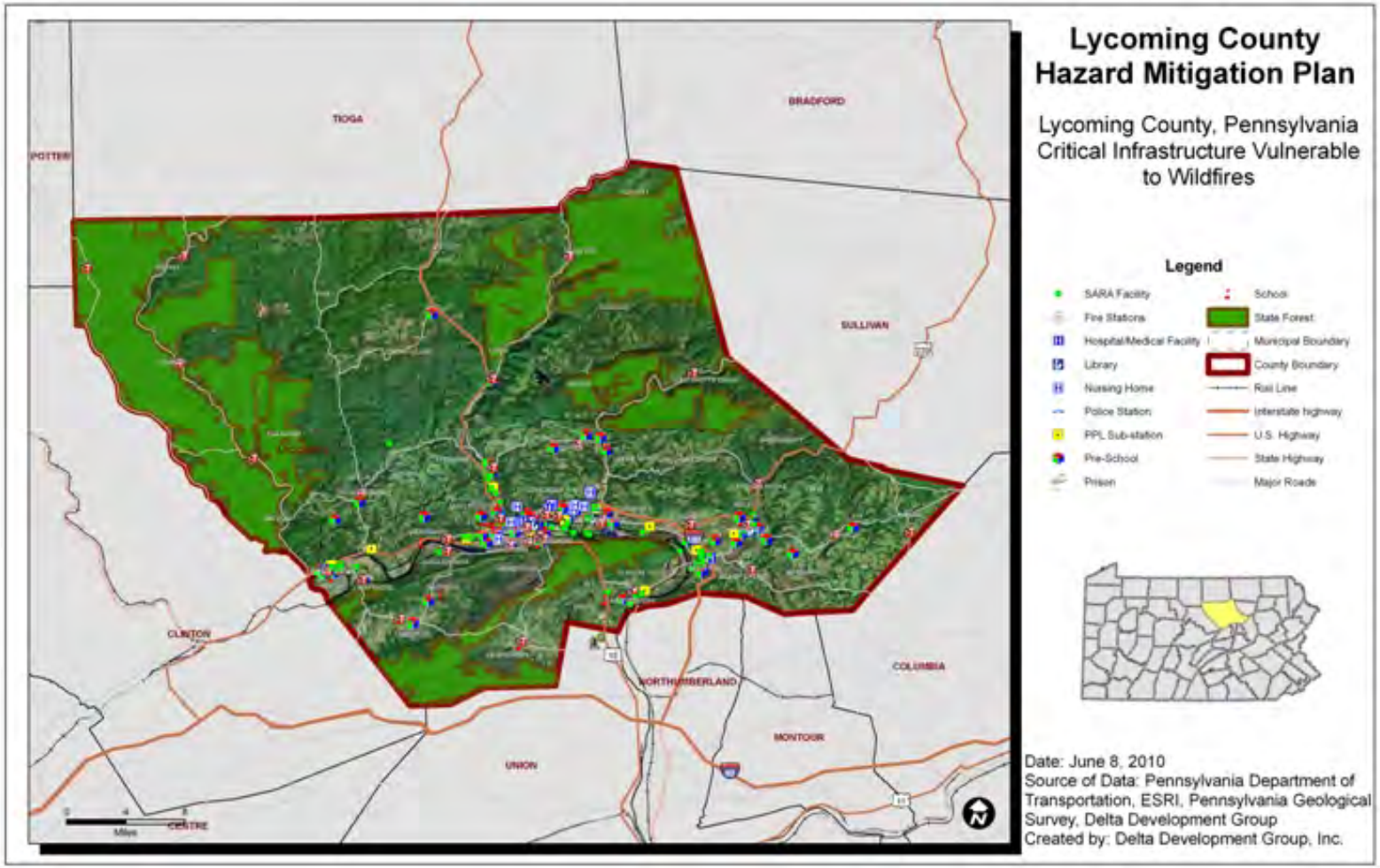
million for Pennsylvania. This was above the 2003 national average of 14.4 per million and ranked the Commonwealth as the fifteenth highest state that year.

4.3.13.1. *Location and Extent*

Wildland fires can occur at any time of the year, but are most likely to occur in the County during a drought. Wildland fires in Pennsylvania can occur in fields, grass, and brush as well as in the forest itself. Under dry conditions or drought, wildfires have the potential to burn forests as well as croplands. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildland fires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion.

The map on the next page shows that the vast majority of the County is forestland, with several state parks and forests. Any area with forest or brush is vulnerable to wildfires.

Map 17: Lycoming County Wildfire Hazard Map



4.3.13.2. *Range of Magnitude*

Wildland fires in Lycoming County have generally been small and easily contained. There have been a few that have burned over 100 acres, but most are confined to 10 acres or less. The fact that Lycoming County's land use is mostly forest or agricultural has led to no property damage being done by these fires. The worst wildfire to occur within the County burned about 4,000 acres, though it caused no property damage, injuries, or deaths. However, the County recognizes that wildfires of this magnitude will continue to occur in Lycoming County, and will have more devastating effects as development in or around wildlands increases.

4.3.13.3. *Past Occurrence*

The following table lists the reported wildfires that have occurred since January 2002.

Table 31: Wildfires in Lycoming County Reported Between 2002 and 2009

Date	Location	Acreage	Death	Injury	Property Damage, $K
1/1/2002	McHenry Township	1.7	0	0	0
3/1/2002	Cummings Township	129.0	0	0	0
3/12/2002	Cummings Township	0.8	0	0	0
8/20/2002	Cummings Township	7.6	0	0	0
4/16/2004	Cummings Township	0.3	0	0	0
4/17/2004	Cummings Township	0.6	0	0	0
4/20/2005	Armstrong Township	0.8	0	0	0
5/9/2005	Moreland Township	1.3	0	0	0
5/27/2005	McHenry Township	21.7	0	0	0
9/11/2005	McHenry Township	5.3	0	0	0
4/29/2006	Washington Township	0.8	0	0	0
4/30/2006	Cummings Township	605.0	0	0	0
8/20/2006	Porter Township	0.1	0	0	0
12/11/2006	Armstrong Township	0.1	0	0	0
12/11/2006	Clinton Township	0.3	0	0	0
12/12/2006	Williamsport	4.5	0	0	0
3/27/2007	McHenry Township	0.1	0	0	0
3/27/2007	Mifflin Township	2.0	0	0	0
3/28/2007	Mifflin Township	10.0	0	0	0
3/30/2007	Cogan House Township	0.1	0	0	0
3/31/2007	McHenry Township	0.1	0	0	0
4/10/2007	Washington Township	2.0	0	0	0
4/21/2007	Armstrong Township	0.1	0	0	0

Date	Location	Acreage	Death	Injury	Property Damage, $K
4/21/2007	Woodward Township	6.0	0	0	0
5/7/2007	Cummings Township	135.0	0	0	0
5/25/2007	Cummings Township	1.5	0	0	0
7/17/2007	Moreland Township	0.7	0	0	0
8/4/2007	McIntyre Township	0.1	0	0	0
8/12/2007	Lewis Township	0.2	0	0	0
11/3/2007	Armstrong Township	6.0	0	0	0
3/17/2008	Armstrong Township	0.1	0	0	0
3/21/2008	Lewis Township	0.4	0	0	0
3/22/2008	Lewis Township	0.5	0	0	0
3/30/2008	McNett Township	4.8	0	0	0
3/30/2008	McNett Township	1.9	0	0	0
4/10/2008	McIntyre Township	0.6	0	0	0
4/16/2008	Upper Fairfield Township	2.0	0	0	0
4/17/2008	Eldred Township	0.1	0	0	0
4/18/2008	Wolf Township	6.1	0	0	0
4/19/2008	Brown Township	4000.0	0	0	0
4/21/2008	Mill Creek Township	10.0	0	0	0
4/24/2008	Plunketts Creek Township	0.1	0	0	0
6/2/2008	Hepburn Township	2.5	0	0	0
10/21/2008	Shrewsbury Township	7.0	0	0	0

4.3.13.4. *Future Occurrence*

Wildland fires are most common in the spring (March to May) and fall (October to 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. Though there have been years with no wildfires reported, it is likely that wildfires will affect the County every year. Based on data from 2002 through 2009, Lycoming County can expect between zero and 14 wildfires each year, with an average of between five and six.

4.3.13.5. *Vulnerability Assessment*

Wildfires have the potential to destroy huge areas of vegetation with no regard to the man-made structures within those areas. The rural areas in which these fires occur generally have little firefighting infrastructure such as hydrants, and the fire departments servicing those areas may take extended times to reach and ultimately extinguish the fire. Recognizing that these fires have the potential to spread relatively unopposed, the most vulnerable people and property are

those within a short distance of the interface between the built environment and the wildland environment. For the purpose of this document, that distance is defined as 100 feet. The table below shows the critical infrastructure, consisting of two fire stations, within that area. Estimates of potential loss due to wildfires are presented in Section 4.4.3.2.

Table 32: Critical Infrastructure by Municipality within 100 Feet of Parks or Wildlands

Municipality	Facility
Brown Township	Black Forest Fire Department
Brown Township	Brown Township Fire Department

4.4. *Hazard Vulnerability Summary*

Ranking hazards helps communities set goals and priorities for mitigation based on their vulnerabilities. For the 2005 HMP, the Steering Committee researched the hazards that affect Lycoming County by gathering input from residents, state agencies (e.g., PEMA and the DCNR), federal agencies (e.g., United States Geological Survey [USGS], National Weather Service), and other sources. The Steering Committee then ranked the hazards that impacted the County based on individual input.

For this update, a quantitative method known as the Risk Factor (RF) calculation was used to rank hazards that affect the County. The RF calculation described in this section is a tool used to measure the degree of risk for identified hazards in a particular planning area. The RF can also be used to assist local community officials in ranking and prioritizing those hazards that pose the most significant threat to their area based on a variety of factors deemed important by the Hazard Mitigation Steering Committee in the hazard mitigation planning process.

4.4.1. Methodology

The RF calculation relies heavily on historical data, local knowledge, and general consensus opinions among the Steering Committee and the public during the hazard mitigation planning process. The hazard profiles in Section 4.3, along with the disaster declaration history for Lycoming County, provide the basis for this analysis.

The RF approach produces numerical values that allow identified hazards to be ranked against one another, where the higher the RF value, the greater the hazard risk. RF values were obtained by assigning varying degrees of risk to the five categories of each hazard: probability, impact, spatial extent, warning time, and duration. The degree of risk for each risk assessment category was weighted by significance. For instance, a high probability that a hazard will occur and a hazard having a strong impact were weighted most heavily. Each degree of risk is assigned a value ranging from 1 to 4. A summary of the RF approach can be found in Table 33.[6]

[6] *Standard Operating Guide* (Philadelphia: Michael Baker, Jr., Inc., 2009).

Table 33: The Risk Factor Approach

Summary of Risk Factor (RF) Approach				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	UNLIKELY	LESS THAN 1% ANNUAL PROBABILITY	1	30% (DEFAULT), but can be re-defined by CMPT
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY	4	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	MINOR	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30% (DEFAULT), but can be re-defined by CMPT
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	NEGLIGIBLE	LESS THAN 1% OF AREA AFFECTED	1	20% (DEFAULT), but can be re-defined by CMPT
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED	3	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	MORE THAN 24 HRS	SELF DEFINED	1	10% (DEFAULT), but can be re-defined by CMPT
	12 TO 24 HRS	SELF DEFINED	2	
	6 TO 12 HRS	SELF DEFINED	3	
	LESS THAN 6 HRS	SELF DEFINED	4	
DURATION *How long does the hazard event usually last?*	LESS THAN 6 HRS	SELF DEFINED	1	10% (DEFAULT), but can be re-defined by CMPT
	LESS THAN 24 HRS	SELF DEFINED	2	
	LESS THAN 1 WEEK	SELF DEFINED	3	
	MORE THAN 1 WEEK	SELF DEFINED	4	

According to the RF formula, the highest possible RF value is 4.0. An example RF value formula is illustrated below:

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

RF Value = [(4 x .30) + (4 x .30) + (4 x .20) + (4 x .10) + (4 x .10)]
RF Value = 4.0

4.4.2. Ranking Results

The individual hazards that can affect the County were each assigned values in the above criteria. The RF was calculated for each of 31 hazards, and the list was sorted by RF. The 10 hazards profiled in Section 4.3 received RFs in the highest third of the sorted list. Their scores are shown in the table below. A table showing the values for all hazards examined can be found in Appendix C.

Table 34: Risk Factor Values for Highest-Risk Hazards

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	Risk Factor
Flood, Flash Flood, and Ice Jams	4	4	4	3	4	3.900
Severe Winter Storm	4	4	4	1	4	3.700
Tornadoes and Windstorms	4	4	4	1	4	3.700
Thunderstorms and Hail	4	2	4	3	2	3.100
Drought and Water Supply Deficiencies	2	3	4	1	4	2.800
Traffic Accidents	4	2	2	4	2	2.800
Power Outages	3	3	1	4	3	2.700
Terrorism	2	3	3	4	2	2.700
Fixed Nuclear Facility Incidents	1	3	3	4	4	2.600
Natural Gas Drilling Accidents	2	3	2	4	3	2.600

4.4.3. Potential Loss Estimates

Of the hazards profiled in Section 4.3, potential loss estimates can feasibly be obtained for floods, flash floods, and ice jams; sinkholes; and wildfires, as these hazards' vulnerability depends on geography more so than the others.

For each hazard below, estimated potential losses were calculated by determining the value of properties situated as follows:

- Floods, Flash Floods, and Ice Jams – within the 1% chance floodplain
- Subsidence and Sinkholes – located above near-surface limestone
- Wildfires – within 100 feet of forests or parks

Winter storms, tornadoes and windstorms, thunderstorms and hail, and earthquakes will affect the entire County, or at least large portions of it. Traffic accidents and power outages can happen at any location in the County. Losses related to terrorism depend on the facility(ies) affected. An incident at the Susquehanna Steam Electric Station will result in health concerns; the only property loss would result from properties so contaminated that they would be unfit for habitation. However, as Lycoming County lies outside of the 10-mile Exposure Pathway EPZ, the likelihood of any evacuations, let alone long-term displacement due to radioactive contamination, is low.

The assessed value of these properties was calculated from the Lycoming County Tax Assessment database for each of the 52 municipalities. The end result of the analysis will allow reasonable determinations of the estimated potential loss in each of the 52 municipalities. The results are presented in a table below. The estimated losses can only be presented as potential, based on the random occurrence of hazard conditions and limited data.

4.4.3.1. *Flood, Flash Floods, and Ice Jams*

Flooding is the most costly and damaging of all hazards impacting Lycoming County. With nine major watersheds and over 2,200 miles of streams, the fertile floodplains of Lycoming County have been subjected to repetitive flooding since the early 1800s. Despite the flood damage reduction measures implemented throughout the years, most Lycoming County communities are susceptible to flood damage. Due to heavy development, along with the Lycoming Creek's susceptibility to flash flooding, communities throughout the creek's watershed are particularly at risk.

From 2004 to 2009, flooding is reported to have caused $50 million worth of property damage based on data from the NCDC. The $50 million in property damage came from one flood event that occurred in 2004, which also caused two deaths. The three flood events reported in PEIRS each caused road closures.

Flooding is the most significant hazard in Lycoming County, both as a direct and a secondary hazard. The estimation of potential loss in this assessment focuses on the monetary damage

that could result from flooding. The estimated potential loss in property from flood damage was determined for each municipality and the entire County. The datasets described in Section 4.1.1 are included in the floodplain analysis.

Estimated potential losses were calculated by first determining the number of properties completely situated in the floodplain. The structures had no assessed value or size attribute information, so a new layer was created that includes all tax parcels with structures contained in the floodplain. The new layer allowed assessed property values to be calculated for parcels with structures completely in a floodplain.

The assessed value was then calculated from the Lycoming County Tax Assessment Database for each of its 52 municipalities.

The end result of the analysis will allow reasonable determinations of the estimated potential loss for each type of property class in each of the 52 municipalities. The results are presented in the table below. The estimated losses can only be presented as potential, based on the random occurrence of flood conditions and limited data. The structures in a floodplain include those based on a point within a two-dimensional (longitude and latitude) plane. This data, however, does not include attribute information for first-floor flood elevations, which is essential to assess the base flood elevation's impact on the County's infrastructure. As a result of this limitation, the estimates are likely overstated, but to what degree the potential losses are overstated cannot be determined. An analysis of the potential flood loss for properties protected by a levee system can be found in Table 36.

Table 35: Estimated Potential Flood Loss

Municipality	Estimated Potential Loss
Anthony Township	$762,760
Armstrong Township	$10,343,310
Bastress Township	$650,420
Brady Township	$336,470
Brown Township	$5,028,810
Cascade Township	$2,071,220
Clinton Township	$7,974,900
Cogan House Township	$3,450,290
Cummings Township	$16,629,280
Duboistown Borough	$4,081,780
Eldred Township	$9,831,160
Fairfield Township	$13,430,240
Franklin Township	$1,324,020
Gamble Township	$2,811,410

Municipality	Estimated Potential Loss
Hepburn Township	$4,767,930
Hughesville Borough	$2,630,330
Jackson Township	$4,523,650
Jersey Shore Borough	$69,948,690
Jordan Township	$2,040,330
Lewis Township	$11,615,510
Limestone Township	$670,390
Loyalsock Township	$34,140,980
Lycoming Township	$11,583,040
McHenry Township	$6,404,200
McIntyre Township	$6,742,980
McNett Township	$1,516,260
Mifflin Township	$8,212,060
Mill Creek Township	$2,039,550
Montgomery Borough	$16,860,180
Montoursville Borough	$50,382,470
Moreland Township	$4,414,760
Muncy Borough	$40,892,100
Muncy Creek Township	$382,058,850
Muncy Township	$357,661,980
Nippenose Township	$7,223,240
Old Lycoming Township	$18,783,610
Penn Township	$3,537,950
Piatt Township	$10,469,690
Picture Rocks Borough	$3,496,080
Pine Township	$9,542,300
Plunketts Creek Township	$12,715,070
Porter Township	$13,166,010
Salladasburg Borough	$2,260,000
Shrewsbury Township	$4,905,870
South Williamsport Borough	$8,030,120
Susquehanna Township	$14,011,570
Upper Fairfield Township	$12,587,520
Washington Township	$8,232,980
Watson Township	$8,411,950
Williamsport, City of	$19,223,200

Municipality	Estimated Potential Loss
Wolf Township	$7,344,730
Woodward Township	$11,388,630
TOTAL	$1,273,162,830

Table 36: Estimated Potential Flood Loss for Properties Protected by a Levee System

Municipality	Estimated Potential Loss
South Williamsport Borough	$57,248,941
Williamsport, City of	$950,513,790
Loyalsock Township	$155,552,186
Old Lycoming Township	$87,031,615
TOTAL	$1,250,346,532

In addition to the above analysis (which is based on local data), the flood loss estimates were determined using FEMA's Hazards U.S. (HAZUS) software. The results of that analysis are provided in Appendix E, and show that the County can expect structural losses over $581 million. The two analyses differ because of the different methodologies each employs. The above analysis is based on the County's property tax assessment database, and uses actual property values. HAZUS analysis is based on census tract-level data, and approximates values based on the percentage of the tracts' geographic area that is contained in Lycoming County.

In 2007, PEMA conducted a Statewide Flood Study using Hazards U.S. Multi-Hazard (HAZUS-MH), a standardized loss estimation software package available from FEMA. The flood study provided estimates of total economic loss, building damage, content damage, and other economic impacts that can be used in local flood response and mitigation planning activities. While this information is extremely valuable, potential loss estimates due to flooding were recalculated using HAZUS-MH during development of the updated HMP for two reasons:

1) Since 2007, an updated version of HAZUS-MH has been released (i.e., version MR-3 replaced version MR-2). Several improvements to data and methodology were made to version MR-3 (the version used for this update), including new Dun & Bradstreet 2006 commercial data, updated building valuations, revised building counts based on census housing units for *RES1* (i.e., single-family dwellings) and *RES2* (i.e., manufactured housing) structures, and an optimized building analysis methodology.

2) The economic loss GIS data available from PEMA includes total damage (in thousands of dollars), building damage, content damage, and a host of other economic loss estimates for each affected census block. However, the data is limited to *Residential* occupancy type, omitting Commercial, Industrial, Agriculture, Religious/Non-Profit, Government, and Education occupancy types. While losses from these occupancy types were included in the Community Summary Report's total economic loss, they were not captured in the GIS data needed for mapping.

Another critical factor in determining potential loss related to flooding is the identification of repetitive loss structures throughout the County. FEMA defines a repetitive loss property as any insurable building that has experienced two losses in a 10-year period where each loss is $1,000.00 or more. A repetitive loss property may or may not be currently insured by the NFIP.

The Lycoming County HMP update aims to reduce the loss of life and property caused by natural and human-made disasters and serves as an essential component of the County's overall emergency management planning program. After natural disasters, repairs and reconstruction are often completed in such a way as to simply restore damaged property to pre-disaster conditions. Replication of pre-disaster conditions results in a repetitive loss cycle of damage, reconstruction, and repeated damage. Hazard mitigation is needed to ensure that such cycles are broken, that post-disaster repairs and reconstruction take place after damages are analyzed, and that sounder, less vulnerable conditions are produced. Additionally, other mitigation actions such as (voluntary) buy-out programs are considered.

Flooding is the most common cause of repetitive loss in Lycoming County. Lycoming County has 415 repetitive loss properties, as shown in the following table.

Table 37: Repetitive Loss Properties

MUNICIPALITY	TYPE					SUM OF REPETITIVE LOSS PROPERTIES
	2-4 FAMILY	ASSMD CONDO	NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Armstrong Township				1	1	2
Brown Township					1	1
Clinton Township			1		4	5
Cummings Township					8	8
Duboistown Borough				1	2	3
Fairfield Township			1	1	5	7
Hepburn Township	3	1	1		34	39
Hughesville Borough					1	1
Jersey Shore Borough	5	1	3		21	30
Lewis Township	1		1		17	19
Loyalsock Township	3	1			21	25
McHenry Township			1		26	27
McIntyre Township			1		10	11
McNett Township					1	1
Montgomery Borough	2	1	2		10	15
Montoursville Borough	4	2	2		8	16
Moreland Township					2	2
Muncy Creek Township		3	2		9	14
Muncy Borough	3		2		39	44
Old Lycoming Township	3	1			71	75
Piatt Township		1			7	8
Pine Township					3	3
Plunketts Creek Township					8	8

MUNICIPALITY	TYPE					SUM OF REPETITIVE LOSS PROPERTIES
	2-4 FAMILY	ASSMD CONDO	NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Porter Township		1				1
Shrewsbury Township			1			1
South Williamsport Borough	1				5	6
Susquehanna Township					5	5
Upper Fairfield Township	1				11	12
Watson Township		1			4	5
Williamsport, City of	2				13	15
Woodward Township					6	6
TOTAL	28	13	18	3	353	415

The following municipalities have the indicated number of Severe Repetitive Loss properties, all of them labeled as Single Family:

- Hepburn Township – 2
- Loyalsock Township – 1
- Lycoming Township – 3
- Plunketts Creek Township – 1

Due to privacy concerns, detailed information on these properties is retained by the Lycoming County Emergency Management Agency.

4.4.3.2. *Wildfires*

The following table presents the assessed value of the properties within 100 feet of a park or wildland. Data on the individual structures on these properties was not available.

Table 38: Lycoming County Potential Loss Due to Wildfires

Municipality	Estimated Potential Loss
Armstrong Township	$21,947,820.00
Brady Township	$554,870.00
Brown Township	$279,606,030.00
Cascade Township	$43,529,760.00
Clinton Township	$11,110,630.00
Cogan House Township	$961,880.00
Cummings Township	$166,575,080.00
Gamble Township	$35,889,900.00
Jackson Township	$334,110.00

Municipality	Estimated Potential Loss
Lewis Township	$30,081,290.00
Limestone Township	$12,235,520.00
McHenry Township	$197,296,300.00
McIntyre Township	$118,814,410.00
McNett Township	$60,327,320.00
Nippenose Township	$2,266,840.00
Pine Township	$7,375,950.00
Plunketts Creek Township	$32,728,760.00
Upper Fairfield Township	$116,580.00
Washington Township	$46,950,300.00
Watson Township	$31,944,120.00
Wolf Township	$87,420.00
Total	**$1,100,734,890.00**

Over $1 billion of property lies within this hazard area. Brown Township, Cummings Township, McHenry Township, and McIntyre Township are the most vulnerable to wildfires, each with over $100 million in potential loss.

4.4.3.3. *Subsidence and Sinkholes*

The following table shows the assessed value of properties vulnerable to sinkholes. Data on the individual structures represented was not available.

Table 39: Lycoming County Potential Loss Due to Sinkholes

Municipality	Estimated Potential Loss
Armstrong Township	$1,900,000
Brady Township	$6,045,380
Clinton Township	$16,792,820
Duboistown Borough	$10,167,000
Fairfield Township	$24,180,960
Limestone Township	$70,904,090
Montoursville Borough	$110,987,100
Muncy Borough	$39,272,830
Muncy Creek Township	$37,644,140
Muncy Township	$264,355,320
Nippenose Township	$5,716,480
Piatt Township	$2,626,030
Porter Township	$5,213,160
South Williamsport Borough	$33,594,810

Municipality	Estimated Potential Loss
Susquehanna Township	$8,915,370
Washington Township	$21,866,460
Williamsport, City of	$30,673,000
Wolf Township	$1,030,010
Woodward Township	$332,080
Total	**$692,217,040**

Data regarding the types of properties represented was not available for this update.

4.4.4. Future Development and Vulnerability

An examination of recent development trends helps to identify and anticipate future vulnerabilities to hazards that may affect the County's growth and development. Analysis of changes in population and demographics is provided in Section 2.3.

A comparison of impervious surface coverage data provides another method of detecting change in Lycoming County's growth and development patterns. Impervious surface data, estimated from Thematic Mapper data using algorithms developed by Dr. Toby Carlson in University Park, Pennsylvania, was originally generated to support hydrologic investigations. This data is also useful for assessing urbanization and development patterns over time. Impervious surfaces primarily reflect the urban and built environments and include rooftops, sidewalks, roads, and parking lots.

Impervious surface coverage data from 1985 and 2000 was analyzed to determine static development trends and developing areas in relation to floodplain proximity. This combined information produces a more accurate depiction of the County's historical growth trends.

By examining impervious surface coverage data, recent development trends in relation to floodplain proximity can be ascertained. This may generate recommendations to examine certain areas in more detail to better mitigate specific hazardous threats, such as flooding or transportation accidents, or hazardous material spills.

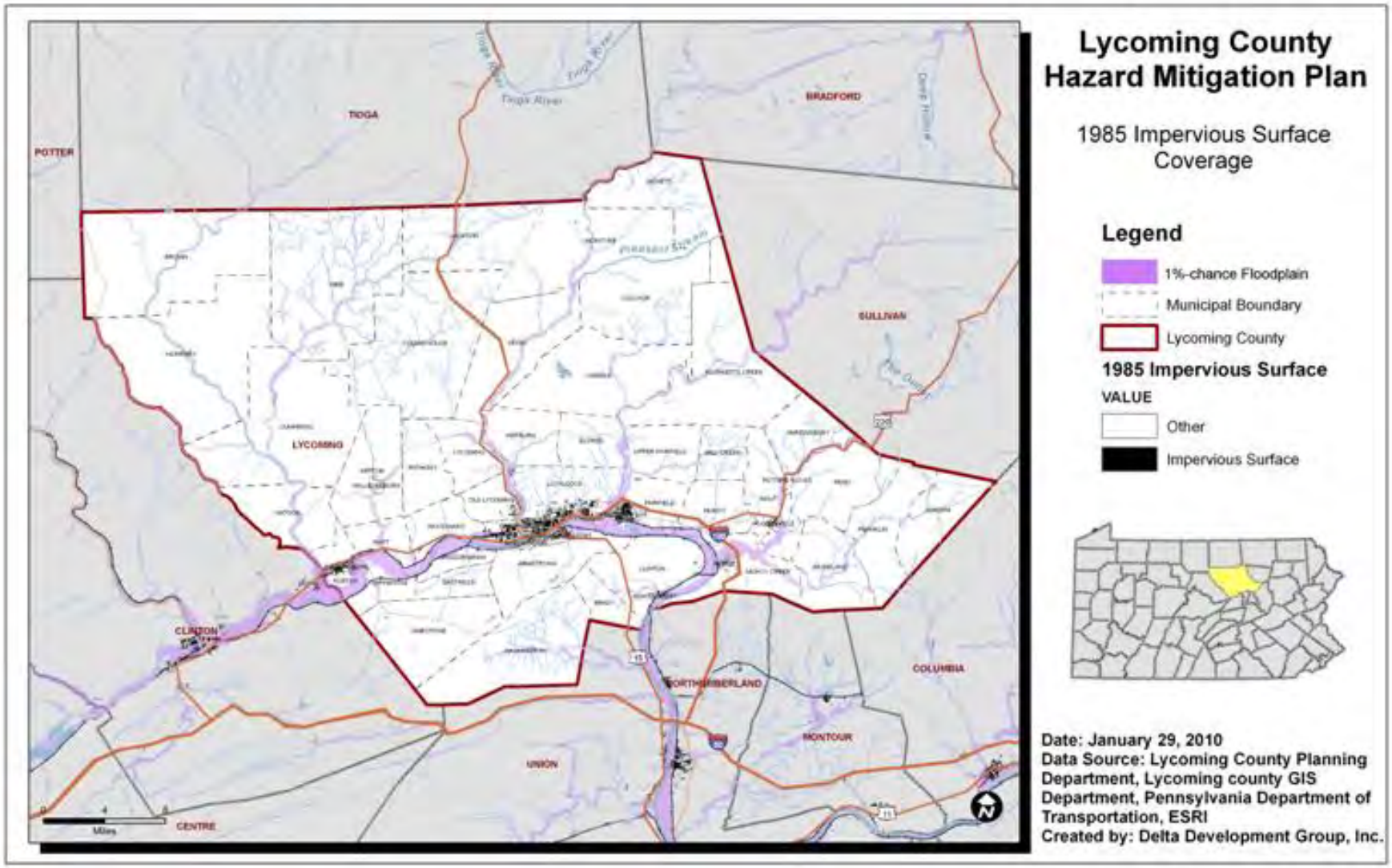
Development can often change the hazard threat level of an area by placing additional critical facilities, businesses, transportation networks, and populations within vulnerable areas. Any development along transportation routes can increase the vulnerability to transportation incidents and hazardous material spills. Most often, development occurs along these transportation networks because of access and increased demand for travel and access to services. Therefore, the impact of these hazards can increase along with their frequency. While it can be difficult to curb development, it is to the municipality's advantage to be aware of development trends in order to successfully mitigate future hazards as risks increase.

The following maps illustrate the change in impervious surface coverage from 1985 to 2000 across Lycoming County. According to the graphics, in 1985 the focus of most development in

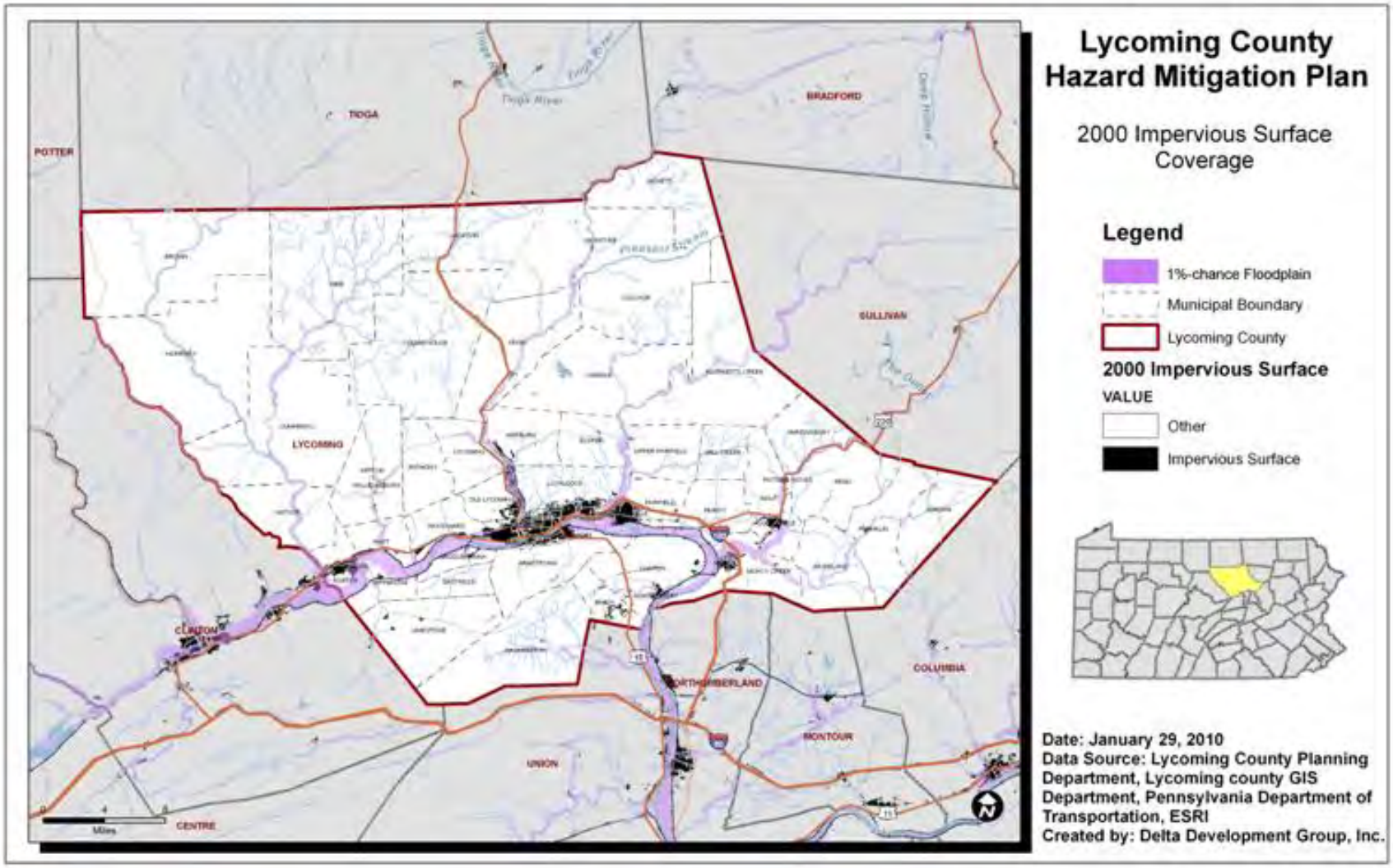
Lycoming County was in the immediate area of the Williamsport, South Williamsport, and Duboistown, as well as in Montoursville and Jersey Shore.

The 2000 impervious surface coverage illustrates significantly expanded development in each of those areas, Hughesville, Muncy, and Montgomery Boroughs; the Antes Fort area of Nippenose Township; and along US-15 north of Williamsport.

Map 18


Lycoming County
Hazard Mitigation Plan
1985 Impervious Surface
Coverage
Legend
1%-chance Floodplain
Municipal Boundary
Lycoming County
1985 Impervious Surface
VALUE
Other
Impervious Surface
Date: January 29, 2010
Data Source: Lycoming County Planning Department, Lycoming county GIS Department, Pennsylvania Department of Transportation, ESRI
Created by: Delta Development Group, Inc.
TIOGA
BRADFORD
POTTER
SULLIVAN
LYCOMING
CLINTON
COLUMBIA
MONTOUR
UNION
CENTRE
Miles

Map 19


Lycoming County
Hazard Mitigation Plan
2000 Impervious Surface
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Municipal Boundary
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Created by: Delta Development Group, Inc.
TIOGA
BRADFORD
POTTER
SULLIVAN
LYCOMING
CLINTON
COLUMBIA
MONTOUR
UNION
CENTRE

Potential future development in floodplain areas has been examined during comprehensive planning efforts at the County and municipal levels. Maps 17-21 are taken from the Muncy Creek, Montoursville/Muncy, US-220/Future I-99, US-15 South, the Greater Williamsport Alliance, and Lower Lycoming Creek Comprehensive Plans[7], respectively, and show both growth areas and floodplains. Each map also contains a table listing the acres for development and net developable areas (acres for development minus areas within the floodway, floodplain, steep slopes, wetlands, etc.) within and outside of growth areas by zoning type. Table 40 summarizes the net developable areas within growth areas.

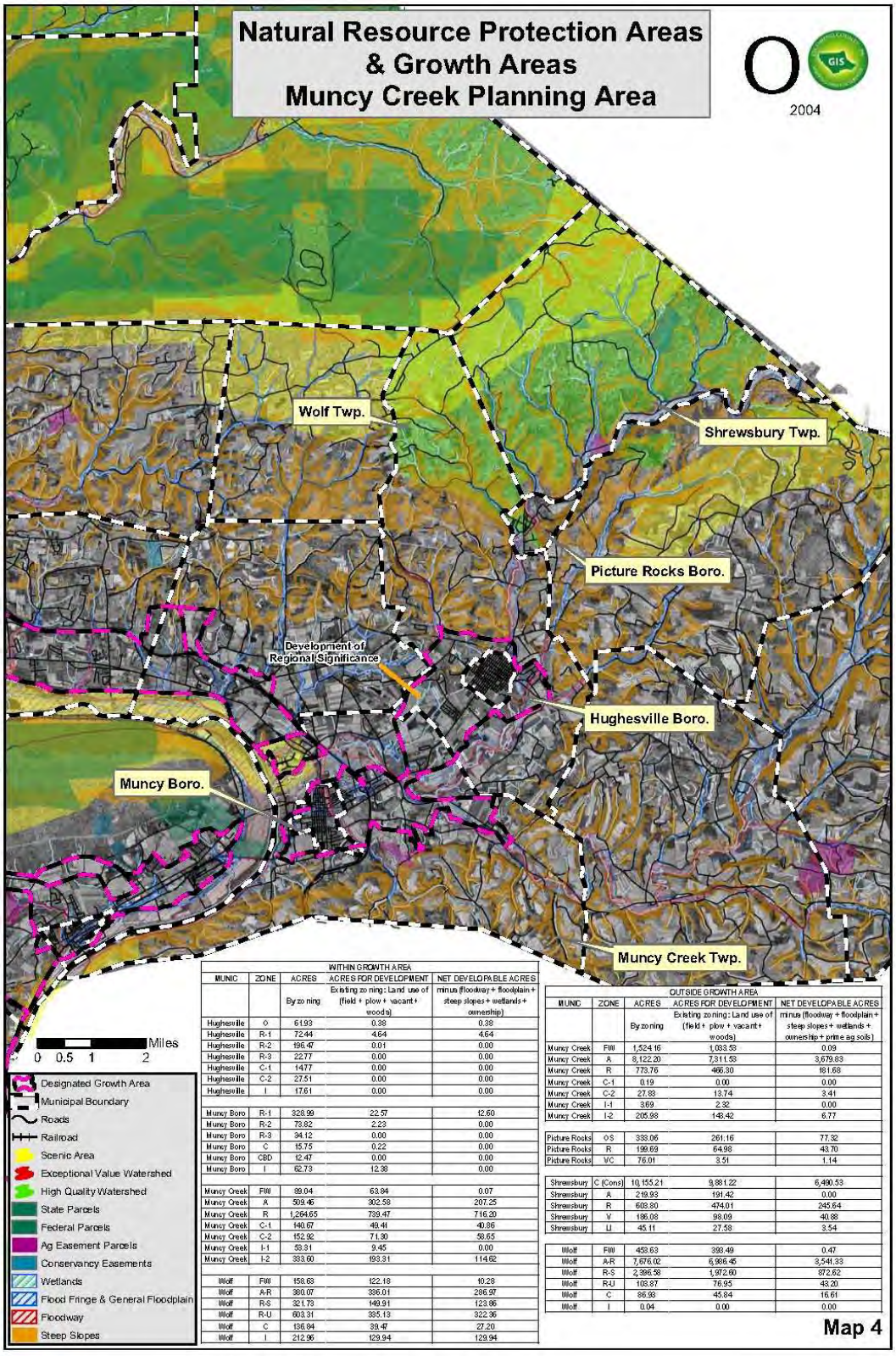
Table 40: Developable Acres

Municipality	Acres for Development	Net Developable Acres
Armstrong Township	81.71	52.68
Brady Township	1,878.40	525.20
Clinton Township	3,343.29	2,774.56
Duboistown Borough	10.21	7.23
Fairfield Township	1,294.21	1,187.33
Hughesville Borough	5.03	5.03
Jersey Shore Borough	135.06	82.72
Loyalsock Township	2,028.27	1,350.46
Lycoming Township	3.36	0.76
Montgomery Borough	77.77	18.79
Montoursville Borough	183.69	96.72
Muncy Borough	37.40	12.50
Muncy Creek Township	1,429.46	1,137.65
Muncy Township	1,429.60	1,240.71
Old Lycoming Township	785.06	459.11
Piatt Township	1,433.78	958.33
Porter Township	1,027.90	795.73
South Williamsport Borough	87.48	72.94
Williamsport, City of	915.82	388.52
Wolf Township	1,112.64	900.61
Woodward Township	2,196.90	1,195.19

Specific data to describe the types and numbers of future buildings, infrastructure, and critical facilities in the hazard areas was not available. However, any planned development of these structures will include an examination of the hazard areas identified in this HMP.

[7] http://www.lyco.org/dotnetnuke/Home/PlanningandCommunityDevelopment/ComprehensivePlans.aspx

Map 20



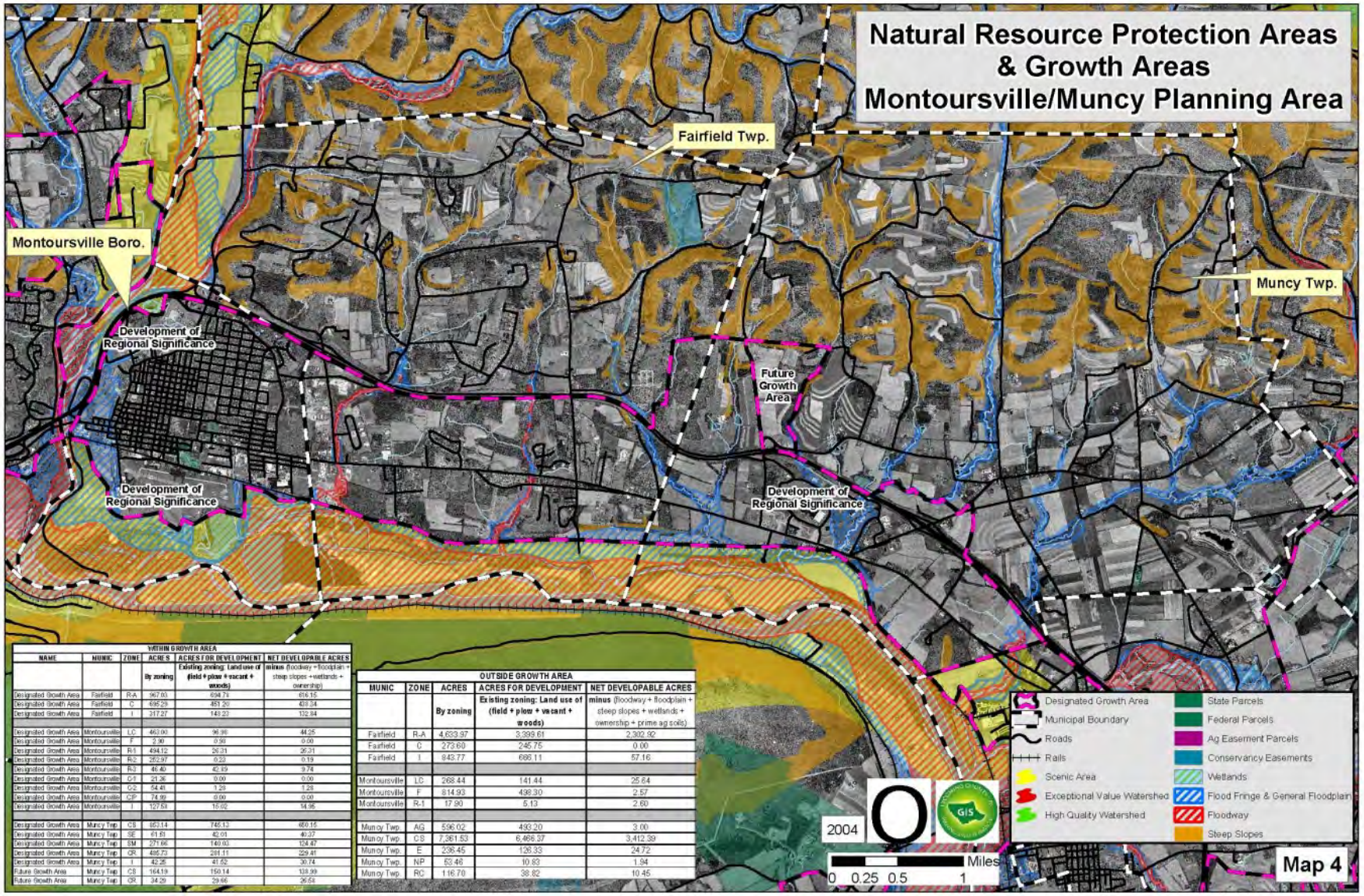
WITHIN GROWTH AREA

MUNIC	ZONE	ACRES	ACRES FOR DEVELOPMENT	NET DEVELOPABLE ACRES
		By zoning	Existing zoning: Land use of (field + plow + vacant + woods)	minus (floodway + floodplain + steep slopes + wetlands + ownership)
Hughesville	O	61.93	0.38	0.38
Hughesville	R-1	72.44	4.64	4.64
Hughesville	R-2	196.47	0.01	0.00
Hughesville	R-3	22.77	0.00	0.00
Hughesville	C-1	14.77	0.00	0.00
Hughesville	C-2	27.51	0.00	0.00
Hughesville	I	17.61	0.00	0.00
Muncy Boro	R-1	328.99	22.57	12.60
Muncy Boro	R-2	73.82	2.23	0.00
Muncy Boro	R-3	34.12	0.00	0.00
Muncy Boro	C	15.75	0.22	0.00
Muncy Boro	CBD	12.47	0.00	0.00
Muncy Boro	I	62.73	12.38	0.00
Muncy Creek	FW	89.04	63.84	0.07
Muncy Creek	A	509.46	302.58	207.25
Muncy Creek	R	1,264.65	739.47	716.20
Muncy Creek	C-1	140.67	49.41	40.86
Muncy Creek	C-2	152.92	71.30	58.65
Muncy Creek	I-1	59.31	9.45	0.00
Muncy Creek	I-2	333.60	193.31	114.62
Wolf	FW	158.63	122.18	10.28
Wolf	A-R	388.07	336.01	286.97
Wolf	R-S	321.73	149.91	123.86
Wolf	R-U	603.31	395.13	322.36
Wolf	C	136.94	39.47	27.20
Wolf	I	212.96	129.94	129.94

OUTSIDE GROWTH AREA

MUNIC	ZONE	ACRES	ACRES FOR DEVELOPMENT	NET DEVELOPABLE ACRES
		By zoning	Existing zoning: Land use of (field + plow + vacant + woods)	minus (floodway + floodplain + steep slopes + wetlands + ownership + prime ag soils)
Muncy Creek	FW	1,524.16	1,083.53	0.09
Muncy Creek	A	8,122.20	7,311.53	3,679.93
Muncy Creek	R	773.76	466.30	161.68
Muncy Creek	C-1	0.19	0.00	0.00
Muncy Creek	C-2	27.88	13.74	3.41
Muncy Creek	I-1	3.69	2.32	0.00
Muncy Creek	I-2	205.98	148.42	6.77
Picture Rocks	OS	333.06	261.16	77.32
Picture Rocks	R	199.69	64.98	43.70
Picture Rocks	VC	76.01	3.51	1.14
Shrewsbury	C (Cons)	10,155.21	9,881.22	6,490.53
Shrewsbury	A	219.93	191.42	0.00
Shrewsbury	R	609.80	474.01	245.64
Shrewsbury	V	186.08	98.09	40.88
Shrewsbury	LI	45.11	27.58	3.54
Wolf	FW	453.63	398.49	0.47
Wolf	A-R	7,676.02	6,986.45	3,541.33
Wolf	R-S	2,396.58	1,972.60	872.62
Wolf	R-U	103.87	76.95	43.20
Wolf	C	86.93	45.84	16.61
Wolf	I	0.04	0.00	0.00

Map 21



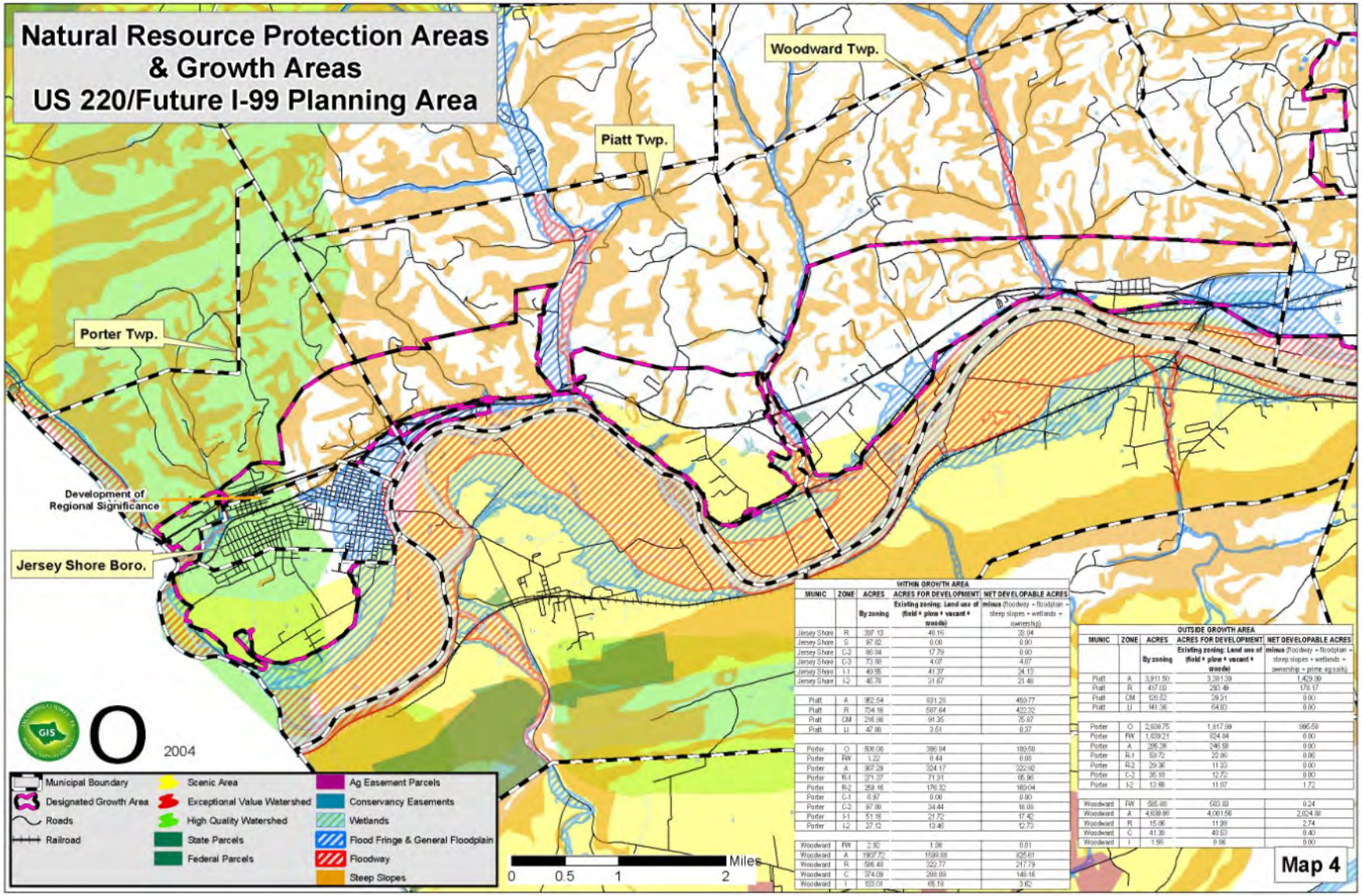
WITHIN GROWTH AREA

NAME	MUNIC	ZONE	ACRES	ACRES FOR DEVELOPMENT	NET DEVELOPABLE ACRES
			By zoning	Existing zoning: Land use of (field + plow + vacant + woods)	minus (floodway + floodplain + steep slopes + wetlands + ownership)
Designated Growth Area	Fairfield	R-A	967.93	694.71	616.15
Designated Growth Area	Fairfield	C	695.29	481.20	428.34
Designated Growth Area	Fairfield	I	317.27	149.23	132.84
Designated Growth Area	Montoursville	LC	463.00	96.96	44.25
Designated Growth Area	Montoursville	F	2.90	0.58	0.00
Designated Growth Area	Montoursville	R-1	494.12	26.31	26.31
Designated Growth Area	Montoursville	R-2	262.97	6.23	0.19
Designated Growth Area	Montoursville	R-3	46.40	42.89	9.74
Designated Growth Area	Montoursville	C-1	21.36	0.00	0.00
Designated Growth Area	Montoursville	C-2	54.45	1.29	1.28
Designated Growth Area	Montoursville	C/P	74.99	0.00	0.00
Designated Growth Area	Montoursville	I	127.58	15.02	14.95
Designated Growth Area	Muncy Twp.	CS	853.14	745.13	650.16
Designated Growth Area	Muncy Twp.	SE	61.61	42.01	40.37
Designated Growth Area	Muncy Twp.	SM	271.66	140.93	124.47
Designated Growth Area	Muncy Twp.	CR	486.73	291.11	229.41
Designated Growth Area	Muncy Twp.	I	42.25	41.52	30.74
Future Growth Area	Muncy Twp.	CS	164.19	150.14	138.99
Future Growth Area	Muncy Twp.	CR	34.29	29.66	26.54

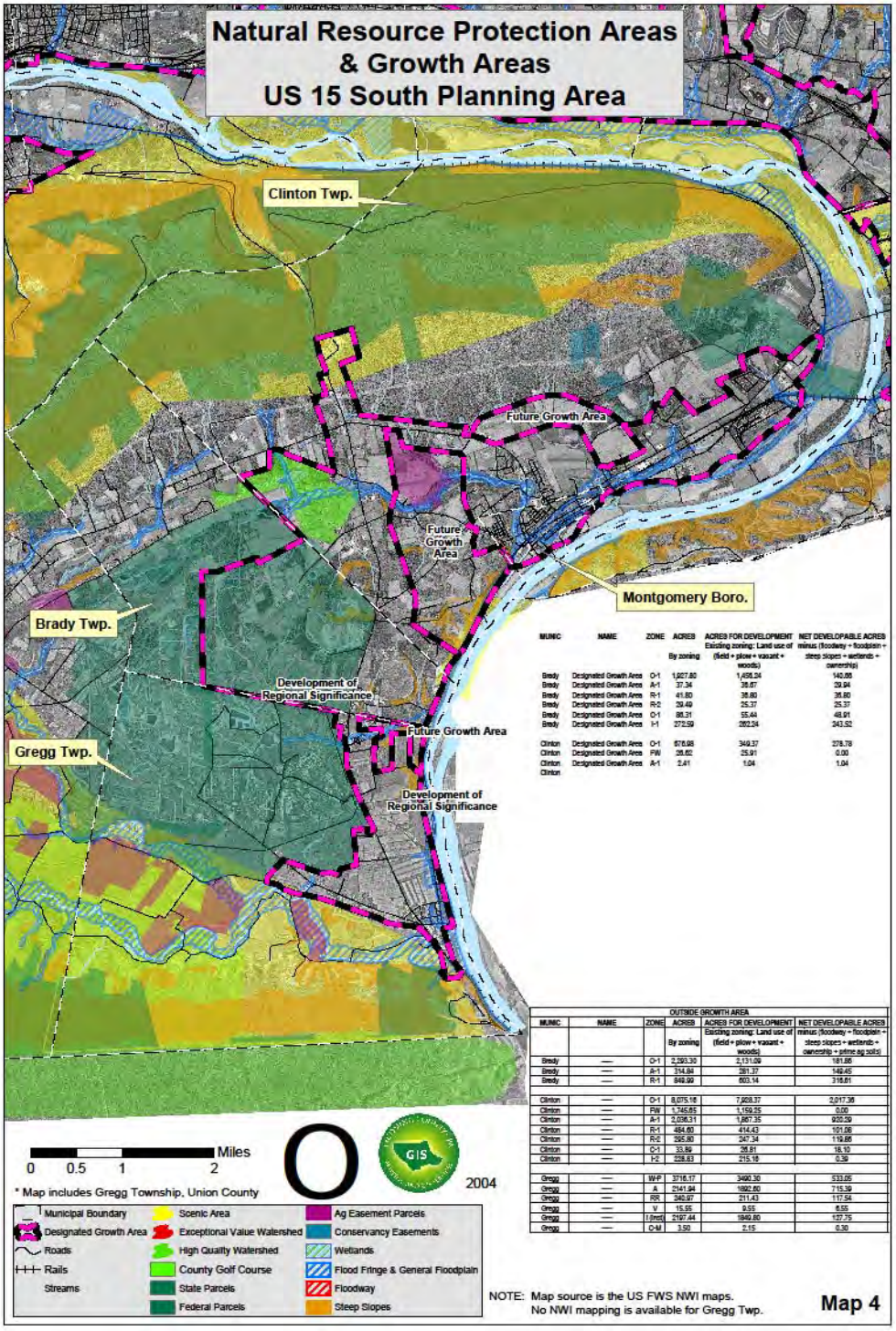
OUTSIDE GROWTH AREA

MUNIC	ZONE	ACRES	ACRES FOR DEVELOPMENT	NET DEVELOPABLE ACRES
		By zoning	Existing zoning: Land use of (field + plow + vacant + woods)	minus (floodway + floodplain + steep slopes + wetlands + ownership + prime ag soils)
Fairfield	R-A	4,633.97	3,399.61	2,302.92
Fairfield	C	273.60	245.75	0.00
Fairfield	I	843.77	686.11	57.16
Montoursville	LC	268.44	141.44	25.64
Montoursville	F	814.93	498.30	2.57
Montoursville	R-1	17.90	5.13	2.60
Muncy Twp.	AG	596.02	493.20	3.00
Muncy Twp.	CS	7,361.53	6,466.37	3,412.39
Muncy Twp.	E	236.45	126.33	24.72
Muncy Twp.	NP	53.46	10.83	1.94
Muncy Twp.	RC	116.70	38.82	10.45

Map 22


Natural Resource Protection Areas
& Growth Areas
US 220/Future I-99 Planning Area
Woodward Twp.
Piatt Twp.
Porter Twp.
Development of Regional Significance
Jersey Shore Boro.
2004
Municipal Boundary
Designated Growth Area
Roads
Railroad
Scenic Area
Exceptional Value Watershed
High Quality Watershed
State Parcels
Federal Parcels
Ag Easement Parcels
Conservancy Easements
Wetlands
Flood Fringe & General Floodplain
Floodway
Steep Slopes
0 0.5 1 2 Miles
Map 4

Map 23

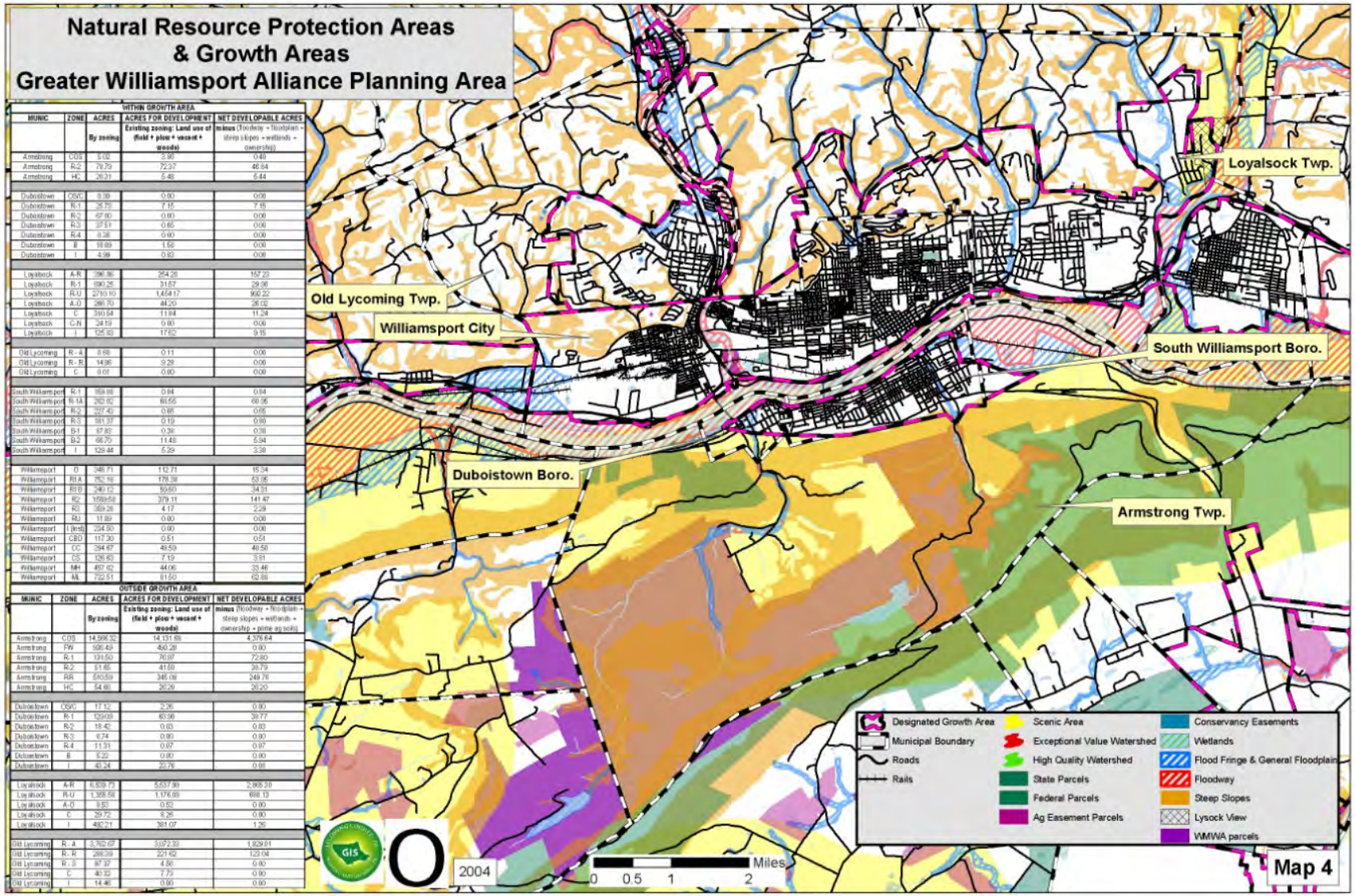


MUNIC	NAME	ZONE	ACRES By zoning	ACRES FOR DEVELOPMENT Existing zoning: Land use of (field + plow + vacant + woods)	NET DEVELOPABLE ACRES minus (floodway + floodplain + steep slopes + wetlands + ownership)
Brady	Designated Growth Area	O-1	1,927.80	1,496.24	140.66
Brady	Designated Growth Area	A-1	37.34	36.67	29.94
Brady	Designated Growth Area	R-1	41.80	36.80	35.80
Brady	Designated Growth Area	R-2	39.49	25.37	25.37
Brady	Designated Growth Area	O-1	86.31	55.44	48.91
Brady	Designated Growth Area	I-1	372.59	282.34	243.52
Clinton	Designated Growth Area	O-1	676.98	349.37	278.78
Clinton	Designated Growth Area	FW	26.82	25.91	0.00
Clinton	Designated Growth Area	A-1	2.41	1.04	1.04
Clinton					

OUTSIDE GROWTH AREA

MUNIC	NAME	ZONE	ACRES By zoning	ACRES FOR DEVELOPMENT Existing zoning: Land use of (field + plow + vacant + woods)	NET DEVELOPABLE ACRES minus (floodway + floodplain + steep slopes + wetlands + ownership + prime ag soils)
Brady	—	O-1	2,293.30	2,131.09	181.66
Brady	—	A-1	314.84	281.37	149.45
Brady	—	R-1	849.99	603.14	316.81
Clinton	—	O-1	8,075.16	7,908.37	2,017.36
Clinton	—	FW	1,745.65	1,159.25	0.00
Clinton	—	A-1	2,036.31	1,867.35	920.59
Clinton	—	R-1	484.60	414.43	101.06
Clinton	—	R-2	395.80	247.34	119.66
Clinton	—	O-1	33.89	28.81	16.10
Clinton	—	I-2	228.83	215.16	0.39
Gregg	—	W-P	3716.17	3490.30	533.05
Gregg	—	A	2141.94	1992.60	715.39
Gregg	—	RR	340.97	211.43	117.54
Gregg	—	V	15.55	9.55	8.55
Gregg	—	I-(med)	2197.44	1949.80	127.75
Gregg	—	O-M	3.50	2.15	0.30

Map 24


Natural Resource Protection Areas
& Growth Areas
Greater Williamsport Alliance Planning Area
Loyalsock Twp.
Old Lycoming Twp.
Williamsport City
South Williamsport Boro.
Duboistown Boro.
Armstrong Twp.
Designated Growth Area
Municipal Boundary
Roads
Rails
Scenic Area
Exceptional Value Watershed
High Quality Watershed
State Parcels
Federal Parcels
Ag Easement Parcels
Conservancy Easements
Wetlands
Flood Fringe & General Floodplain
Floodway
Steep Slopes
Lysock View
WMWA parcels
2004
Miles
0 0.5 1 2
Map 4

5. Capability Assessment

Performing the Capability Assessment is important to formulate a viable mitigation strategy later in the planning process. A Capability Assessment has two components: an inventory of a jurisdiction's existing planning and regulatory tools and an analysis of its capacity to use them effectively. The assessment process helps identify existing gaps, conflicts, and/or weaknesses that may need to be addressed through future mitigation planning goals, objectives, and actions. It also highlights the measures in place or already undertaken that merit continued support and enhancement through future mitigation efforts. The Capability Assessment also helps to ensure that proposed mitigation actions are practical, considering the local ability to implement them.

The Capability Assessment is an evaluation of Lycoming 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 identified hazards. The Capability Assessment has two components: (1) an inventory of the County's and municipalities' mission, programs, and policies; and (2) 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 to 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.

The evaluation of the categories listed above – governmental structure, political framework, legal jurisdiction, fiscal status, policies and programs, regulations and ordinances, and resource availability – allows the Steering Committee to determine the viability of certain mitigation actions. The Capability Assessment analyzes what Lycoming County and its municipalities have the capacity to do and provides an understanding of what must be changed to mitigate loss.

Throughout the planning process, the Steering Committee considered the County's 52 individual 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. Therefore, this Capability Assessment must consider the various characteristics and capabilities of each municipality under study.

5.1. *Update Process Summary*

Specific mitigation capabilities of the County and each municipality were not delineated in the 2005 version of the HMP. To identify these capabilities, a Capability Assessment survey was developed at the beginning of the Plan update process. This survey is presented in Appendix B. Copies of the survey were distributed at the kick-off meeting and sent to each municipal secretary and emergency management coordinator for completion. Survey recipients were given a period of about three months to complete the surveys and return them to the Steering Committee. Follow-up contacts were made by Lycoming County's Hazard Reduction Planner

as necessary to achieve the highest level of municipal participation possible. The results were compiled and are presented in Section 5.2.

5.2. *Capability Assessment Findings*

Below are descriptions of the items listed in the Capability Assessment survey. The County's and each municipality's response to the survey can be found in Table 31. All 52 municipalities submitted surveys.

5.2.1. Emergency Management

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.

5.2.1.1. *Emergency Operations Plan*

The Pennsylvania Emergency Management Services Code, Title 35, requires all political jurisdictions in the Commonwealth to have an emergency operations plan (EOP), an emergency management coordinator (EMC), and an emergency operations center (EOC).

Lycoming County's EOP is an all-hazards plan that 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 Lycoming County. The EOP, or portions thereof, would be implemented when emergency circumstances warrant it. All 52 municipalities have local EOPs in place, though several municipalities need to update their EOPs to the most recent PEMA-approved format.

Lycoming County's EOP is administered by the County's Department of Public Safety. It assigns responsibility to all response organizations, not only for training and preparedness, but also for response and recovery. Specific annexes, referred to as Emergency Support Function (ESF) documents, have been developed to address specific natural and technological hazards that may require an added level of coordination. A mitigation plan that is added as an addendum to an EOP can enhance the recovery process. In order to comply with the Pennsylvania Emergency Management Agency's (PEMA's) annual work plan, units of local government are required to prepare and submit a hazard vulnerability analysis, which identifies and assesses the community's risk to natural and human-induced hazards. The County of Lycoming's Hazard Vulnerability Analysis (HVA) was updated in July 2000 and again in 2009 as part of this Plan's update process. Information gathered for the Hazard Mitigation Opportunity section if this document may prove valuable in enhancing the existing HVA.

The development of Marcellus Shale gas that requires drilling and use of water containing hazardous constituents, construction and maintenance of gas lines, and the movement of heavy equipment has created a suite of new hazards to be accounted for in emergency operations planning. Lycoming County is taking steps to deal with these new hazards in its emergency operations planning process.

On September 19, 2009, a drilling rig emergency exercise was held in Cogan House Township. The key objectives of the exercise were as follows:

- Link municipal emergency response managers with industry representatives
- Present hands-on rescue and emergency medical services problems to local responders
- Provide opportunity to practice five control procedures
- Practice management of spills and runoff
- Activate local hospital emergency department procedures
- Activate the local EOC

More than 200 individuals participated in this exercise.

5.2.1.2. *Continuity of Operations Plan*

Continuity of Operations (COOP) is a critically important planning principle for emergency managers as well as for municipal officials. The National Fire Protection Association's *Standard on Disaster/Emergency Management and Business Continuity Programs* (NFPA 1600) provides those with the responsibility for disaster and emergency management and COOP planning programs with the criteria to assess current programs or to develop, implement, and maintain a program to mitigate, prepare for, respond to, and recover from disasters and emergencies. During the capability survey, only 22 municipalities indicated that they currently have a COOP plan.

The County of Lycoming Court of Common Pleas has developed a COOP plan that identifies alternative sites for courts and magistrates to conduct operations in the event the County courthouse is not accessible or is damaged due to man-made or natural disaster. The plan, with an effective date of November 1, 2007, also addresses delegation of authority, order of succession, and essential functions.

The County of Lycoming also instituted a Crisis Management/Emergency Response Plan in July of 2008 to address continuity issues, chain of command, and disaster declaration issues when County government is interrupted.

During the solutions workshop held on November 17, 2009, it was stressed that it is very important that local municipalities understand the importance of having a COOP plan.

5.2.1.3. *Evacuation Plan*

Evacuation is one of the most widely used methods of protecting the public from hazard impacts. The easiest way to minimize death and injury due to a hazard event is to remove as many people as possible from its path. Evacuation plans include descriptions of the area(s) being evacuated, the demographics and characteristics of people within those area(s), transportation routes to safe areas, and how the community will support those individuals who do not have access to their own transportation. Only 25 municipalities noted that they have evacuation plans. The County EOP noted above addresses various evacuation situations, such

as evacuation plans for dam safety, hazardous material spills, and radiation releases. Emergency Action Plans developed for dams contain evacuation plans, and each municipality's EOP includes identification of traffic and access control points.

5.2.1.4. *Disaster Recovery Plan*

A Disaster Recovery Plan (DRP) is a comprehensive set of measures and procedures that ensure essential, mission-critical resources and infrastructure are maintained or backed up by alternatives during various stages of a disaster. The DRP is another step to ensure the preparedness and ability to respond quickly and effectively to restore the community's essential services. The DRP addresses the public sector's responsibilities, including temporary shelter, refuse disposal, overall damage assessment, restoration of utility services, reconstruction priorities, financial assistance, and dealing with emergency demands. Only 15 local municipalities indicated that they have a DRP. In Lycoming County this is a component of the EOP.

During disasters, the Lycoming County Planning and Community Development Department staff has a supporting role in staffing the EOC to coordinate information, supply transportation information, coordinate housing efforts for disaster victims, and conduct public damage assessment.

5.2.1.5. *StormReady*

StormReady is a program administered by the National Weather Service (NWS). To be certified as StormReady, a community must establish links to the NWS's warning systems and relationships with NWS staff, establish a 24-hour warning point, ensure sufficient capability to respond to severe weather events, and provide public outreach and education.

The County of Lycoming was certified as Storm Ready in 2000 under this national program. In 2009 Lycoming County renewed its Storm Ready Community designation with the NWS and PEMA officials from Central Region. This entailed a thorough inspection of numerous documents and file information by the NWS.

The County also plans on implementing two Skywarn training classes offered by the NWS and implementing a yearly damage assessment/reporting class related to the adverse weather training and preparation system offered by PEMA.

5.2.2. Participation in the National Flood Insurance Program (NFIP)

5.2.2.1. *National Flood Insurance Program*

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

the floodplain regulations for their community. This helps keep insurance rates low and makes sure that the risk of flood damage is not increased by property development.

All 52 municipalities participate in the NFIP. The following table shows the number of NFIP policies and the date of the most recent official Flood Insurance Rate Map (FIRM).

Table 41: NFIP Participation

Municipality	# Policies	FIRM Date
Anthony Township	1	03/16/2004
Armstrong Township	16	03/16/2004
Bastress Township	0	03/16/2004
Brady Township	1	03/16/2004
Brown Township	19	03/16/2004
Cascade Township	4	03/16/2004
Clinton Township	24	03/16/2004
Cogan House Township	2	03/16/2004
Cummings Township	78	03/16/2004
Duboistown Borough	42	03/16/2004
Eldred Township	14	03/16/2004
Fairfield Township	13	03/16/2004
Franklin Township	7	03/16/2004
Gamble Township	5	03/16/2004
Hepburn Township	66	03/16/2004
Hughesville Borough	7	03/16/2004
Jackson Township	1	03/16/2004
Jersey Shore Borough	488	03/16/2004
Jordan Township	3	03/16/2004
Lewis Township	70	03/16/2004
Limestone Township	10	03/16/2004
Loyalsock Township	123	03/16/2004
Lycoming Township	110	03/16/2004
McHenry Township	27	03/16/2004
McIntyre Township	32	03/16/2004
McNett Township	2	03/16/2004
Mifflin Township	23	03/16/2004
Mill Creek Township	2	03/16/2004
Montgomery Borough	88	03/16/2004
Montoursville Borough	40	03/16/2004
Moreland Township	6	03/16/2004

Municipality	# Policies	FIRM Date
Muncy Creek Township	112	03/16/2004
Muncy Borough	253	03/16/2004
Muncy Township	10	03/16/2004
Nippenose Township	17	03/16/2004
Old Lycoming Township	178	03/16/2004
Penn Township	9	03/16/2004
Piatt Township	56	03/16/2004
Picture Rocks Borough	2	03/16/2004
Pine Township	21	03/16/2004
Plunketts Creek Township	69	03/16/2004
Porter Township	47	03/16/2004
Salladasburg Borough	2	03/16/2004
Shrewsbury Township	12	03/16/2004
South Williamsport Borough	54	03/16/2004
Susquehanna Township	36	03/16/2004
Upper Fairfield Township	25	03/16/2004
Washington Township	5	03/16/2004
Watson Township	63	03/16/2004
Williamsport	70	03/16/2004
Wolf Township	24	03/16/2004
Woodward Township	29	03/16/2004

There have been no NFIP sanctions against Lycoming County's municipalities. Flood-prone communities that opt out of the NFIP are no longer eligible for federal financial assistance for acquisition or construction projects.

5.2.2.2. *National Flood Insurance Program – CRS*

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

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

been incorporated into the CRS, and communities now receive credit toward premium reductions for activities that contribute to them.

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

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

There are 10 CRS classes that provide varied reduction in insurance premiums. Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction. CRS premium discounts on flood insurance range from 5 percent for Class 9 communities up to 45 percent for Class 1 communities. The CRS recognizes 18 creditable activities that are organized under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness.[8]

Jersey Shore Borough (CRS Class 9) and Loyalsock Township (CRS Class 10, rescinded) are the only municipalities participating in this program. Input provided during the mitigation solutions workshop indicates that the administrative documentation procedures and their associated costs may be a hindrance to municipalities in using this program.

5.2.3. Planning and Regulatory Capability

Pennsylvania municipalities have the authority to govern more restrictively than the state and federal minimum requirements, as long as they are in compliance with all criteria established in the Pennsylvania Municipalities Planning Code (MPC). Respective municipal codes are also pertinent. 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 via a local ordinance, and enforced through the governmental body or its appointee.

Municipalities implement land use controls via the adoption and enforcement of zoning, subdivision and land development ordinances, building codes, building permit ordinances,

[8]Federal Emergency Management Agency, Federal Insurance and Mitigation Administration, *National Flood Insurance Program: Program Description* (August 2002).

floodplain, and/or stormwater management ordinances. When effectively prepared and administered, these regulations can lead to hazard mitigation. For example, the adoption of the NFIP and the Pennsylvania Floodplain Management Act (Act 166 of 1978) established minimum floodplain management criteria. A municipality must adopt and enforce these minimum criteria to be eligible for participation in the NFIP. Municipalities have the option of adopting a single-purpose ordinance or incorporating these provisions into their zoning and/or subdivision and land development ordinances, or building codes, thereby mitigating the potential impacts of local flooding.

5.2.3.1. *Hazard Mitigation Plan*

Hazard mitigation plans (HMPs) such as this 2010 update, describe in detail the hazards that may affect the community, the community's vulnerability to those hazards, and an action plan for how the community plans to minimize or eliminate that vulnerability. HMPs are governed by the Disaster Mitigation Act of 2000 (DMA 2000), and having a FEMA-approved HMP makes the jurisdiction eligible for federal mitigation funding.

5.2.3.2. *Comprehensive Land Use Plan (or General, Master, or Growth Management 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. Pennsylvania's MPC (Act 247 of 1968), as reauthorized and amended, requires counties to prepare and maintain a county comprehensive plan and to update it every 10 years.

With regard to hazard mitigation planning, Section 301(a)2 of the MPC requires comprehensive plans to include a plan for land use, which, among other provisions, suggests that the Plan give consideration to floodplains and other areas of special hazards and other similar uses. The MPC also requires comprehensive plans to include a plan for community facilities and services, and recommends giving consideration to storm drainage and floodplain management. The Lycoming County Comprehensive Plan was adopted in 2006.

This plan includes six multi-municipal regional plans designed to address specific issues and characteristics of the following areas within the County: Muncy Creek area, Montoursville/Muncy area, US 220/I-99 corridor, US 15 corridor, Greater Williamsport Alliance, and Lower Lycoming Creek. Hazards such as floodplains and steep slopes were critical issues impacting on all of these plans.

All municipalities are covered, in some capacity, under one or more comprehensive plans adopted by the County of Lycoming. The following is a link to the comprehensive plans available via the County's home page: http://www.lyco.org/dotnetnuke/Home/PlanningandCommunityDevelopment/ComprehensivePlans/tabid/310/Default.aspx.

5.2.3.3. *Floodplain Management Plan*

Floodplain management plans describe how the community will reduce the impact of flood events through preventive and corrective actions. These actions may include mandated open space and prohibition of development in floodplains, property buyout, and other measures. All 52 municipalities in Lycoming County administer their floodplain management ordinances through their zoning programs. Municipalities that participate in the County Zoning Partnership have their floodplain ordinances administered by the County Zoning Administrator. Thirty-two municipalities indicated that they have floodplain management plans.

5.2.3.4. *Open Space Management Plan (or Parks/Rec or Greenways Plan)*

Open space management plans are designed to protect the natural environment of the community. They describe how the community will manage woodlands, grasslands, and trails without sacrificing the economic goals of the community. These areas are most widely used for recreational purposes, but also serve as the primary habitat for a number of species of plants and animals.

Lycoming County adopted a Recreation, Parks, and Open Space/Greenway Plan in the spring of 2008. Fifteen municipalities indicated that they have open space plans.

5.2.3.5. *Stormwater Management Plan/Ordinance*

The proper management of stormwater runoff can improve conditions and decrease the chance of flooding. Thirteen municipalities indicated they have developed local stormwater management ordinances. These ordinances were developed in conjunction with the guidelines established in the Pennsylvania Stormwater Management Act (Act 167 of 1978).

The Pennsylvania Department of Environmental Protection's Stormwater Management Program provides grant moneys to counties to develop stormwater management plans for designated watersheds. This planning effort, as required by the Stormwater Management Act of 1978 (Act 167), results in sound engineering standards and criteria being incorporated into local codes and ordinances to manage stormwater runoff from new development in a coordinated, watershed-wide approach. Without such planning, stormwater is either not controlled by municipal ordinances, or is addressed on a site-to-site or municipal boundary basis. Municipalities within the same watershed may require different levels of control of stormwater. The result is often the total disregard of downstream impacts or the compounding of existing flooding problems.

Municipalities have an obligation to implement the criteria and standards developed in each watershed stormwater management plan by amending or adopting laws and regulations for land use and development. The implementation of stormwater management criteria and standards at the local level is 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. Municipalities within rapidly developing watersheds will benefit from the watershed stormwater management plan and will use the information for sound land use

considerations. A watershed stormwater management plan is designed to aid the municipality in setting standards for the land uses it has proposed. 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.

Currently there are four approved stormwater management plans in the County for Grafius Run, McClure's Run, and Millers Run. The Lycoming Creek Watershed Stormwater Plan is nearing completion. A county-wide watershed stormwater plan has been prepared and is currently going through the public review process.

Thirteen municipalities indicated that they have stormwater management plans and/or ordinances, but the Planning and Community Development Department reports that all 52 municipalities have them under development.

5.2.3.6. *Natural Resource Protection Plan*

Natural resource protection plans are designed to protect woodlands, steep slopes, waterways, floodplains, wetlands, and coastal buffers through prohibiting or severely limiting development in these areas. Emergency managers and community planners have been made more and more aware of the benefits of protecting these areas as mitigation measures over the last few decades. Natural resource protection is covered in the Recreation, Parks, and Open Space/Greenway Plan (2008), the County Comprehensive Plan, and multi-municipal regional plans.

5.2.3.7. *Flood Response Plan*

These plans describe how a community will respond to flood events. They include warning the public, evacuation and sheltering, emergency response, recovery, and mitigation of future events. Most communities in Pennsylvania have moved away from planning for individual hazards and now include flood response as part of their all-hazards EOPs. This issue is addressed in the Lycoming County EOP.

5.2.3.8. *Capital Improvement Plan*

The capital improvement plan is a multiyear 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 improvement plan should be prepared by the respective county's planning commission and should include a capital budget. This budget identifies the highest priority projects recommended for funding in the next annual budget. The capital improvement plan is dynamic and can be tailored to specific circumstances. According to the survey, only six municipalities responded that they have a capital improvement plan.

Lycoming County has identified the following capital improvement projects as important in hazard mitigation planning:

- EOC expansion: near-term
- Communication Towers replacement: near-term
- Montoursville Levee: mid-term
- Lower Lycoming Creek mitigation: long-term
- Maintain or improve Williamsport Flood Protection Project compliance rating with US ACE: long-term

5.2.3.9. *Economic Development Plan*

An economic development plan serves as a road map for economic development decision making, based on the collection of statistical data, historical perspective, and human potential, and it does the following:

- Clearly defines realistic goals and objectives
- Establishes a defined time frame to implement goals and objectives
- Communicates those goals and objectives to the organization's constituents
- Ensures effective use of the organization's resources
- Provides a baseline from which progress can be measured
- Builds consensus around future goals and objectives

Only eight municipalities indicated that they have economic development plans. The County Comprehensive Plan and the six regional multimunicipal comprehensive plans have sections addressing economic development.

5.2.3.10. *Historic Preservation Plan*

These plans describe how the community will preserve the historic structures and areas within it. Since these structures pre-date building codes and modern community planning requirements, many of them are especially vulnerable to a variety of hazards. A historic preservation plan may include measures to retrofit or relocate historic treasures out of hazard impact areas. Five municipalities have indicated that they have historic preservation plans.

5.2.3.11. *Floodplain Regulations*

Through administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to existing structures in the 1% chance floodplain are engineered to minimize the impact of flooding and are better able to withstand the forces of a 1% chance flood event. By following floodplain regulations, citizens are not only living in safer buildings but will have lower flood insurance premiums due to NFIP-compliant construction practices.

All 52 municipalities in Lycoming County have enacted floodplain ordinances.

5.2.3.12. *Zoning Regulations*

Article VI of the MPC authorizes municipalities to prepare, enact, and enforce zoning to regulate land use. Its regulations can apply to the following:

- Permitted use of land
- Height and bulk of structures
- Percentage of a lot that may be occupied by buildings and other impervious surfaces
- Yard setbacks
- Density of development
- Height and size of signs

Zoning ordinances contain both a map that delineates zoning districts and text documenting the regulations that apply in each zoning district. Lycoming County has adopted a county zoning ordinance that covers municipalities that do not have their own ordinance. Forty-nine municipalities have adopted local zoning ordinances.

In addition, the County offers a program by which the County administers the zoning ordinances of the municipalities. Currently the County administers the ordinances in the South Williamsport Borough, Muncy Borough, and Plunketts Creek Township.

Key zoning issues for consideration in this Plan update include the following:

- 2005 plan emphasized the need for floodplain restrictions and potential for zoning to play a significant role in managing risk.
- Since 2004, filling in the floodplain has remained an issue, creating concerns about future flooding conditions.
- While floodplain ordinances throughout Lycoming County are generally more restrictive than the state's recommended minimum, floodplain development is still a concern to both citizens and municipal officials. Lycoming County currently addresses this concern by hosting an annual flood summit to educate officials and employs a Hazard Reduction Planner to offer expert advice to local permitting officials.
- The County is working on model zoning ordinance provisions related to Marcellus Shale issues.

The County Partnership Zoning Ordinance covers specifics relating to floodplain management, wind energy development, airport hazard areas, steep and severe slopes, carbonate geology, and woodland protection (wildfire prevention standards).

5.2.3.13. *Subdivision Regulations*

Article V of the MPC authorizes municipalities to prepare, enact, and enforce a subdivision and land development ordinance, including regulations to control the layout of streets, minimum lot sizes, and the provision of utilities. The County's subdivision regulations also include restrictions on building in areas with karst topography (see Section 4.3.12). The objectives of a subdivision and land development ordinance are to do the following:

- Coordinate street patterns
- Ensure that adequate utilities and other improvements are provided in a manner that will not pollute streams, wells, and/or soils
- Reduce traffic congestion
- Provide sound design standards as a guide to developers, elected officials, planning commissions, and other municipal officials

The Lycoming County Planning Commission has the authority to approve, approve with conditions, or disapprove all subdivisions and land developments that occur in municipalities that do not have an ordinance. Those municipalities in Lycoming County are shown in Table 42.

In cases where municipalities have their own subdivision and land development ordinance, plans must be submitted to the County Planning Commission for review, and the Planning Commission provides comments to the municipality within 30 days. Municipalities in Lycoming County with an ordinance are listed in Table 42.

5.2.3.14. *Unified Development Ordinance*

Unified development ordinances combine all other development ordinances (e.g., subdivision management, zoning) into a single document reflecting the community's vision for its development. Combining these documents helps to deconflict any discrepancies among them which may be due to the individual documents being required by separate legislation.

5.2.3.15. *Post-Disaster Redevelopment/ Reconstruction Ordinance*

These ordinances are passed by proactive communities that recognize the complexities of post-disaster recovery. They describe the organization of the redevelopment oversight body, damage assessment, and recovery policies related to making the community more sustainable and safer following a disaster. Seven of the 52 municipalities indicated that they have such an ordinance.

5.2.3.16. *Building Code*

Building codes are important in mitigation, because codes are developed for regions of the country in consideration of the hazards present within that region. Consequently, structures that are built to applicable codes are inherently resistant to many hazards such as strong winds, floods, and earthquakes, and can help mitigate regional hazards like wildfires. In 2003, the

Commonwealth of Pennsylvania implemented the Uniform Construction Code (UCC) (Act 45 of 1999), a comprehensive building code that establishes minimum regulations for most new construction, including additions and renovations to existing structures.

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

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.[9] If a municipality has "opted out," the Department of Labor and Industry is responsible for all commercial code enforcement in that municipality. The Department of Labor and Industry also has sole jurisdiction for all state-owned buildings no matter where they are located.[10]

Local residential and nonresidential code officials were required to register and obtain certification within three and five years, respectively. While some municipalities in Lycoming County had already instituted building codes prior to the mandate by the Commonwealth, all municipalities and the County have spent considerable time and resources retraining and becoming certified in the new requirements and revamping their administrative and enforcement procedures. With the exception of three municipalities, Cummings, Gamble, and McHenry, all other municipalities have opted in. Except for the City of Williamsport and Loyalsock Township, municipalities in Lycoming County have hired a third-party contractor to enforce building codes.

5.2.3.17. *Fire Code*

Fire codes relate to both the construction and use of structures in terms of preventing fires from starting and minimizing their spread, and minimizing the injuries and deaths caused by a fire within a building. They govern such things as the following:

- Building materials that may be used
- The presence and number/type of fire extinguishers
- Means of egress
- Hazardous materials storage and use

Sixteen municipalities indicated that they have fire codes.

5.2.3.18. *Firewise*

Firewise is a national program that brings together the response community, community planners, and homeowners to minimize the risk of wildfires. The program focuses on

[9] Ibid.

[10] Pennsylvania Department of Labor and Industry, *Building Codes: Uniform Construction Code*.

development that is compatible with the natural environment. Participation in the program is begun and maintained by groups of homeowners. Five municipalities indicated they participate in the Firewise program.

Lycoming County assists communities in the establishment of a Firewise community rating for the local municipality in cooperation with the Department of Conservation and Natural Resources Bureau of Forestry. The Tanker Task Force is also part of this initiative. The County also provides resource for training through the Bureau of Forestry and community colleges.

5.2.3.19. *Farmland Preservation*[11]

Farmland preservation measures are important to hazard mitigation. Preserved farms protect soil from erosion and prevent the contamination of local surface water. In addition, farms and forest land are important for recharging the community's aquifer and providing habitat for local wildlife. Lycoming County has a very active agricultural land preservation program overseen by a seven-member board. The County Conservation District administers the program.

5.2.3.20. *Act 537 Sewage Facilities Planning*

Pennsylvania Act 537, the Sewage Facilities Planning Act, requires municipalities to develop and implement comprehensive official plans that provide for the resolution of existing sewage disposal problems, provide for the future sewage disposal needs of new land development, and provide for the future sewage disposal needs of the municipality. This planning process is designed to protect the health, welfare, and safety of all Pennsylvanians by protecting the Commonwealth's water resources. While these plans are designed to manage health risks, the planning process associated with keeping these plans current and applicable requires consideration of how local hazards may impact on a community's ability to implement these plans in a cost-effective manner. Some hazards that can affect the sewage facilities planning process and implementation include flooding, drought, and terroristic sabotage. In Lycoming County the key issue of concern is flooding and how it impacts various wastewater treatment plants (WWTPs) and planned expansions.

Lycoming County has seven WWTPs. In recent years, the nutrient reduction mandates associated with the Chesapeake Bay cleanup, and consent orders relating to Combined Sewer Overflows (CSO) and Inflow and Infiltration (I&I) problems, have placed renewed attention on the condition of wastewater infrastructure in the County. Two of the plants, Lycoming County Water and Sewer Authority (LCWSA) and Hughesville-Wolf Authority (HWA), are relatively new, modern WWTPs that are located in secure areas not threatened by flooding. The two plants operated by the Williamsport Sanitary Authority (WSA) are located behind the City's levees and are thus protected from flood hazards. However, three of the County's plants located in borough population centers are at significant risk of flooding. Fortunately, all three of these

[11] Pennsylvania Farmland Preservation Association, "Why Preserve Farmland?" http://www.pafarmland.org/why_preserve_farmland.htm (accessed November 13, 2009).

plants are currently undergoing planning to reduce hazard exposure. The Jersey Shore Borough plant will be closed down in the coming years and a new plant built out of the floodplain. The Borough of Montgomery is also considering upgrading its plant and considering possible regional solutions.

In addition to the County's WWTPs, the community collection systems that serve as tributaries to the WSA plants (Loyalsock and Old Lycoming Townships, and South Williamsport and Duboistown Boroughs), are being upgraded to reduce the I&I conditions that currently contribute to the CSO problem in the City of Williamsport.

5.2.3.21. *Erosion and Sedimentation Control*

The Pennsylvania Department of Environmental Protection (PA DEP) Rules and Regulations Chapter 102: Erosion and Sediment Control requires persons proposing or conducting earth disturbance activities to develop, implement, and maintain Best Management Practices (BMPs) to minimize the potential for accelerated erosion and sedimentation. The BMPs are designed to protect, maintain, reclaim and restore water quality of Commonwealth waters in order to protect the health, welfare, and safety of all Pennsylvanians.

Section 102.5 requires that permits be issued by the PADEP for certain earth disturbance activities that exceed certain threshold levels depending on the type of activity. Steep slopes, sinkholes, and hazardous materials are examples of some hazards that may be an integral consideration in the permit application review process. In many instances the program is administered by the County Conservation District. In Lycoming County, the Conservation District does administer the program.

The County Conservation District has always been a very critical partner in the management and protection of natural resources so critical to the economic health of Lycoming County. During 2008 and 2009, Lycoming County invested more than $500,000 in developing its own Chesapeake Bay Nutrient Management Strategy. This strategy brings together a diverse group of stakeholders including municipalities, wastewater authorities, watershed organizations, and the business community to work together in implementing cost-effective solutions to reduce point source and non-point source pollution discharges to local waterways. The Conservation District is again in the forefront of efforts to implement BMPs that will protect local waterways and the Chesapeake Bay. Floodplain restoration is one very interesting BMP that is being looked at since it not only can reduce erosion that contributes nutrient loads to the waterways, but can also reduce flooding hazards.

5.2.3.22. *Drought Planning*

Under management of the Lycoming County Department of Public Safety, the County maintains a drought task force to deal with drought emergencies. Included in its review is maintenance of the Tanker Task Force, up-to-date listing of water surveys, and list of well drilling companies.

5.2.3.23. *Coroner's Office Response Planning*

The Coroner's office has developed a response plan for disasters involving mass casualties. The Susquehanna Health System and the County of Lycoming have invested over $220,000 to develop the forensic center located at the Williamsport Hospital Campus. The forensic center houses the morgue area for providing autopsy services, dental x-ray equipment for providing dental identification services, a family viewing area, office space, radio and telephone communications equipment, and a 13′ x 16′ refrigerated cooler with a capacity of approximately 20 decedents. Muncy Valley Hospital has refrigeration to hold two decedents. Additional refrigerated decedent holding areas throughout the County include space for four at Spitler Funeral Home, three at Maneval Funeral Home, and four at McCarty Thomas Funeral Home. In the event the need for space exceeds the 44 available spaces, there is a regional response plan to make regional resources available or to bring in refrigerated trucks. The local plan is coordinated by the County of Lycoming Coroner, and the regional response would be coordinated by the Pennsylvania State Coroners Association president and regional vice presidents.

5.2.4. Administrative and Technical Capability

5.2.4.1. *Planners with knowledge of land development/management practices*

County Planning Department

In Pennsylvania, planning responsibilities traditionally have been delegated to each county and local municipality through the municipal planning commission (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 and engineering advisors to the planning agency. In addition to the duties and responsibilities authorized by Article II of the MPC, a governing body may, by ordinance, delegate approval authority to a planning agency for subdivision and land development applications. A governing body has considerable flexibility, not only as to which powers and duties are assigned to a planning agency, but also as to what form an agency will possess. A governing body can create a planning commission, a planning department, or both.

The purpose of the Lycoming County Planning and Community Development Department is to receive and make recommendations on public and private proposals for development, and to prepare and administer planning regulations. Subdivision and land development plans are also reviewed and approved by the Lycoming County Planning and Community Development Department, which works in conjunction with the municipal planning commissions, where applicable. Lycoming County Planning and Community Development Department activities and continuous education of commission members is very serious business in this County. The County supports training for members by covering the costs for attendance at training sessions and attendance at state and national planning conferences. The development of the Lycoming County Comprehensive Plan and the six multimunicipal plans facilitated an environment of

collaboration between the County Planning and Community Development Department and the local municipalities that has now resulted in more coordination between local planning initiatives and County planning initiatives.

Municipal Planning Commission

The MPC conveys the planning authority and establishes the requirements that a municipality must follow. 31 municipalities indicated that they have planners with appropriate knowledge of land development and management practices.

5.2.4.2. *Engineers or professionals trained in construction practices related to buildings and/or infrastructure (includes building inspectors)*

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 reviews and/or prepares plans, specifications, and estimates of the work undertaken within the municipality. All 52 municipalities have contracted with a private engineer for consultation in this area.

5.2.4.3. *Planners or engineers with an understanding of natural and/or human-caused hazards*

When staff who are responsible for community planning or engineering the structures on which people rely are familiar with the hazards that can impact the community, there is a great potential for synergy. These staff members will design the communities and structures with hazard impacts in mind, resulting in more sustainable communities and stronger structures. Twenty-eight municipalities responding indicated that they have such capabilities. Although some individual municipalities do not have a staff member with an understanding of hazards (natural or otherwise), the County Planning Department will provide consultation in many facets of planning and employ a hazard reduction planner whose focus is the mitigation of natural hazards. The County's Department of Public Safety functions in much the same way.

5.2.4.4. *Emergency manager*

A municipal emergency management coordinator (EMC) is responsible for emergency management – preparedness, response, recovery, and mitigation within his/her respective Authority Having Jurisdiction (AHJ). The responsibilities of the EMC are outlined in the Pennsylvania Code, Title 35 §7503:

- Prepare and maintain a current disaster emergency management plan
- Establish, equip, and staff an emergency operations center (EOC)
- Provide individual 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 applicable agency or by the federal government

All 52 municipalities in Lycoming County have EMCs. It is not uncommon that one EMC covers multiple municipal jurisdictions.

5.2.4.5. *Floodplain manager*

Floodplain managers are experts in the rules and regulations of development in a floodplain, and can provide vast amounts of information on the risks and impacts of building within those hazard areas. They are an integral part of the mitigation planning team, and can make recommendations based on the needs and conditions of the community. Thirty municipalities responding indicated that they do have this technical resource capability.

5.2.4.6. *Land surveyors*

Land surveyors determine, among other things, the elevation of a given point (e.g., a structure). This is especially useful in determining what development lies in the floodplain, but can also be useful in examining vulnerability to other hazards as well. Seven municipalities indicated that they do have this technical resource capability.

5.2.4.7. *Scientist familiar with the hazards of the community*

Natural and human-made hazards' characteristics and impacts can be highly technical. Meteorology, aerodynamics, fluid dynamics, physics and health physics, chemistry, and several other scientific fields are involved in determining the impacts of a hazard event. Having access to a scientist who can describe the technical aspects of hazards in lay terms is important to having a sound mitigation strategy. Only three municipalities reported that they have access to this technical capability. However, the Pennsylvania College of Technology, an affiliated institution of Penn State University, is located in Williamsport. It could provide significant academic support by offering related programs in the following: architectural technology, residential construction technology, building construction technology, construction management, civil engineering technology, forest technology, and landscape architecture technology. The Clean Water Institute at Lycoming College is another resource (see http://www.lycoming.edu/biologydept/cwi/).

5.2.4.8. *Staff with the education or expertise to assess the community's vulnerability to hazards*

The basis of hazard mitigation is hazard identification and vulnerability assessment. Conducting the vulnerability assessment is a complicated process. Planners must know where to find data on the hazards and their impacts and the characteristics of the community. More importantly, they must be able to combine these two sets of knowledge to make the analysis useful. Twenty-five municipalities responded that this capability is addressed. However, the Lycoming County Department of Planning and Community Development has a hazard reduction planner on staff who can provide this expertise.

5.2.4.9. *Personnel skilled in Geographic Information Systems (GIS) and/or FEMA's HAZUS program*

Spatial and tabular data are linked in a computerized, visual format through the use of sophisticated GIS technology. Through GIS projects, it is possible to accomplish environmental restoration, economic development, Smart Growth land use planning, infrastructure development, and training to use GIS for decision support. Lycoming County has GIS capabilities that can assist the municipalities. According to the survey, only seven noted this capability. However, the County has a very sophisticated and comprehensive system database and is undertaking various initiatives to make GIS more accessible and useable by local municipalities. The County also makes available GeoPlan, a GIS based municipal management tool to 30 municipalities and authorities. In addition, all of the municipalities in the County Zoning Partnership use GeoPlan. The County also makes available to Fire, EMA and Police Departments across the County a GIS DVD of the County.

5.2.4.10. *Resource development staff or grant writers*

Few communities have the financial resources that are required to implement all of their potential programs (e.g., mitigation measures). Therefore, they must rely on grants and other fundraising opportunities to obtain the money necessary to perform mitigation projects. Many grants are competitive, and individuals can provide donations to a vast array of causes, so the community must demonstrate that it can use those funds better than other applicants. This may be difficult, but having a specialist on staff will likely increase the community's chances of receiving funding. Only nine municipalities responded that they have this capability. The Lycoming County Department of Planning and Community Development often provides assistance on grant writing, especially when it involves multimunicipal initiatives.

5.2.4.11. *Fiscal staff to handle large/complex grants*

Many of the funding streams that can be used for hazard mitigation have substantial management and reporting requirements. Employing or having access to staff specializing in grants management will help the community ensure that it does not lose a grant opportunity because it did not meet the administrative requirements of that grant. While only 13 municipalities noted this capability in the survey, Lycoming staff is well versed in grants management and provides assistance to local municipalities.

5.2.5. Fiscal Capability

Fiscal capability is important to the implementation of hazard mitigation activities. Every jurisdiction must operate within the constraints of limited financial resources. During the 1960s and 1970s, state and federal grants-in-aid were available to finance a large number of programs, including streets, water and sewer facilities, airports, and parks and playgrounds. During the early 1980s, there was a significant change in federal policy, based on rising deficits and a political philosophy that encouraged states and local governments to raise their own revenues for capital programs. The result has been a growing interest in "creative financing." [12]

The following information pertains to various financial assistance programs pertinent to hazard mitigation.

5.2.5.1. *Capital improvement programming*

Most capital improvement projects involve the outlay of substantial funds, and local government can seldom budget for these improvements in the annual operating budget. Therefore, numerous techniques have evolved to enable local governments to finance for capital improvements over a time period exceeding one year. Public finance literature, and state laws governing local government finance, classify techniques that are allowed to finance capital improvements. These techniques include revenue bonds; lease-purchase, authorities, and special districts; current revenue (pay-as-you-go); reserve funds; and tax increment financing.

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. See section 5.2.3.8 of this Plan, the Capital Improvement Plan section, for additional information. Eleven municipalities indicated that they do have capital improvement programming.

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. Municipal authorities have powers to receive grants, borrow money, and operate revenue-generating programs, and 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. Lycoming County and its municipalities have numerous special purpose authorities dealing with such things as water and sewer infrastructure, industrial development, and housing.

[12] Frank S. So and Judith Getzels, eds., *The Practice of Local Government Planning*, 2nd ed. (Washington, D.C.: International City Management Association, 1988), 451.

5.2.5.2. *Community Development Block Grants (CDBGs)*[13]

These grants are designed to assist the vulnerable populations within the community by ensuring affordable housing, creating jobs, and providing direct services. The amount of each grant is determined by a formula that accounts for the community's need, poverty, population, housing, and comparison to other areas. The annual appropriation is divided among the states and local jurisdictions (referred to as "non-entitlement communities" and "entitlement communities"). The following are entitlement communities:

- Central cities of Metropolitan Statistical Areas (MSAs)
- Cities with at least 50,000 people
- Some urban counties with at least 200,000 people

States provide CDBG funds to non-entitlement jurisdictions.

The majority of CDBG funds are required to be spent to benefit low- and moderate-income people. Also, there is a set of national objectives for the program, including addressing existing conditions that pose a threat to the health and welfare of the community (e.g., low-income housing in a floodplain). All municipalities within Lycoming County have access to CDBG funding, be it directly through the federal or state government or through a competitive county selection process.

5.2.5.3. *Special purpose taxes*

Communities may exercise their taxing authority to raise funds for any project they see fit. This includes special taxes to fund mitigation measures. Spreading the cost of a community project among the community's taxpayers helps provide the greatest public good for relatively little individual cost. Twenty-three municipalities noted that they use special purpose taxes.

5.2.5.4. *Gas/electric utility fees*

In the same way that special taxes can be levied to fund mitigation projects, another avenue for financing a project that a community may utilize is to dedicate a portion of homeowners' gas and electric utilities fees to upgrade and maintain the related infrastructure. Burying transmission lines, thereby mitigating from the effects of winds and ice storms, is expensive. These fees help to offset that cost. Only Fairfield Township reported using this approach.

5.2.5.5. *Water/sewer fees*

Water Authorities and Fees

Water authorities are multipurpose authorities with water projects, many of which operate both water and sewer systems. The financing of water systems for lease back to the municipality is

[13] U.S. Department of Housing and Urban Development, "Community Development Block Grant – CDBG," http://www.hud.gov/offices/cpd/communitydevelopment/programs/ (accessed September 21, 2009).

among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage. The cost of constructing or extending water supply lines can be funded by special assessments against abutting property owners. Tapping fees also help fund water system capital costs. Water utilities are directly operated by municipal governments and by privately owned public utilities regulated by the Pennsylvania Public Utility Commission. The PADEP has a program to assist with consolidation of small individual water systems to make system upgrades more cost effective.

Sewer Authorities and Fees

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

There are five sewer authorities operating in Lycoming County, including the Williamsport Sanitary Authority, Montgomery Sewer Authority, Lycoming County Water and Sewer Authority, Muncy Borough Municipal Authority, and the Hughesville-Wolf Township Municipal Authority. These five authorities, in partnership with the Jersey Shore Borough WWTP, local municipalities, and Lycoming County, are working on regional cooperation efforts to manage in a cost-effective manner sewage facilities infrastructure upgrades[14]. A key objective of this effort involves the elimination of WWTPs from the floodplain. In addition there are seven public water supply authorities, including Hughesville – Wolf Joint Municipal Authority, Jersey Shore Area Joint Water Authority, Lycoming County Water and Sewer Authority, Montgomery Water and Sewer Authority, Muncy Borough Municipal Authority, Williamsport Municipal Water Authority, and Woodward Township Water and Sewer Authority. Detailed information can be found in the Lycoming County Water Supply Plan at http://www.lyco.org/DotNetNuke/Portals/1/PlanningCommunityDevelopment/Documents/EDPS_PDFs/WSP_Final_Report.pdf.

5.2.5.6. *Stormwater utility fees*

Stormwater utility fees are assessed and collected to offset the cost of maintaining and upgrading stormwater management structures such as drains, retention ponds, and culverts. No municipalities were identified as using this approach in Lycoming County.

[14] Lycoming County Chesapeake Bay Nutrient Management Strategy Phase II Report, April 2009.

5.2.5.7. *Development impact fees*

Development impact fees are one-time fees assessed to offset the cost of providing public services to a new development. In Pennsylvania, impact fee programs may be established for capital improvements associated with transportation infrastructure in accordance with section 505-A of the Pennsylvania Municipalities Planning Code and the Pennsylvania Transportation Partnership Act. This program would allow for investments in highway infrastructure to reduce hazard risks. In addition, Pennsylvania Act 203 of 1990: Municipalities Authorities Act Amendments, allows water and sewer authorities to charge tapping fees for infrastructure improvements to connect adjacent properties to systems. However, this authorization would only have limited value in addressing hazards. In other states, such impact fees may be dedicated to providing the related new water or sewer infrastructure, roads, parks and recreational areas, libraries, schools, etc. The new infrastructure may be less vulnerable to hazard impacts. Lycoming County staff indicated that no municipalities have impact fee programs per se.

5.2.5.8. *General obligation, revenue, and/or special tax bonds*

Jurisdictions may simply decide to dedicate general fund or similar financing to implement hazard mitigation projects. Eleven of the municipalities surveyed indicated they have such capabilities.

5.2.5.9. *Partnering arrangements or intergovernmental agreements*

Intergovernmental cooperation is one manner of accomplishing common goals, solving mutual problems, and reducing expenditures. The 52 municipalities within Lycoming County comprise 10 boroughs and 42 townships. Each of these municipalities conducts its daily operations and provides various community services according to local needs and limitations. Some adjacent 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. Other municipalities have chosen to operate on their own. Each municipality varies in staff size, resource availability, fiscal status, service provision, constituent population, overall size, and vulnerability to the identified hazards. Twenty-three municipalities indicated they have such arrangements or agreements.

Lycoming County has cooperative agreements with 16 local municipalities to administer their zoning and subdivision and land development ordinances. Numerous municipalities have cooperative agreements for mutual fire and police response.

Circuit Rider Program (Engineer)

The Circuit Rider Program is an example of intergovernmental cooperation. This program offers municipalities the ability to join together to accomplish a common goal. The Circuit Rider is a municipal engineer or other form of professional who serves several small municipalities simultaneously. These are municipalities that may be too small to hire such a professional

assistant for their own operations, yet need the skills and expertise the circuit rider can offer. Municipalities can jointly obtain what no single municipality could obtain on its own.

5.2.6. Political Capability

Political capability refers to a jurisdiction's incentive or willingness to accomplish hazard mitigation objectives. It is measured by the degree to which local political leadership (including appointed boards) is willing to enact policies and programs that reduce hazard vulnerabilities in the community, even if met with some opposition. Examples may include guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (e.g., building codes, floodplain management).

Local decision makers may not rank hazard mitigation as a high priority task if there are other, more immediate political concerns. Unfortunately, it often takes a disaster to get people thinking about hazard mitigation. Responding to and recovering from a disastrous event can exhaust local resources, thereby elevating hazard mitigation to the forefront.

Cooperation among planning commission officials, emergency management officials, and other officials is essential to achieving hazard mitigation objectives. Maintaining open lines of communication and sharing up-to-date information is key.

5.2.7. Self-Assessment

The self-assessment provided the County and each municipality with an opportunity to approximate the jurisdiction's capability to implement hazard mitigation strategies. The assessment reflects this capability in each of the major capability areas.

5.2.8. Existing Limitations

Based on the Capability Assessment Survey, to which all 52 municipalities responded, limitations that may need to be addressed include the following:

- Continuity of Operations Plans – Only 22 municipalities noted this capability. During hazard mitigation planning meetings, this was noted as a very important capability that warrants priority attention.
- Evacuation Plans – Twenty-five municipalities noted this capability. During the hazard mitigation solutions workshop, this program was noted as one solution or capability that should be improved.
- Disaster Recovery Plans – Only 15 municipalities noted this capability.
- National Flood Insurance Program Community Rating System (CRS) – Only two communities, Jersey Shore Borough and Loyalsock Township, benefit from this program. During the hazard mitigation solutions workshop, this program was noted as one solution or capability that should be improved.

- Floodplain Management Plans – While 32 municipalities responded that they have this capability, there has been an overriding theme at various hazard mitigation planning meetings related to the need for more restrictive floodplain ordinances and the concern that the use of fill for elevation purposes (in the flood fringe/1% chance floodplain) might change future flood depths and patterns, thus putting lives and property in jeopardy. Therefore, this capability appears to warrant further emphasis.
- Natural Resource Protection Plans – Only six municipalities noted such plans. However, the County does have a Recreation, Parks, and Open Space/Greenway Plan and a County Comprehensive Plan that addresses natural resource protection issues. Thus, this is not viewed as a capability that is lacking effective implementation at this time.
- Flood Response Plan – Seventeen municipalities noted this capability. While this issue is addressed in the Lycoming County EOP, it warrants continuous attention in light of flood issues being an overriding theme during all-hazard mitigation planning meetings.
- Capital Improvement Plans – Only six municipalities noted having this capability. This warrants attention in order to help ensure that future investments are not compromised by potential hazard events.
- Economic Development Plan – Only eight municipalities noted having this capability. This warrants attention in order to help ensure that future investment strategies are not compromised by potential hazard events.
- Historic Preservation Plan – Only five municipalities noted having this capability. However, during the various hazard mitigation planning meetings, this was not identified as a priority as related to hazard mitigation planning.
- Unified Development Ordinance – The Lycoming County Planning and Community Development Department indicated that no municipalities have a unified development ordinance. Based on the conditions in Lycoming County, this does not appear to be a capability that would be a priority in hazard mitigation planning.
- Post-disaster Redevelopment/Reconstruction Ordinance – Seven municipalities noted this capability. This warrants attention in order to help ensure that future private investments are not compromised by potential hazard events.
- Fire Code – Sixteen municipalities noted this capability. Thus, this capability may warrant further attention in hazard mitigation planning.
- Firewise – Only five municipalities noted participation in this program. However, the County does take an active role in assisting communities in the establishment of Firewise community ratings. This appears to be a program that warrants continued attention.
- Farmland Preservation – Thirteen municipalities noted this capability. However, the County has a very proactive agricultural land preservation program. In addition, implementation of best management strategies in accordance with the Lycoming County Chesapeake Bay Nutrient Management Strategy is leading to more improvements on

farms and riparian areas that will help to reduce public safety and health hazards. Thus, maintaining the current approach to farmland preservation in the County is important to hazard mitigation planning.

- Planners or Engineers with an Understanding of Natural and/or Human-Caused Hazards – Twenty-eight municipalities noted this capability. With the resources available through the County Planning Staff and resources available at the local educational institutions, this situation warrants further attention.
- Land Surveyors – Seven municipalities identified this capability. In light of the availability of private surveyors, and with the County working on developing a more effective GIS-based flood inundation warning program, this capability appears to be in the process of being appropriately addressed.
- Staff with Education or Expertise to Assess the Community's Vulnerability to Hazards – Twenty-five municipalities noted this capability. However, the County does maintain a hazard reduction planner on staff who is available to all municipalities in the County. Thus, this capability appears to be appropriately addressed in current hazard mitigation planning.
- Fiscal Capabilities – These include such things as capital improvement programming, the CDBG program, special purpose taxes, utility fees, development impact fees, special tax bonds, and intergovernmental agreements, which are not widely used in a rural county like Lycoming. The most widely used capability was the CDBG program, with all 52 municipalities having access to it. In contrast, there were no municipalities indicating the use of stormwater utility fees and only one (Fairfield Township) uses gas/electric utility fees.

Table 42 shows which municipalities completed the Capabilities Assessment Survey and their responses.

Table 42

Lycoming County

Section		Anthony Twp	Armstrong Twp	Bastress Twp	Brady Twp	Brown Twp	Cascade Twp	Clinton Twp	Cogan House Twp	Cummings Twp	Duboistown Borough	Eldred Twp	Fairfield Twp	Franklin Twp	Gamble Twp	Hepburn Twp	Hughesville Borough	Jackson Twp	Jersey Shore Borough	Jordan Twp	Lewis Twp	Limestone Twp	Loyalsock Twp	Lycoming Twp	McHenry Twp	McIntyre Twp	McNett Twp	Mifflin Twp	Mill Creek Twp	Montgomery Borough	Montoursville Borough	Moreland Twp	Muncy Borough	Muncy Twp	Muncy Creek Twp	Nippenose Twp	Old Lycoming Twp	Penn Twp	Piatt Twp	Picture Rocks Borough	Pine Twp	Plunketts Creek Twp	Porter Twp	Salladasburg Borough	Shrewsbury Twp	So Williamsport Boro	Susquehanna Twp	Upper Fairfield Twp	Washington Twp	Watson Twp	Williamsport, City of	Wolf Twp	Woodward Twp
Planning and Regulatory Capability																																																					
5.2.1.1	Emergency Operations Plan	X	0	X	X	X	X	X	X	X	0	X	X	√	0	+	X	√	X	X	√	√	X	√	√	X	0	X	0	X	√	√	0	0	√	X	X	X	X	X	X	X	X	X	X	0	X	X	X	0	X	X	X
5.2.1.2	Continuity of Operations Plan	X			X			X	X				X			+					X				X	X				X						X	X	X		X	X			X	X		X	X	+		X		X
5.2.1.3	Evacuation Plan	X		X				X	X				X			+				X	X				X					X			X	X	X	X	X	X			X	X		X	X	X	X		+		X		X
5.2.1.4	Disaster Recovery Plan	X	0	X	0	0	0	X	X	0	0	0	0	0	0	+	0	0	0	X	X	0	0	0	0	0	0	0	0	X	0	0	0	X	0	0	0	X	X	0	X	0	0	X	0	0	X	0	0	0	X	0	0
5.2.1.5	StormReady	X	0	X	0	0	0	X	0	X	0	X	X	0	0	+	X	0	0	X	X	0	X	0	0	X	X	0	X	X	0	0	0	0	0	X	0	X	0	0	0	X	0	0	0	X	X	0	X	0	X	0	X
5.2.2.1	National Flood Insurance Program	X	X	X	0	X	X	X	X	X	0	X	X	0	0	X	X	0	X	X	0	0	X	0	0	X	X	X	X	X	X	0	X	0	X	X	X	X	0	X	X	X	0	0	X	X	X	X	X	X	0	0	X
5.2.2.2	National Flood Insurance Program – CRS							√								X			X																√					√										√			
5.2.3.1	Hazard Mitigation Plan	X	0	0	X	X	X	X	0	X	0	X	X	0	0	X	X	0	0	0	0	0	X	X	X	X	X	0	X	X	0	0	0	0	X	X	0	X	0	X	X	X	0	0	0	0	X	0	X	0	0	0	X
5.2.3.2	Comprehensive Land Use Plan (or General, Master, or Growth Mgmt. Plan)	X	X	X	0	0	0	X	X	X	X	X	X	X	0	X	X	0	X	X	0	X	X	X	X	X	X	X	0	X	0	X	X	X	X	X	0	X	X	X	X	0	X	0	X	0	X	0	X	0	X	X	X
5.2.3.3	Floodplain Management Plan		X		X		X	X	X	X	X	X	X	X		X		X	X	X				X	X	X	X	X	X	X	X	X					X		X	X	X	X	X					X			X		X
5.2.3.4.	Open Space Management Plan (or Parks/Rec or Greenways Plan)	0	0	0	0	0	X	X	0	X	0	0	0	0	0	X	0	0	X	X	X	0	X	0	X	0	0	0	0	X	0	0	X	0	0	0	0	0	X	X	0	0	X	0	0	0	0	0	0	0	X	0	0
5.2.3.5	Stormwater Management Plan/Ordinance	+	X	+	X	+	X	+	+	X	+	X	+	+	+	X	X	+	+	+	+	+	X	+	X	+	+	X	+	X	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	X	+	X
5.2.3.6	Natural Resource Protection Plan (Comp Plan 3)						X			X						+									X								X				X														X		
5.2.3.7	Flood Response Plan			X				X			X		X			+	X			X	X			X	X	X				X										X	X	X		X							X		X
5.2.3.8	Capital Improvement Plan			X												+			X						X					X									X												X		
5.2.3.9	Economic Development Plan			X												+	X		X							X				X									X												X		X
5.2.3.10	Historic Preservation Plan								X							+			X														X						X												X		
5.2.3.11	Floodplain Regulations	X	X	X	X	X	X	X	X	X	X	X	X	0	0	X	X	X	X	X	0	X	X	0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	0	X	X	X	0	X	X	X	0	X
5.2.3.12	Zoning Regulations	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X	X	X
5.2.3.13	Subdivision Regulations	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X	X	X
5.2.3.14	Unified Development Ordinance			√												+			√		√														√				√												√		
5.2.3.15	Post-Disaster Redevelopment/ Reconstruction Ordinance															+			X		X																		X	X	X					X	X						
5.2.3.16	Building Code	X	X	X	0	0	X	X	X	•	X	X	X	0	•	X	X	X	X	X	X	X	X	0	•	X	0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	0	0	X	X	X	0	X	X	X	X	X
5.2.3.17	Fire Code							X		X	X					X			X				X						X	X	X				X		X									X					X		
5.2.3.18	Firewise			X		0										+					X																X				X						X						
5.2.3.19	Farmland Preservation							X	X		X					+		X		X		X												X	X				X		X				X		X	X					
5.2.3.20	Act 537 Sewage Facilities Planning*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.2.3.21	Erosion & Sedimentation Control*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

Table 42

Lycoming County

Section		Anthony Twp	Armstrong Twp	Bastress Twp	Brady Twp	Brown Twp	Cascade Twp	Clinton Twp	Cogan House Twp	Cummings Twp	Duboistown Borough	Eldred Twp	Fairfield Twp	Franklin Twp	Gamble Twp	Hepburn Twp	Hughesville Borough	Jackson Twp	Jersey Shore Borough	Jordan Twp	Lewis Twp	Limestone Twp	Loyalsock Twp	Lycoming Twp	McHenry Twp	McIntyre Twp	McNett Twp	Mifflin Twp	Mill Creek Twp	Montgomery Borough	Montoursville Borough	Moreland Twp	Muncy Borough	Muncy Twp	Muncy Creek Twp	Nippenose Twp	Old Lycoming Twp	Penn Twp	Piatt Twp	Picture Rocks Borough	Pine Twp	Plunketts Creek Twp	Porter Twp	Salladasburg Borough	Shrewsbury Twp	So Williamsport Boro	Susquehanna Twp	Upper Fairfield Twp	Washington Twp	Watson Twp	Williamsport, City of	Wolf Twp	Woodward Twp
Administrative and Technical Capability																																																					
5.2.4.1	Planners with knowledge of land development / management practices	X	X	X	X	0	X	X	0	X	X	X	X		0	X	X	0	X	0	X	0	X		0	X	X	0	X	X		0			X	X		0	0	X	0	X	X	0	X	X	X	X	X	0	X		X
5.2.4.2	Engineers or professionals trained in construction practices related to buildings and/or infrastructure (includes building inspectors)	X	X	0	X	0	X	X	0	0	X	X	X	0	0	0	X	X	X	0	X	0	X	0	0	X	0	0	X	X	X	0	0	0	X	0	X	0	0	X	0	X	X	0	0	X	0	0	X	0	X	0	X
5.2.4.3	Planners or engineers with an understanding of natural and/or human-caused hazards	X	X	X				X		X	X	X	X				X		X		X					X				X					X	X	X	X		X	X	X	X		X	X	X		X		X		X
5.2.4.4	Emergency manager	X	X	X	X	0	X	X	X	X	0	X	X	X	0	X	X	X	X	X	X	0	0	X	X	X	X	X	X	X	X	X	X	X	•	X	X	X	X	X	X	X	X	0	X	X	X	0	X	X	X	X	X
5.2.4.5	Floodplain manager	X	X	X	0	0	X	X	0	X	0	X	X	0	0	0	X	X	X	0	X	0	0	0	0	X	0	X	X	X	0	0	0	X	X	X	0	X	X	X	0	0	X	0	X	X	X	0	X	X	X	0	X
5.2.4.6	Land surveyors							X													X														X		X			X						X					X		
5.2.4.7	Scientist familiar with the hazards of the community	0	X	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.2.4.8	Staff with the education or expertise to assess the community's vulnerability to hazards		X	X			X	X		X		X	X	X			X		X						X	X			X	X								X	X		X	X	X		X	X	X		X		X		
5.2.4.9	Personnel skilled in Geographic Information Systems (GIS) and/or FEMA's HAZUS program	0	X	X	X	0	0	0	0	X	0	X	0	0	0	0	X	0	0	0	0	0	X	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X
5.2.4.10	Resource development staff or grant writers	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	X	0	0	X	0	0	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	X	0	X	0	0	0	0
5.2.4.11	Fiscal staff to handle large/complex grants	X	X	X	0	0	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	X	0	0	X	0	0	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	0	X	0	X	0	0	0	X
Fiscal Capability																																																					
5.2.5.1	Capital improvement programming							X		X															X					X	X							X	X	X						X					X		
5.2.5.2	Community Development Block Grants (CDBGs)	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	S	C	C	C	S	C	C	C	C	C	C	C	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	S	C	C	C	C	C	C	C
5.2.5.3	Special purpose taxes – (e.g., Fire Tax)		X					X		X		X					X		X				X			X	X	X		X							X		X	X	X		X		X	X	X		X		X	X	X
5.2.5.4	Gas/electric utility fees												X																																								
5.2.5.5	Water/sewer fees				X			SA		X	SA/ WA						SA/ MW		WA/ SM				SA/ WA			WA				SA	SA/ WM		SA/ WA	SA/ WA	SA/ MA	WA	SA	SA					WA			SA/ WA					SA/ WA		WA
5.2.5.6	Stormwater utility fees																																																				
5.2.5.7	Development impact fees						X				√																																			√							
5.2.5.8	General obligation, revenue, and/or special tax bonds							X		X		X		X									X			X						X								X	X					X							
5.2.5.9	Partnering arrangements or intergovernmental agreements	X		X	X		X			X	X		X	X									X								X	X	X	X	X	X	X	X		X	X	X	X			X			X				

Table 42

Lycoming County

Section		Anthony Twp	Armstrong Twp	Bastress Twp	Brady Twp	Brown Twp	Cascade Twp	Clinton Twp	Cogan House Twp	Cummings Twp	Duboistown Borough	Eldred Twp	Fairfield Twp	Franklin Twp	Gamble Twp	Hepburn Twp	Hughesville Borough	Jackson Twp	Jersey Shore Borough	Jordan Twp	Lewis Twp	Limestone Twp	Loyalsock Twp	Lycoming Twp	McHenry Twp	McIntyre Twp	McNett Twp	Mifflin Twp	Mill Creek Twp	Montgomery Borough	Montoursville Borough	Moreland Twp	Muncy Borough	Muncy Twp	Muncy Creek Twp	Nippenose Twp	Old Lycoming Twp	Penn Twp	Piatt Twp	Picture Rocks Borough	Pine Twp	Plunketts Creek Twp	Porter Twp	Salladasburg Borough	Shrewsbury Twp	So Williamsport Boro	Susquehanna Twp	Upper Fairfield Twp	Washington Twp	Watson Twp	Williamsport, City of	Wolf Twp	Woodward Twp
Community Political Capability																																																					
	5 - Definitely Willing	X	X						X	X													X				X						X				0				X		X			X	X		X	X	X		
	4 - Very Willing									X											X	X		X		X					X				X	X																	X
	3 - Moderately Willing			X	X	X	X	X			X	X	X	X			X		X	X					X				X					X					X			X										X	
	2 - Somewhat Willing																	X														X						X							X								
	1 - Not Very Willing														X																																						
	0 - Unwilling to adopt policies/programs																																																				
Community Resiliency Capability after an Event (Consequence Analysis)																																																					
	Public	3	5	4	5	3	1	3	3	1	3	0	2	1	1		3	3	3		2	4	4		1	0	1		2	3		2	3	3	2	0		1	3	3	0	5	3		3	5	0	3	3	3		3	0
	Responders	3	0	4	5	3	1	5	0	0	2	0	1	4	1		0	4	3		5	5	4		2	0	0		4	0		4	4	3	2	0		0	3	3	3	3	3		0	0	0	0	0	1		0	0
	Continuity of operations of local government, including continued delivery of services	3	3	4	0	3	0	5	0	0	2	0	2	1	1		2	1	3		4	2	5		1	0	0		4	0		0	1	3	3	0		0	3	3	3	2	3		2	3	0	0	1	3		2	0
	Property, facilities, and infrastructure	3	4	5	0	3	1	5	3	0	3	0	0	2	1		0	3	5		3	4	4		1	0	0		6	3		1	3	3	3	1		0	3	3	0	5	3		1	5	0	3	3	3		4	0
	Environment	3	5	5	5	3	3	3	0	0	3	0	0		1		0	2	3		3	2	4		2	0	0		3	0		5	4	3	3	2		0	3	3	0	1	3		3	3	0	0		3		3	0
	Economic condition of the jurisdiction	3	5	5	3	3	4	3	3	0	3	0	1	3	1		0	2	5		4	2	4		1	0	0		4	3		2	1	3	4	0		0	3	3	0	3	5		0	5	0	0	2	0		2	1
	Public confidence in the jurisdiction's governance	3	0	5	3	3	2	5		0	3	0	0	1	1		3	3	3		4	2	4		1	0	1		3	2		0	1	3	4	0		0	3	3	3	1	3		0		0	0	0	0		3	1
Self-Assessment of Capability (High, Medium, or Low)																																																					
	Planning and Regulatory Capability	M	M	H	H	L	H	H	H	H	M	H	M	L	L	L	M	L	L	L	H	L	H		L	H	H	M	H	H	M	L		M	M	H	H	M	L	M	M	M	L		M	L	H	M		L		M	H
	Administrative and Technical Capability	M	H	H	H	L	H	H	H	H	M	M	H	L	L	L	H	L	M	L	M	L	H		L	H	H	L	M	H	L	L		M	L	H	H	M	M	M	M	M	M		M	M	H	M	H	L		M	H
	Fiscal Capability	M	L	H	H	M	M	H	M	H	M	H	H	L	L	L	M	M	M	L	M	L	H		L	H	H	L	L	H	M	L		M	L	H	M	H	M	M	L	L	M		H	L	H	M	H	L		H	H
	Community Political Capability	M	M	H	H	M	M	M	M	H	M	M	M	M	L	L	M	L	M	L	L	M	H		M	H	M	L	M	H	M	M		M	M	H	H	M	M	M	L	H	M		M	M	H	M	H	L		M	H
	Community Resiliency Capability	M	H	H	M	M	M	H	L	H	M	H	M	H	L	L	M	M	M	L	M	M	H		M	H	H	L	M	H	M	H		M	M	H	H	H	M	M	L	M	M		M	M	H	H	M	L		M	H

Key:

	Local ordinance or support	**0**	Identified as applicable by the LCPCD	**SA**	Sewer Authority provider	**●**	Municipality opted out, requires private certification
	County ordinance or support	**WA**	Water authority provider	**SM**	Municipal sewer provider	**+**	Under development based on LCPCD
	Municipality did not return survey	**WM**	Municipal water provider	**F**	Funded by Federal Government	*****	Not in survey
X	Indicates positive response in survey	**S**	Funded by State	**A**	Applicable through state regulation	**√**	Identified as applicable by municipality but not applicable by LCPCD
C	Eligible for County CDBG						

6. Mitigation Strategy

This section of the Lycoming County Hazard Mitigation Plan (HMP) identifies the goals, objectives, actions, and mitigation action plan for mitigating against the impacts of hazards.

Goals are general guidelines that explain what you want to achieve. Goals are usually expressed as broad policy statements representing desired long-term results.

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.

Actions provide more detailed descriptions of specific work tasks to help a community achieve the goals and objectives. For each objective statement, there are alternatives for mitigation actions that must be evaluated to determine the best choices for each situation (see Section 3: Alternative Mitigation Actions).

The Mitigation Action Plan includes a listing and description of the preferred mitigation actions and the strategy for implementation (e.g., who is responsible, how will they proceed, when should action be initiated and/or completed, etc.).

6.1. *Update Process Summary*

The goals and objectives listed in the HMP were first examined during the five-year plan review held as part of the Kick-off Meeting. During this review, the Steering Committee members were afforded the opportunity to comment on the goals, objectives, and actions that were listed in the existing HMP. In addition, throughout the course of the plan update, the HMP was posted on the County's Web site. All correspondence that was distributed to the municipalities referenced the Web site and welcomed comments on the HMP to the County Department of Public Safety or the Planning and Community Development Department (PCD), or to Delta.

In 2005, Lycoming County chose to align its mitigation goals with those listed in the State Hazard Mitigation Plan:

- To encourage actions that support public safety during hazard events, natural hazard identification and awareness, hazard avoidance, damage minimization, environmental historic protection, and the mitigation of future severe and repetitive damage due to natural hazards
- To ensure that local and state agencies identify critical buildings, facilities, and infrastructure that are at risk of damage due to natural hazards, and to undertake feasible and cost-effective hazard mitigation measures to minimize future losses and expenditures
- To make hazard mitigation a public value

- To promote economic development consistent with floodplain management, building codes, and similar guidance
- To develop an effective public awareness program for the natural hazards that Pennsylvania is most likely to experience
- To encourage scientific study of natural hazards and the development of data to support mitigation strategies for those hazards that are a threat to the Commonwealth
- To promote recognition of the value of hazard mitigation to the health, safety, and welfare of the population

On November 17, 2009, the Steering Committee hosted a Mitigation Solutions Workshop, which was attended by several County, municipal, and private industry representatives. The purpose of this workshop was to provide another opportunity to review the current goals, objectives, and actions listed in the HMP, and to determine what the revised HMP's goals, objectives, and actions would be. The goals, objectives, and mitigation techniques to be considered in the document were identified. Meeting minutes are provided in Appendix B. The Steering Committee then used the outcomes from the workshop to identify and prioritize the final mitigation actions that would be included in the HMP.

The Steering Committee determined that each of the actions listed in the 2005 version of the HMP will be continued (i.e., deferred) in the current version of the plan. Based on the revised and additional goals and objectives, however, the exact wording of the mitigation actions may have changed. Maps depicting mitigation projects completed or currently being undertaken can be found in Appendix I. Table 43 shows the disposition of the mitigation actions listed in the 2005 HMP.

Table 43: Disposition of Existing Mitigation Actions

Item	Disposition	Comments
Preventive Activities		
Adopt disaster-resistant, sustainable, community strategy.	Deferred to 1.A.1	Although there is no official strategy adopted, all municipalities do enforce to floodplain management, zoning ordinances, and building codes.
Evaluate gravel deposition flooding and alternatives solutions.	Deferred to 1.D.1	Lack of time to complete.
Incorporate hazard mitigation objectives into Comprehensive Plan and CIPs.	Deferred to 1.A.2	The county comprehensive plan incorporates hazard mitigation in Chapter 3: "Land Use and Resource Management Plan"
Adopt "official map" defining acquisition, retrofit, and relocation areas.	Deferred to 1.A.3	Lack of time to complete.
Improve floodplain management practices.	Deferred to 1.A.6	Floodplain management practices have been continuously worked on throughout the County in all jurisdictions. This has been accomplished through County outreach trainings such as an annual flood summit, as well as through aiding permit officials with plan/permit review and ordinance explanation.
Adopt "no basement zone" in 500-year floodplain and alluvial soils.	Deferred to 1.A.4	Lack of time to complete.
Acquire floodway properties for greenway open space.	Deferred to 2.A.1	106 floodway properties along Lycoming Creek have been acquired and returned to open space. The acquired land is being used as community parks, gardens, and greenway.
Adopt flood damage reduction construction code.	Deferred to 1.A.5	Lack of time to complete.
Maintain property flood damage/loss/history permit tracking system.	Deferred to 1.E.1	County PCD has provided all municipalities the ability to track all permits through GEO Plan. Currently 25 municipalities and the County zoning administrator, who is responsible for the permitting in 17 municipalities, utilize GEO Plan.
Create and maintain stormwater management plans for the County's watersheds.	Deferred to 1.B.1	This is currently in development and is close to being adopted.
Regularly clean and maintain drainage culverts.	Deferred to 6.A.1	Recurring action.

Item	Disposition	Comments
Property Protection		
Implement planned acquisitions, retrofits, relocations via Flood Mitigation Assistance (FMA) program/Hazard Mitigation Grant Program (HMGP).	Deleted	This action reflects implementing other actions. As funding becomes available through grant applications and disaster declarations, we will continue to offer these mitigation opportunities.
Acquire floodway land for Lower Lycoming project.	Deferred to 2.A.2	Due to lack of federal interest in the project, the County and the US Army Corps of Engineers (US ACE) will no longer be partners on this project. The County will continue this initiative with PA Department of Environmental Protection (DEP) while using the US ACE developed feasibility report as the basis of knowledge. Once the project scope is determined, the County will begin acquiring land needed for this project.
Protect or remove repetitive loss and floodway properties.	Deferred to 2.B.3	Project is dependent on available funding.
Assist in relocation of historically significant structures.	Deferred to 2.C.1	Project is dependent on available funding.
Seek funding to retrofit flood-prone homes/businesses.	Deferred to 2.B.1	Project is dependent on available funding.
Promote the National Flood Insurance Program (NFIP) and Community Rating System (CRS) participation.	Deferred to 1.C.1	Ongoing action.
Emergency Services		
Improve flood warning to residents and business owners.	Deferred to 3.B.1	The County Flood Warning System (FWS) is accessible by both emergency management professionals and the general public via the Internet: http://www.lyco.org/dotnetnuke/Home/FloodReady/tabid/410/Default.aspx.
Improve emergency response procedures and capabilities.	Deferred to 3.A.2	There are mutual aid agreements and 24/7 police coverage between Lycoming Township, Old Lycoming Township, Hepburn Township, and the City of Williamsport. This project focuses on improving the capabilities built so far.

Item	Disposition	Comments
Coordinate evacuation plans with major employers.	Deferred to 3.A.1	Department of Public Safety (DPS) maintains relationships with major employers that are located in hazard areas.
Provide emergency alert radios to critical facility operators.	Deferred to 3.B.2	DPS provided critical facilities with weather alert radios, but this project remains to reflect the development of other communications and warning media, such as RSS feeds.
Protect critical facilities, etc., during an event.	Deleted	This is an emergency response action to be taken during an emergency, and is therefore outside the scope of this document.
Conduct detailed vulnerability assessment of critical facilities, etc.	Deferred to 3.A.3	Each municipality has and maintains an Emergency Operations Plan that includes a vulnerability analysis. These plans must be updated/reviewed every two years.
Make vulnerable critical facilities, etc., disaster-resistant.	Deferred to 2.B.4	As opportunities and funding become available in the future, the County will work with these critical facilities to help them become disaster resistant.
Build disaster-resistant public infrastructure.	Deferred to 2.D.1	As opportunities and funding become available in the future, the County will work to make infrastructure disaster resistant.
Seek funds to protect public sewer, water, and critical facilities.	Deferred to 2.B.2	Ongoing action.
Structural Projects		
Secure funding partners to implement Lycoming Creek Project.	Deferred to 6.B.1	Funding for the LLC-FDR has been authorized in the Commonwealth's budget, and Lycoming County will continue to budget funding in the County's Hazard Mitigation Subsidy for associated costs.
Implement five-component Heshbon-Hepburnville plan.	Deferred to 6.B.2	This project is being implemented.
Design the concept for the Lower Lycoming Creek project.	Deferred to 6.B.3	The County will be working with PA DEP to re-scope and re-evaluate this project
Evaluate structural solutions for other at-risk "hot spots."	Deferred to 6.B.4	Lack of time to complete this project.
Evaluate and upgrade transportation infrastructure to reduce damages.	Deferred to 6.A.2	Lack of time to complete this project.

Item	Disposition	Comments
Organize joint entity to manage flood protection.	Deferred to 1.C.2	Lack of time to complete this project.
Natural Resources Protection		
Promote natural functioning of floodplains, wetlands, etc.	Deferred to 4.A.1	Lycoming County Conservation District provides Environmental Educations Programs to youth and citizens groups on the function and benefits of floodplains, wetlands, and buffers. In addition, the Lycoming/Tioga Annual Flood Summit demonstrates the importance of floodplains and wetlands to municipal officials.
Implement multi-objective watershed management approach.	Deferred to 4.B.2	Lack of time to complete this project.
Implement best management practices (BMPs) to protect natural functioning of floodplains.	Deferred to 4.A.2	Lycoming County is implementing a Chesapeake Bay Tributary Strategy that includes a nutrient trading program that will fund implementation of BMPs that promote natural floodplain functioning, including riparian buffers, floodplain restoration, and other BMPs as approved by PA DEP for nutrient reductions.
Assist in organization of the Lycoming Creek Watershed Association.	Completed	Lycoming County Conservation District provides the Lycoming Creek Watershed Association with technical assistance and project implementation. County PCD applied for and received Growing Greener funding for the US Fish and Wildlife stream restoration project that took place near Trout Run Park.
Co-sponsor and support watershed clean-up events.	Deferred to 4.B.3	Lycoming County Conservation District assists with the greater Nippenose Valley Watershed Association's Annual Sink Hole Clean-ups.
Seek funds for riparian buffers, erosion and sedimentation (E&S) control, and stabilizing banks.	Deferred to 4.A.3	The County received a National Fish and Wildlife Foundation (NFWF) grant that includes funding for floodplain restoration and for 20 acres of riparian buffers.

Item	Disposition	Comments
Assist in converting Lower Lycoming Creek Floodway (LLC FW) land to greenway park.	Deferred to 4.A.4	Lycoming County PCD has aided Lewis Township in creating a master plan for its park, which is located on land purchased with HMGP funds.
Public Information		
Promote building safe, sustainable, community initiatives.	Deferred to 5.C.2	Ongoing action.
Educate public about "what to do" if floods occur.	Deferred to 5.A.3	County DPS holds community preparedness seminars, and sends newsletters to local Emergency Management Coordinators, as well as posts the letters on its Web site for the public to view.
Provide hazard maps and promote Internet hazard mapping.	Deferred to 5.C.4	This project is under development.
Educate public about NFIP, CRS, and Flood Insurance Rate Maps (FIRM).	Deferred to 5.A.1	Ongoing action.
Publish newsletter/brochure to improve emergency preparedness.	Deferred to 5.C.1	County DPS holds community preparedness seminars, and sends newsletters to local Emergency Management Coordinators, as well as posts the letters on its Web site for the public to view.
Provide "how to retrofit" self-help literature to residents.	Deferred to 5.A.2	Lack of time to complete this project.
Encourage alert radio use by homeowners.	Deferred to 5.A.4	The project remains and has been updated to reflect modern notification and alert methods.
Place flood of record monuments around damage centers.	Deferred to 5.B.1	Lack of time to complete this project.
Sponsor environmental education and watershed management workshops.	Deferred to 5.C.3	Elected officials are educated about zoning and building codes through the annual flood summits.

6.1.1. Completed Mitigation Activities

6.1.1.1. *Property Acquisitions*

Since the County began its mitigation efforts, 106 properties in flood hazard areas have been acquired and returned to open space, and are being used as community parks, gardens, and greenways. Of these, 18 have been acquired since 2004. The following table identifies seven property acquisitions that were identified in the 2005 HMP and have been carried out by the County. Additional property acquisitions were carried out after Hurricane Ivan in 2004; several of those properties had not been identified in the 2005 HMP for acquisition.

Table 44: Properties Identified in the 2005 HMP That Have Been Acquired

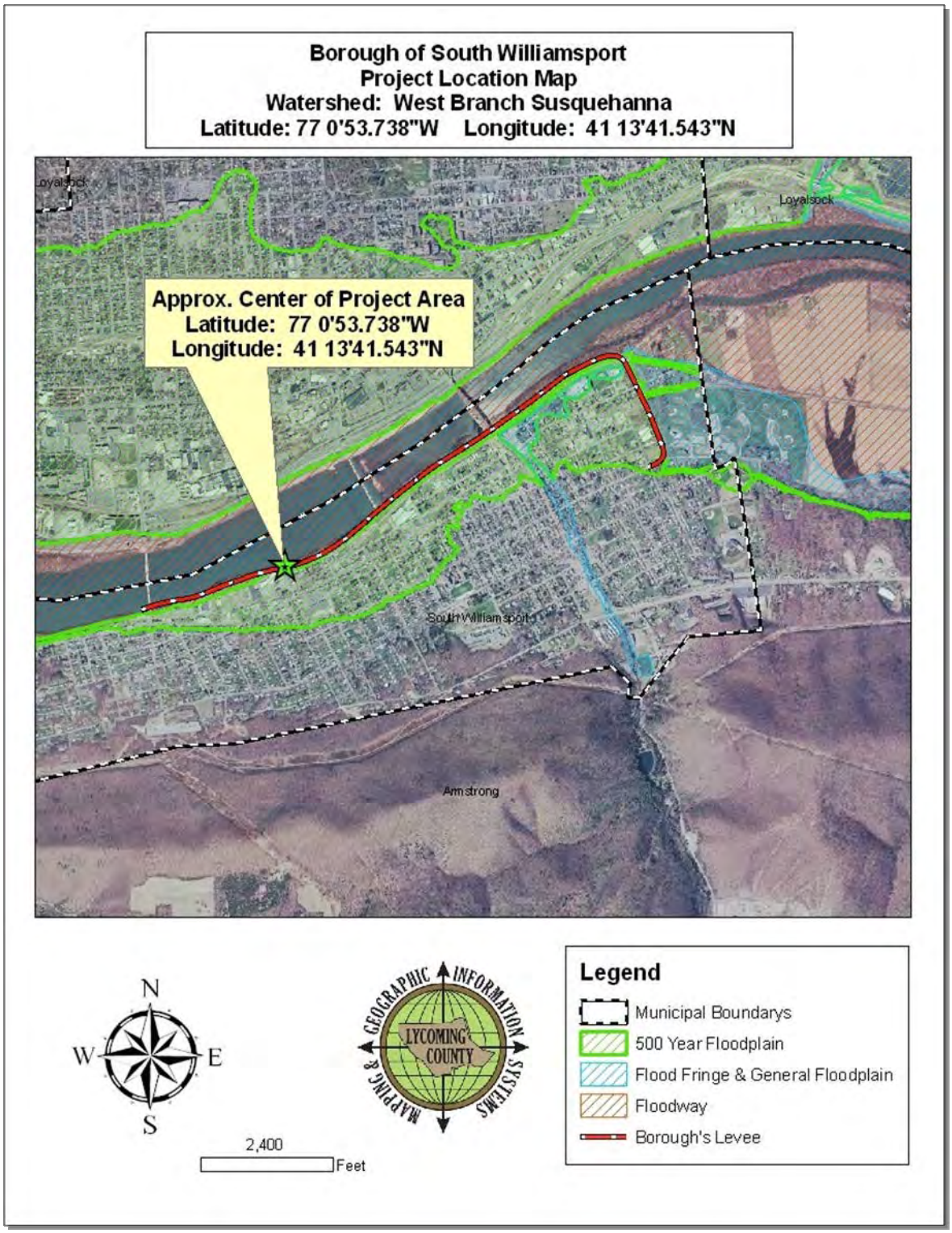
Project	Page	Purchase Price	Date Purchased	Owned By
PP1	117-2	$28,949.00	4/16/2007	Old Lycoming Twp.
PP2	118-1	$256,100.00	10/12/2006	Lewis Twp.
PP3	120-1	$49,097.00	4/20/2007	Old Lycoming Twp.
PP17	136-1	$56,500.00	4/27/2007	Montgomery Boro
PP18	137-1	$74,000.00	11/13/2007	Loyalsock Twp.
PP18	137-2	$87,000.00	11/13/2007	Loyalsock Twp.
PP18	137-2	$65,000.00	10/24/2007	Loyalsock Twp.

The County is applying for HMGP funding to acquire two additional properties, both located in the Lycoming Creek floodway and classified by FEMA as Repetitive Loss Properties.

6.1.1.2. *Replacement of the Eck's Run Sluice Gate*

The Borough of South Williamsport's levee system runs from Maynard Street in the west to almost the northernmost boundary of the borough, and is 12,180 feet in length. The levee protects approximately 774 properties. The U.S. Army Corps of Engineers' 2009 annual inspection report on the system noted that the Eck's Run Sluice Gate, which aids in the control and facilitated evacuation of stormwater runoff through the Eck's Run Pump Station, required immediate attention. In 2009, the County secured PA DEP funding to replace the gate.

Map 22


Borough of South Williamsport
Project Location Map
Watershed: West Branch Susquehanna
Latitude: 77 0'53.738"W Longitude: 41 13'41.543"N
Approx. Center of Project Area
Latitude: 77 0'53.738"W
Longitude: 41 13'41.543"N
Loyalsock
Loyalsock
South Williamsport
Armstrong
N
W
E
S
2,400
Feet
GEOGRAPHIC INFORMATION SYSTEMS
MAPPING &
LYCOMING COUNTY
Legend
Municipal Boundarys
500 Year Floodplain
Flood Fringe & General Floodplain
Floodway
Borough's Levee

6.1.1.3. *Provision of Technical Assistance to Local Communities*

The Lycoming County Planning and Community Development Department has three Certified Floodplain Managers on staff, including the Hazard Reduction Planner. These staff members are available to provide advice and mapping support to municipal zoning officers and officials with regard to proposed development within the special flood hazard area. The department also offers guidance to property owners regarding flood insurance and floodplain mapping.

6.1.1.4. *Trout Run Village Floodplain Map Revision*

The County Planning Department contracted with USGS to review and revise the existing floodplain mapping for the Village of Trout Run, in an effort to produce a flood insurance rate map (FIRM) that more accurately represents the Village's special flood hazard area. In 2009, USGS submitted the product of their study to the County Planning Department and Lewis Township for review and comment. Both parties are pleased with the outcome of this project.

Depicted in red, the floodway in the current FIRM (see Figure 6, left) affects 39 properties. Property owners within the floodway are severely restricted in their ability to develop or renovate their homes or develop their land. The proposed USGS revision (see Figure 3, right) significantly reduces the number of properties within the floodway from 39 to four. Once approved by FEMA, the new map will increase the ability of the Village to develop, as well as significantly reduce the financial burden for a number of property owners who have been required to purchase flood insurance.

Figure 3: Revision of Trout Run Village Floodplain Map

6.1.1.5. *Flood Summits*

Since 2006, members of Lycoming County's planning staff and the Conservation District have teamed with Endless Mountains Resource Conservation & Development to organize and educate municipal officials in Bradford, Sullivan, Lycoming, Tioga, Susquehanna, and Wyoming Counties on a semi-annual basis. The 2007 summit touched on topics such as the history of development and stream dynamics, a discussion on watershed preservation, and floodplain management. In 2009, it concentrated on the topics of floodplain mapping, permitting, hazard mitigation, stormwater management, floodplain permitting, and included a field exercise. Future summits will focus on grants, emergency operations (e.g., damage reporting), and floodplain management as it pertains to the burdgeoning natural gas industry in the region.

6.1.1.6. *Flood Warning System*

Completion of the Flood Warning System

One of the most significant projects that the County of Lycoming has completed since the adoption of the 2005 HMP is the completion of the Flood Warning System (FWS). The need for the advanced warning that this system provides was most salient during the January 1996 flood. During this flood event, citizens throughout the County endured millions of dollars of property damage, hundreds of flood-related injuries, and tragically, six deaths.

At a cost of $700,000, the FWS consists of 20 gauges (a combination of ultrasonic and pressure transducer units) on the County's five biggest tributary creeks (Pine Creek, Larry's Creek, Lycoming Creek, Loyalsock Creek, and Muncy Creek). It enables emergency responders to be alerted instantaneously to changes in stream height and initiates pre-flood operations such as warning businesses and residents about the imminent threat of flooding. The information provided by the FWS is also provided to the public via the Flood Ready link on the County's homepage (www.lyco.org).

Ultrasonic Gauge Retrofits

Nine new encapsulated ultrasonic sensors were purchased in November 2008 and replaced existing sensors in the spring of 2009. The new encapsulated units reduce maintenance costs and diminish down time caused by environmental issues such as insect infestation and extreme cold.

6.1.2. Mitigation Activities in Progress

6.1.2.1. *Property Acquisitions*

The County is applying for HMGP funding to acquire two additional properties, both located in the Lycoming Creek floodway and classified by FEMA as Repetitive Loss Properties. They have claimed over $116,000 of flood losses since 1994, and the County is hopeful that these properties will be acquired and returned to open space in 2011.

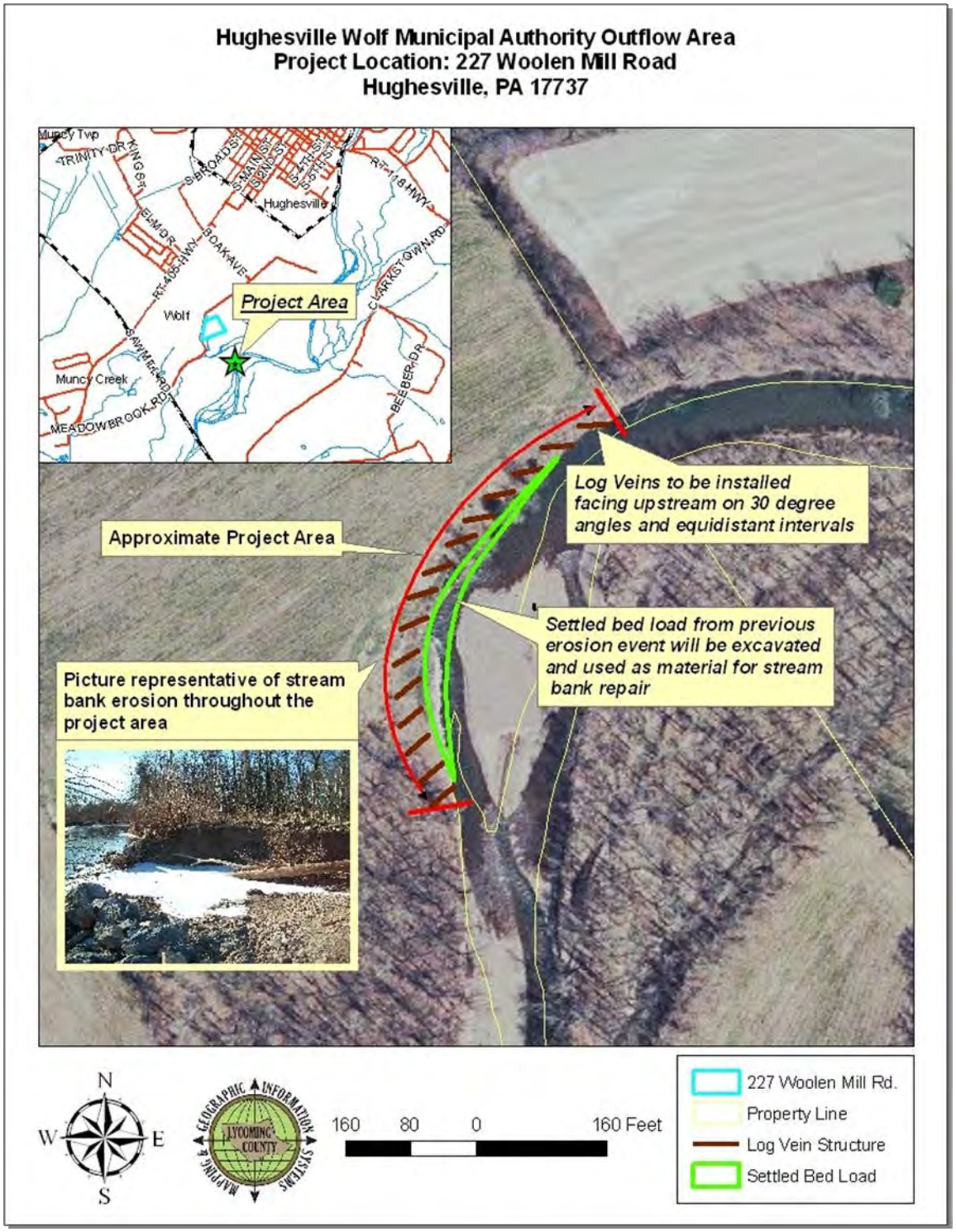
6.1.2.2. *Hughesville-Wolf Joint Municipal Authority (HWA) Stream Bank Stabilization*

In 2010 the Hazard Reduction Planner aided the Hughesville-Wolf Joint Municipal Authority (HWA) in writing a competitive Growing Greener Plus grant application to protect a critical piece of a wastewater treament plant's infrastructure. The grant focuses on stabilizing a segment of stream bank just upstream of HWA's effulent outfall pipe that has historically experienced severe stream bank erosion during high-water events. HWA, on two occasions, used its own financial resources to try to repair the eroded stream bank. Following the January 25, 2010, flood event, the HWA experienced its worst degree of stream bank erosion. It is obvious that HWA's initial two re-construction attempts, which utilized large riprap material to stabilize the stream bank, required an alternate approach to be undertaken to protect the long-term viability of HWA's outfall pipe.

After meeting with officials from Lycoming County and the Sullivan County Conservation District to discuss what structural improvements could be undertaken to help minimize future, massive erosion events, the HWA decided to install 15 multi-log vein structures immediately upstream from its existing outfall pipe, encompassing an upstream reach of approximately 800-900 feet. This conclusion was reached based on input from both County entities and the proven success of other local stabilization projects.

Currently, this grant application is being reviewed by PA DEP. If the grant application is selected to be funded, the County anticipates commencing this project in late summer of 2011.

Map 23


Hughesville Wolf Municipal Authority Outflow Area
Project Location: 227 Woolen Mill Road
Hughesville, PA 17737
Muncy Twp
TRINITY DR
KING ST
S BROAD ST
S MAIN ST
RT-118 HWY
Hughesville
ELM DR
RT-405 HWY
OAK AVE
CLARKSTOWN RD
Project Area
Wolf
SAWMILL RD
Muncy Creek
MEADOWBROOK RD
BEEBER DR
Log Veins to be installed facing upstream on 30 degree angles and equidistant intervals
Approximate Project Area
Settled bed load from previous erosion event will be excavated and used as material for stream bank repair
Picture representative of stream bank erosion throughout the project area
N
W
E
S
GEOGRAPHIC INFORMATION SYSTEMS
LYCOMING COUNTY
160 80 0 160 Feet
227 Woolen Mill Rd.
Property Line
Log Vein Structure
Settled Bed Load

6.1.2.3. *Internet-Based Flood Map Viewing*

The County of Lycoming is in the process of developing a Web portal that will display most of the County's GIS data layers to the public over the Internet. The available data layers will include aerial photography, streets, zoning, topography, limited tax parcel information, and the County's current DFIRMS. The Web portal will be located on the County's homepage and will be provided free of charge to the general public.

Specifically pertaining to hazard mitigation, this portal will enable realtors, lending institutions, current property owners, perspective buyers, and permitting officials to easily educate themselves on the flood status of a certain property. This portal will also be utilized in the County's upcoming RISK map initiative as a public outreach tool. It will provide municipal officials, and citizens, a means of reviewing the current DFIRMS against the proposed revisions to ensure that the final adopted product is as accurate as possible.

Lycoming County also partners with 30 of its 52 municipalities in providing a GIS-based permitting and municipal management system. This system, GeoPlan, makes all of the current GIS data that the County possesses, including effective DFIRMS, available to municipal officials. GeoPlan enables local permitting officials to utilize the best available mapping information during the permit evaluation process and also provides them an accurate way to track their issued permits. In addition, the County provides, free of charge, a GIS DVD of the County to emergency management and fire company personnel for use during emergency situations.

6.1.2.4. *Jersey Shore Borough Inundation Mapping*

Through a partnership with USGS and SRBC, the County will enable the National Weather Service to display a real-time inundation map of Jersey Shore Borough on their Advanced Hydrologic Prediction Service (AHPS) Web site. The inundation map will show current and predicted levels of flooding by utilizing weather prediction software and current river-level readings from the Route 44 bridge gauge over the Susquehanna River. This capability will be made publicly available on the AHPS Web site (http://water.weather.gov/ahps) in 2011.

6.2. *Mitigation Goals and Objectives*

6.2.1. Goals

The County identified the following goals for hazard mitigation over the next five years:

1. Prevent hazards from impacting the community.
2. Protect the people, property, and environment in hazard areas.
3. Maintain and enhance emergency services capabilities in the community.
4. Protect natural resources within the hazard areas.
5. Ensure that stakeholder groups have the necessary information to mitigate against hazard impacts.
6. Implement structural projects to reduce the impacts of hazards.

6.2.2. Objectives

The goals in Section 6.2.1 were used to develop the objectives. These objectives addressed in more specific terms the results of the vulnerability assessment and reflected the nature of what can be mitigated for the identified hazards, as well as existing limitations in data and information. These draft objectives were presented to the Steering Committee for review and comment, and are listed below.

Goal 1: Prevent hazards from impacting the community.	
Objective 1.A:	*Work with the municipalities to create and/or update land use regulations (e.g., zoning, subdivision, and land development).*
Objective 1.B:	*Complete and/or update stormwater management plans for all the watersheds in the County.*
Objective 1.C:	*Promote municipal participation in the NFIP and CRS.*
Objective 1.D:	*Evaluate hazard impacts and potential preventive measures.*
Objective 1.E:	*Maintain permit tracking.*
Goal 2: Protect the people, property, and environment in hazard areas.	
Objective 2.A:	*Acquire properties within hazard areas.*
Objective 2.B:	*Retrofit structures to withstand hazard impacts.*
Objective 2.C:	*Relocate structures to outside of hazard areas.*
Objective 2.D:	*Ensure future public facilities can withstand hazard impacts.*
Goal 3: Maintain and enhance emergency services capabilities in the community.	
Objective 3.A:	*Conduct and enhance emergency planning activities.*
Objective 3.B:	*Improve alert and warning systems.*

Goal 4: Protect natural resources within the hazard areas.

Objective 4.A: *Protect natural functions of waterways.*

Objective 4.B: *Protect watersheds in the County.*

Goal 5: Ensure that stakeholder groups have the necessary information to mitigate against hazard impacts.

Objective 5.A: *Promote personal mitigation measures to the general public.*

Objective 5.B: *Promote public awareness of previous hazard impacts.*

Objective 5.C: *Conduct community outreach regarding hazard mitigation.*

Goal 6: Implement structural projects to reduce the impacts of hazards.

Objective 6.A: *Maintain infrastructure.*

Objective 6.B: *Design and implement flood control projects.*

6.3. *Identification and Analysis of Mitigation Techniques*

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

- Prevention
- Property protection
- Emergency services measures
- Structural projects
- Natural resource protection
- Public education/awareness programs

Prevention measures keep problems from getting started or getting worse. The use of known hazard areas, like floodplains for example, can be limited through planning, land acquisition, or regulation. These activities are usually administered by building, zoning, planning, and/or code enforcement officials, and include the following:

- Planning and zoning
- Open space preservation
- Building codes and enforcement
- Stormwater management
- Drainage system maintenance

Property Protection measures are those actions that go directly to permanently getting people, property, and businesses out of unsafe areas where, in terms of wise disaster planning, they should not have been in the first place.

The first of these measures is property acquisition: public procurement and management of lands that are vulnerable to damage from hazards. For example, flood-damaged homes have been purchased by municipalities (using state, federal, and local funds) and removed from flood-prone areas (by demolition or relocation). The acquired land then becomes public property that can only be used as “open space” in the future. Open space use means that future development of the site is restricted to low-impact uses like parks, playing fields, gravel parking lots, or agriculture – no permanent or enclosed structures.

Relocation of at-risk structures also achieves the same result as acquisition. The home or business is moved to a safer location, but it remains the property of the individual owner while the original site is purchased and maintained by the local municipality.

Elevation of structures can be an effective, in-place mitigation for some flood-threatened homes. By raising the height of the structure’s living area above flood levels, damage and threat to life can be reduced. Retrofitting of homes is another in-place damage reduction method. Utilities, services, systems, and appliances in some homes can be raised above flood levels.

Construction techniques to improve structural resistance to high wind or heavy snow accumulation can be incorporated into new homes or retrofitted into existing structures.

Private home and business insurance policies and participation in the NFIP can also reduce uninsured losses to properties.

Emergency Services Measures are taken during a disaster to minimize its impact. The following measures are the responsibility of municipal or County emergency management staff, operators of major and critical facilities, and other local emergency service organizations:

- Alert warning systems
- Monitoring systems
- Emergency response planning
- Evacuation
- Critical facilities protection
- Preservation of health and safety

Structural Projects are usually designed by engineers and managed and maintained by public works staffs. They are designed to reduce or redirect the impact of natural disasters (especially floods) away from at-risk population areas. The following are examples:

- Reservoirs
- Levees and floodwalls
- Diversions
- Channel modifications (i.e., dredging)
- Storm sewers

Natural Resource Protection preserves or restores natural areas or their natural functions. Such measures are usually implemented by park and recreation organizations, conservation agencies, or wildlife groups. They include the following:

- Wetland protection
- Best management practices
- Erosion and sediment control
- Riverine protection

Public Education/Awareness Programs advise property owners, potential property owners, and others of hazards and ways to protect people and property from them. They are usually implemented by a public information office and can include the following:

- Flood maps and data
- Library resources
- Outreach projects
- Technical assistance
- Real estate disclosure information
- Environmental education programs

The participants of the Mitigation Solutions Workshop and the Steering Committee identified actions that relate to the techniques indicated in Table 45 for each high- and moderate-risk hazard.

Table 45: Mitigation Technique Matrix

Mitigation Technique Matrix										
Mitigation Technique	**High- and Moderate-Risk Hazards**									
	Flood, Flash Flood, and Ice Jams	Winter Storms	Tornadoes and Wind Storms	Thunderstorms and Hail	Droughts and Water Supply Deficiencies	Traffic Accidents	Power Outages	Terrorism	Fixed Nuclear Facility Incidents	Natural Gas Drilling Incidents
Prevention	X	X	X	X		X	X			
Property Protection	X	X	X	X		X	X	X		
Emergency Services	X	X	X	X	X	X	X	X	X	X
Natural Resource Protection	X									
Public Education / Awareness	X	X	X	X	X	X	X	X	X	X
Structural Projects	X					X				

6.4. *Mitigation Action Plan*

6.4.1. Identification of Mitigation Actions

The following table presents the set of Mitigation Actions for each goal and objective identified by the Steering Committee or municipalities. Those highlighted in blue (the majority of all mitigation actions identified) reflect actions that are directly related to exceeding the requirements or continued compliance with the NFIP.

Table 46: Mitigation Actions for Each Goal and Objective

ID	Goal	Objective	Action
1	Prevent hazards from impacting the community.		
	1.A	*Work with the municipalities to create and/or update land use regulations (e.g., zoning, subdivision, and land development).*	
		1.A.1	Adopt disaster-resistant, sustainable community strategy.
		1.A.2	Incorporate hazard mitigation objectives into Comprehensive Plan and CIPs.
		1.A.3	Adopt "official map" defining acquisition, retrofit, and relocation areas.
		1.A.4	Adopt "no basement zone" in 0.2% chance floodplain and alluvial soils.
		1.A.5	Adopt flood damage reduction construction code.
		1.A.6	Improve floodplain management practices.
	1.B	*Complete and/or update stormwater management plans for all the watersheds in the County.*	
		1.B.1	Create and maintain stormwater management plans for the County's watersheds.
	1.C	*Promote municipal participation in the NFIP and CRS.*	
		1.C.1	Promote NFIP and CRS participation.
		1.C.2	Organize joint entity to manage flood protection.
	1.D	*Evaluate hazard impacts and potential preventive measures.*	
		1.D.1	Evaluate gravel deposition flooding and alternatives solutions.
	1.E	*Maintain permit tracking.*	
		1.E.1	Maintain property flood damage/loss/history permit tracking system.
2	Protect the people, property, and environment in hazard areas.		
	2.A	*Acquire properties within hazard areas.*	
		2.A.1	Acquire floodway properties for greenway open space.
		2.A.2	Acquire floodway land for Lower Lycoming project.
	2.B	*Retrofit structures to withstand hazard impacts.*	
		2.B.1	Seek funding to retrofit flood-prone homes/businesses.
		2.B.2	Seek funds to protect public sewer, water, and critical facilities.
		2.B.3	Protect or remove repetitive loss and floodway properties.
		2.B.4	Make vulnerable critical facilities, etc., disaster resistant.
	2.C	*Relocate structures to outside of hazard areas.*	
		2.C.1	Assist in relocation of historically significant structures.
	2.D	*Ensure future public facilities can withstand hazard impacts.*	

ID	Goal	Objective	Action
		2.D.1	Build disaster-resistant public infrastructure.
3	Maintain and enhance emergency services capabilities in the community.		
	3.A	*Conduct and enhance emergency planning activities.*	
		3.A.1	Coordinate evacuation plans with major employers.
		3.A.2	Improve emergency response procedures and capabilities.
		3.A.3	Conduct detailed vulnerability assessment of critical facilities, etc.
	3.B	*Improve alert and warning systems.*	
		3.B.1	Improve flood warning to residents and business owners.
		3.B.2	Encourage use of alert radios, RSS feeds, inundation mapping, the County FWS, and other Internet technologies by owners/operators of critical facilities.
4	Protect natural resources within the hazard areas.		
	4.A	*Protect natural functions of waterways.*	
		4.A.1	Promote natural functioning of floodplains, wetlands, etc.
		4.A.2	Implement BMPs to protect natural functioning of floodplains.
		4.A.3	Seek funds for riparian buffers, E&S control, and stabilizing banks.
		4.A.4	Assist in converting LLC FW land to greenway park.
	4.B	*Protect watersheds in the County.*	
		4.B.1	Implement multi-objective watershed management approach.
		4.B.2	Co-sponsor and support watershed clean-up events.
5	Ensure that stakeholder groups have the necessary information to mitigate against hazard impacts.		
	5.A	*Promote personal mitigation measures to the general public.*	
		5.A.1	Educate public about NFIP, CRS, and FIRM (flood maps).
		5.A.2	Provide "how to retrofit" self-help literature to residents.
		5.A.3	Educate public about "what to do" if floods occur.
		5.A.4	Encourage use of alert radios, Lycoming County FWS Web site, and other Internet technologies by homeowners.
	5.B	*Promote public awareness of previous hazard impacts.*	
		5.B.1	Place flood of record monuments around damage centers.
	5.C	*Conduct community outreach regarding hazard mitigation.*	
		5.C.1	Publish newsletter/brochure to improve emergency preparedness.
		5.C.2	Promote building safe, sustainable, community initiatives.
		5.C.3	Sponsor environmental education and watershed management workshops.
		5.C.4	Provide hazard maps and promote Internet hazard mapping.
6	Implement structural projects to reduce the impacts of hazards.		
	6.A	*Maintain infrastructure.*	
		6.A.1	Regularly clean and maintain drainage culverts.
		6.A.2	Evaluate and upgrade transportation infrastructure to reduce damages.
	6.B	*Design and implement flood control projects.*	
		6.B.1	Secure funding partners to implement Lycoming Creek Project.
		6.B.2	Implement five-component Heshbon-Hepburnville plan.

ID	Goal	Objective	Action
		6.B.3	Design the concept for the Lower Lycoming Creek project.
		6.B.4	Evaluate structural solutions for other at-risk "hot spots."
		6.B.5	Construct an earthen levee in order to protect Montoursville Borough from both flooding on the Susquehanna River and backwater flooding from Loyalsock Creek.
		6.B.6	Eliminate the possibility of failure of public infrastructure and localized flooding due to undersized culvert section of Lawshee Run.

6.4.2. Evaluation of Mitigation Actions

The preceding list includes 46 action items, many of which will require substantial commitments of time by County and municipal staff. It is unrealistic to assume that the individuals working for these entities will have the time and resources to pursue all of these activities within the planning horizon for this Plan (i.e., over the next five years, which is the planning horizon for this Plan relative to the requirements of DMA 2000). To focus the energies of these individuals and related organizations, it was necessary to determine priorities for actions.

The first step in prioritizing these actions was to evaluate them based on their technical feasibility, social effects on the community, and the support of residents and local officials. The PA-STEEL evaluation method (see table below) categorizes the evaluation criteria into political, administrative, social, technical, economic, environmental, and legal areas.

Table 47: PA-STEEL Criteria

Criteria	Considerations
Political	Who are the stakeholders in this proposed action? Have all of the stakeholders been offered an opportunity to participate in the planning process? How can the mitigation goals be accomplished at the lowest cost to the stakeholders? Is there public support both to implement and maintain this measure? Is the political leadership willing to propose and support the favored measure?
Administrative	Does the community have the capability to accomplish the action (i.e., can it implement the mitigation action)? Can the community provide any necessary maintenance? Is there enough staff, technical experts, and funding? Can it be accomplished in a timely manner?

Criteria	Considerations
Social	Will it cause any one segment of the population to be treated unfairly? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of low- and moderate-income people? Is the action compatible with present and future community values? Will the measures adversely affect cultural values or resources?
Technical	How effective is the measure in avoiding or reducing future losses? Will it create more problems than it solves? Does it solve a problem or only a symptom? In light of other community goals, is it the most useful?
Economic	What are the costs and benefits of this measure? How will the implementation of this measure affect the pocketbook of the community?
Environmental	Is the action consistent with the community's environmental goals?

Criteria	Considerations
Legal	Does the community have the authority to implement the proposed measure? Is there a clear legal basis for the mitigation action? Is an ordinance or resolution necessary? What are the legal side effects? Will the community be liable for the actions, or support of actions, or lack of action? Is it likely to be challenged?

Using PA-STEEL criteria, the mitigation alternatives were scored as shown in Table 48.

Table 48: PA-STEEL Evaluation of Mitigation Actions

Alternative Actions	PA STEEL Criteria Considerations (+ Favorable - Less favorable N Not Applicable)																							Summary (Equal Weighting)	Summary (Benefits & Costs Prioritized)
	P Political			A Admini-strative			S Social		T Technical			E Economic				E Environmental					L Legal					
	Political Support	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	Cost of Action	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		
Preventative Activities Actions																									
1.A.1: Adopt disaster resistant sustainable community strategy	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	+	+	+	22 (+) 0 (-) 1 (N)	26 (+) 0 (-) 1 (N)
1.A.2: Incorporate hazard mitigation objectives into Comp Plan & CIPs	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
1.A.3: Adopt "official map: defining acquisition, retrofit, and relocation areas	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	N	+	+	+	+	+	21 (+) 0 (-) 2 (N)	25 (+) 0 (-) 2 (N)
1.A.4: Adopt "no basement zone" in 0.2%-chance FP & alluvial soils	+	+	-	+	+	+	-	+	+	+	+	+	+	+	N	+	N	N	+	+	+	+	-	17 (+) 3 (-) 3 (N)	21 (+) 3 (-) 3 (N)
1.A.5: Adopt flood damage reduction construction code	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	N	N	+	+	+	+	+	20 (+) 0 (-) 3 (N)	24 (+) 0 (-) 3 (N)

Alternative Actions	*PA STEEL Criteria Considerations* + Favorable - Less favorable N Not Applicable																								
	P Political			*A* Admini-strative			*S* Social		*T* Technical			*E* Economic				*E* Environmental					*L* Legal			Summary (Equal Weighting)	Summary (Benefits & Costs Prioritized)
	Political Support	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	Cost of Action	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.A.6: Improve FP management practices	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
1.B.1: Create and maintain stormwater management plans for the County's watersheds.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
1.C.1: Promote NFIP & CRS participation	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	19 (+) 0 (-) 4 (N)	23 (+) 0 (-) 4 (N)
1.C.2: Organize joint-entity to manage flood protection	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	19 (+) 0 (-) 4 (N)	23 (+) 0 (-) 4 (N)
1.D.1: Evaluate gravel deposition flooding and alternatives solutions	+	+	+	+	-	-	+	-	+	-	-	+	-	-	N	-	-	N	-	-	-	+	+	9 (+) 12 (-) 2 (N)	11 (+) 14 (-) 2 (N)
1.E.1: Maintain Property flood damage/ loss /history permit track	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	N	N	N	N	+	15 (+) 0 (-) 8 (N)	19 (+) 0 (-) 8 (N)

Alternative Actions	PA STEEL Criteria Considerations + Favorable - Less favorable N Not Applicable																								
	P Political			A Admini-strative			S Social		T Technical			E Economic				E Environmental					L Legal				
	Political Support	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	Cost of Action	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)
Property Protection Actions																									
2.A.1: Acquire FW properties for greenway open space	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
2.A.2: Acquire FW land for Lower Lycoming project	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
2.B.1: Seek funding to retrofit flood prone homes/businesses	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
2.B.2: Seek funds to protect public sewer, water, critical facilities	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
2.B.3: Protect or remove repetitive loss and FW properties	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
2.B.4: Make vulnerable crit. facilities, etc., disaster resistant	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)

Alternative Actions	*PA STEEL Criteria Considerations* (+ Favorable - Less favorable N Not Applicable)																						Summary (Equal Weighting)	Summary (Benefits & Costs Prioritized)
	P Political			*A* Admini-strative			*S* Social		*T* Technical			*E* Economic				*E* Environmental					*L* Legal				
	Political Support	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	Cost of Action	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.C.1: Assist in relocation of historically significant structures	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
2.D.1: Build disaster resistant public infrastructure	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
Emergency Services Actions																									
3.A.1: Coordinate evacuation plans with major employers	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	+	N	N	+	+	+	18 (+) 0 (-) 5 (N)	22 (+) 0 (-) 5 (N)
3.A.2: Improve emergency response procedures	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	N	N	+	N	+	+	+	+	19 (+) 1 (-) 3 (N)	23 (+) 1 (-) 3 (N)
3.A.3: Conduct detailed vulnerability assessment of crit. facilities, etc.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	N	N	+	N	+	+	+	+	19 (+) 1 (-) 3 (N)	23 (+) 1 (-) 3 (N)

Alternative Actions	*PA STEEL Criteria Considerations* + Favorable - Less favorable N Not Applicable																								
	P Political			*A* Admini-strative			*S* Social		*T* Technical			*E* Economic				*E* Environmental					*L* Legal			Summary (Equal Weighting)	Summary (Benefits & Costs Prioritized)
	Political Support	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	Cost of Action	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.B.1: Improve flood warning to residents & business owners	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	+	N	+	+	+	+	19 (+) 0 (-) 4 (N)	23 (+) 0 (-) 4 (N)
3.B.2: Encourage use of alert radios, RSS feeds, inundation mapping, the County FWS, and other Internet technologies by owners/operators of critical facilities.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
Natural Resources Protection Actions																									
4.A.1: Promote natural functioning of FP, wetlands, etc.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
4.A.2: Implement BMPs to protect natural functioning of FPs	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)

Alternative Actions	*PA STEEL Criteria Considerations* + Favorable - Less favorable N Not Applicable																								
	P Political			*A* Admini-strative			*S* Social		*T* Technical			*E* Economic				*E* Environmental					*L* Legal				
	Political Support	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	Cost of Action	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)
4.A.3: Seek funds for riparian buffers, E&S control, and stabilizing banks	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
4.A.4: Assist in converting LLC FW land to greenway Park	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
4.B.1: Implement multi-objective watershed management approach	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
4.B.2: Co-sponsor and support watershed clean-up events	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
Public Information Actions																									
5.A.1: Educate public about NFIP, NFIP, and FIRM (flood maps)	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	N	N	N	+	+	+	+	19 (+) 0 (-) 4 (N)	23 (+) 0 (-) 4 (N)

Alternative Actions	PA STEEL Criteria Considerations (+ Favorable - Less favorable N Not Applicable)																								
	P Political			A Admini-strative			S Social		T Technical			E Economic				E Environmental					L Legal				
	Political Support	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	Cost of Action	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)
5.A.2: Provide "how to retrofit" self-help literature to residents	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	+	+	+	+	20 (+) 0 (-) 3 (N)	24 (+) 0 (-) 3 (N)
5.A.3: Educate public about "what to do" if floods occur	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	+	+	+	+	20 (+) 0 (-) 3 (N)	24 (+) 0 (-) 3 (N)
5.A.4: Encourage use of alert radios, Lycoming County FWS Web site, and other Internet technologies by homeowners.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	19 (+) 0 (-) 4 (N)	23 (+) 0 (-) 4 (N)
5.B.1: Place flood of record monuments around damage centers	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	N	N	N	+	+	+	+	+	19 (+) 1 (-) 3 (N)	21 (+) 3 (-) 3 (N)
5.C.1: Publish newsletter / brochure to improve emergency preparedness	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	+	+	+	+	+	20 (+) 0 (-) 3 (N)	24 (+) 0 (-) 3 (N)
5.C.2: Promote building safe sustainable community initiatives	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	+	22 (+) 0 (-) 1 (N)	26 (+) 0 (-) 1 (N)
5.C.3: Sponsor environmental education & watershed mgmt workshops.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)

Alternative Actions	*PA STEEL Criteria Considerations* + Favorable - Less favorable N Not Applicable																								
	P Political			*A* Admini-strative			*S* Social		*T* Technical			*E* Economic				*E* Environmental					*L* Legal			Summary (Equal Weighting)	Summary (Benefits & Costs Prioritized)
	Political Support	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	Cost of Action	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		
5.C.4: Provide hazard maps & promote internet hazard mapping	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	+	+	+	+	20 (+) 0 (-) 3 (N)	24 (+) 0 (-) 3 (N)
Structural Projects Actions																									
6.A.1: Regularly clean & maintain drainage culverts	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	+	+	+	+	+	21 (+) 0 (-) 2 (N)	25 (+) 0 (-) 2 (N)
6.A.2: Eval & upgrade trans infrastructure to reduce damages	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	N	+	+	+	+	21 (+) 0 (-) 2 (N)	25 (+) 0 (-) 2 (N)
6.B.1: Secure funding partners to implement Lycoming Creek Project	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
6.B.2: Implement five-component Heshbon-Hepburnville plan	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)

Alternative Actions	*PA STEEL Criteria Considerations* + Favorable - Less favorable ᴎ Not Applicable																								
	P Political			*A* Admini-strative			*S* Social		*T* Technical			*E* Economic				*E* Environmental					*L* Legal			Summary (Equal Weighting)	Summary (Benefits & Costs Prioritized)
	Political Support	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	Cost of Action	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		
6.B.3: Design concept for Lower Lycoming Creek project	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
6.B.4: Evaluate structural solutions for other at risk "hot spots"	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
6.B.5: Construct an earthen levee in order to protect Montoursville Borough from both flooding on the Susquehanna River and backwater flooding from Loyalsock Creek.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)
6.B.6: Eliminate the possibility of failure of public infrastructure and localized flooding due to undersized culvert section of Lawshee Run.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (-) 0 (N)	27 (+) 0 (-) 0 (N)

6.4.3. Prioritization of Mitigation Actions

Once the mitigation actions were evaluated, the leadership of the Steering Committee set about prioritizing them to create an implementation strategy.

The Federal Emergency Management Agency (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. Though the PA-STEEL values for each action are somewhat vague, all of the actions listed as having an economic impact indicated that that impact would be beneficial to the community. Whether the actions had associated costs or not, those mitigation actions could not be ruled out based on the benefit or cost values in the PA-STEEL evaluation. Implementation of any project will be based on a benefit-cost analysis as described in FEMA 386-5: Using Benefit Cost Review in Mitigation Planning (2007). The specific economic benefits and costs will be determined prior to application for funding of the mitigation project.

Those participating in the 2010 HMP update provided comments that allowed for the prioritization of the mitigation actions listed in Table 49 using the seven PA-STEEL criteria. In order to evaluate and prioritize the mitigation actions, participants identified *favorable* and *less favorable* factors for each action. Table 48 summarizes the evaluation methodology and provides the results of this evaluation for all 46 mitigation actions in two columns. The first results column includes a 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.

The results of the weighted PA-STEEL matrix were examined to prioritize the mitigation actions. The number of unfavorable ratings was subtracted from the number of favorable ratings to determine each action's score. Actions that received scores of 27 (the highest possible) were assigned high priority. Those that received scores of 24 (the average of the scores) to 26, inclusive, were assigned medium priority. The actions cited below are listed in order of priority, with the high-priority actions listed first. Any actions, including projects, to be implemented will have benefits outweighing their associated costs to the community(ies) (i.e., they will have a benefit-cost ratio greater than 1).

Table 49: Prioritized Mitigation Actions

Mitigation Action	Score
High-Priority Actions	
1.A.2: Incorporate hazard mitigation objectives into Comprehensive Plan and CIPs.	27
1.A.6: Improve floodplain management practices.	27
1.B.1: Create and maintain stormwater management plans for the County's watersheds.	27

Mitigation Action	Score
2.A.1: Acquire floodway properties for greenway open space.	27
2.A.2: Acquire floodway land for Lower Lycoming project.	27
2.B.1: Seek funding to retrofit flood-prone homes/businesses.	27
2.B.2: Seek funds to protect public sewer, water, and critical facilities.	27
2.B.3: Protect or remove repetitive loss and floodway properties.	27
2.B.4: Make vulnerable critical facilities, etc., disaster resistant.	27
2.C.1: Assist in relocation of historically significant structures.	27
2.D.1: Build disaster-resistant public infrastructure.	27
3.B.2: Encourage use of alert radios, RSS feeds, inundation mapping, the County FWS, and other Internet technologies by owners/operators of critical facilities.	27
4.A.1: Promote natural functioning of floodplains, wetlands, etc.	27
4.A.2: Implement BMPs to protect natural functioning of floodplains.	27
4.A.3: Seek funds for riparian buffers, E&S control, and stabilizing banks.	27
4.A.4: Assist in converting LLC FW land to greenway park.	27
4.B.1: Implement multi-objective watershed management approach.	27
4.B.2: Co-sponsor and support watershed clean-up events.	27
5.C.3: Sponsor environmental education and watershed management workshops.	27
6.B.1: Secure funding partners to implement Lycoming Creek Project.	27
6.B.2: Implement five-component Heshbon-Hepburnville plan.	27
6.B.3: Design the concept for the Lower Lycoming Creek project.	27
6.B.4: Evaluate structural solutions for other at-risk "hot spots."	27
6.B.5: Construct an earthen levee in order to protect Montoursville Borough from both flooding on the Susquehanna River and backwater flooding from Loyalsock Creek.	27
6.B.6: Eliminate the possibility of failure of public infrastructure and localized flooding due to undersized culvert section of Lawshee Run.	27
Medium-Priority Actions	
1.A.1: Adopt disaster-resistant, sustainable community strategy.	26
5.C.2: Promote building safe, sustainable community initiatives.	26
1.A.3: Adopt “official map” defining acquisition, retrofit, and relocation areas.	25
6.A.1: Regularly clean and maintain drainage culverts.	25
6.A.2: Evaluate and upgrade transportation infrastructure to reduce damages.	25
1.A.5: Adopt flood damage reduction construction code.	24
5.A.2: Provide “how to retrofit” self-help literature to residents.	24
5.A.3: Educate public about “what to do” if floods occur.	24
5.C.1: Publish newsletter/brochure to improve emergency preparedness.	24
5.C.4: Provide hazard maps and promote Internet hazard mapping.	24
Low-Priority Actions	
1.C.1: Promote NFIP and CRS participation.	23
1.C.2: Organize joint entity to manage flood protection.	23

Mitigation Action	Score
3.B.1: Improve flood warning to residents and business owners.	23
5.A.1: Educate public about NFIP, CRS, and FIRM (flood maps).	23
5.A.4: Encourage use of alert radios, Lycoming County FWS Web site, and other Internet technologies by homeowners.	23
3.A.1: Coordinate evacuation plans with major employers.	22
3.A.2: Improve emergency response procedures and capabilities.	22
3.A.3: Conduct detailed vulnerability assessment of critical facilities, etc.	22
1.E.1: Maintain property flood damage/loss/history permit tracking system.	19
1.A.4: Adopt “no basement zone” in 0.2% chance floodplain and alluvial soils.	18
5.B.1: Place flood of record monuments around damage centers.	18
1.D.1: Evaluate gravel deposition flooding and alternatives solutions.	-3

Mitigation Strategy Action Plans were then developed for each project. The set of action plans and a table summarizing them are presented in Appendix F. A blank Mitigation Strategy Action Plan template is found in Appendix G. Project Opportunity Forms for structural projects to implement actions 6.B.1 through 6.B.5 are provided in Appendix J.

Given that floods, flash floods, and ice jams are the highest-risk hazard in the County, all but one of the mitigation actions identified, evaluated, and prioritized in this HMP relate to decreasing the County’s risk from flood events. Some actions, such as adopting disaster-resistant, sustainable community strategies (Action 1.A.1), incorporating the hazard mitigation objectives into comprehensive planning and capital improvement plans (Action 1.A.2), and improving emergency response procedures and capabilities (Action 3.A.2) will reduce the County’s vulnerability to all natural and man-made hazards. Other actions, such as 2.B.2 and 2.B.4, both of which are designed to protect critical infrastructure, apply especially to those hazards with salient effects on that infrastructure (e.g., power outages). Actions designed to increase public awareness of hazards and measures that individuals can take to mitigate against them (i.e., those under Goal 5) are split between those actions that mitigate against all hazards and those that mitigate against a single or several specific hazards.

The table on the next page shows which actions apply to each hazard profiled in this HMP.

Table 50: Mitigation Actions and the Hazards They Address

Action	Flood, Flash Flood, and Ice Jams	Winter Storms	Tornadoes and Wind Storms	Thunderstorms and Hail	Droughts and Water Supply Deficiencies	Traffic Accidents	Power Outages	Terrorism	Fixed Nuclear Facility Incidents	Natural Gas Drilling Incidents	Earthquakes	Subsidence and Sinkholes	Wildfires
1.A.1	X	X	X	X	X	X	X	X	X	X	X	X	X
1.A.2	X	X	X	X	X	X	X	X	X	X	X	X	X
1.A.3	X												
1.A.4	X												
1.A.5	X												
1.A.6	X												
1.B.1	X												
1.C.1	X												
1.C.2	X												
1.D.1	X												
1.E.1	X												
2.A.1	X												
2.A.2	X												
2.B.1	X												
2.B.2	X		X				X	X					
2.B.3	X												
2.B.4	X		X				X	X					
2.C.1	X												
2.D.1	X		X				X	X					
3.A.1	X	X	X					X	X				
3.A.2	X	X	X	X	X	X	X	X	X	X	X	X	X
3.A.3	X	X	X	X	X	X	X	X	X	X	X	X	X
3.B.1	X												
3.B.2	X	X	X	X	X	X	X	X	X	X	X	X	X
4.A.1	X												
4.A.2	X												
4.A.3	X												
4.A.4	X												
4.B.1	X												
4.B.2	X												
5.A.1	X												
5.A.2	X	X	X	X				X					
5.A.3	X												

Action	Flood, Flash Flood, and Ice Jams	Winter Storms	Tornadoes and Wind Storms	Thunderstorms and Hail	Droughts and Water Supply Deficiencies	Traffic Accidents	Power Outages	Terrorism	Fixed Nuclear Facility Incidents	Natural Gas Drilling Incidents	Earthquakes	Subsidence and Sinkholes	Wildfires
5.A.4	X	X	X	X	X	X	X	X	X	X	X	X	X
5.B.1	X												
5.C.1	X	X	X	X	X	X	X	X	X	X	X	X	X
5.C.2	X	X	X	X	X	X	X	X	X	X	X	X	X
5.C.3	X												
5.C.4	X	X	X	X	X	X	X	X	X	X	X	X	X
6.A.1	X												
6.A.2	X					X	X	X					
6.B.1	X												
6.B.2	X												
6.B.3	X												
6.B.4				X	X			X					
6.B.5	X												
6.B.6	X												

7. Plan Maintenance

7.1. *Update Process Summary*

This update to Lycoming County's Federal Emergency Management Agency (FEMA)-approved 2005 Hazard Mitigation Plan (HMP) was a comprehensive update that expanded the sources and amount of data for better trend analysis, updated the vulnerability and risk assessment for local hazards, created a more fluid process to streamline future updates to the HMP, and updated the hazard mitigation measures identified to limit the effects of local hazards.

The 2005 HMP states that it will be updated on a periodic basis, including in the aftermath of disasters or at least every five years. Since 2005, the HMP has actually been reviewed and evaluated more frequently, as it was consulted in the creation and/or update of other County planning documents (see Section 7.3). Any potential modifications to the HMP identified during the planning process for those other documents were noted by County planning staff and subsequently incorporated into the update of the HMP.

7.2. *Monitoring, Evaluating, and Updating the Plan*

Hazard mitigation planning in Lycoming County is the responsibility of all levels of government (i.e., county and local), as well as the citizens of the County. As listed in FEMA 386-4, the planning team (the Lycoming County Hazard Mitigation Steering Committee) must continuously monitor and document the progress of the Plan's recommended actions. The Lycoming County Hazard Mitigation Steering Committee (listed in Section 3.2), under the direction of the Lycoming County Planning and Community Development Department, will be responsible for maintaining this Multi-Jurisdictional HMP. The Steering Committee will meet annually and following each emergency declaration, with the purpose of reviewing the Plan. John Lavelle, Hazard Reduction Planner for the Lycoming County Planning and Community Development Department, will lead the Steering Committee for annual reviews of the HMP. Each year, the County will solicit new projects from the municipalities by sending out Project Opportunity Forms and informing the municipalities of the opportunity to update their mitigation measures.

Each review process will ensure that the Hazard Vulnerability Analysis and Risk Assessment reflect current conditions in the County and the municipalities, the Capability Assessment accurately reflects local circumstances, and the hazard mitigation strategies are updated based on the County's damage assessment reports and local mitigation project priorities. The Steering Committee will complete a Progress Report to evaluate the status and accuracy of the HMP and record the Steering Committee's findings. The Lycoming County Planning and Community Development Department will maintain a copy of these records. The Progress Report template is found in Appendix H.

As directed by FEMA 386-4, the Progress Report will include the following information: the hazard mitigation action's objectives; who the lead and supporting agencies responsible for implementation are; how long the project should take, including a delineation of the various

stages of work along with timelines (milestones should be included); whether the resources needed for implementation, funding, staff time, and technical assistance are available, or if other arrangements must be made to obtain them; the types of permits or approvals necessary to implement the action; details on the ways the actions will be accomplished within the organization, and whether the duties will be assigned to agency staff or contracted out; and the current status of the project, identifying any issues that may hinder implementation.

The HMP must be updated on a five-year cycle. This HMP will be updated and resubmitted to FEMA for approval within the five-year period. The monitoring, evaluating, and updating of the Plan every five years will rely heavily on the outcomes of the annual Steering Committee meetings.

7.3. *Incorporation into Other Planning Mechanisms*

7.3.1. Lycoming County Comprehensive Plan

7.3.1.1. *Method*

The Lycoming County Planning and Community Development Department is responsible for maintaining and updating the County Comprehensive Plan and the County Subdivision and Land Development Ordinance. The Planning Commission meets monthly to review, discuss, and comment on municipal subdivision and land development plans. It uses this information to identify necessary revisions and to amend both the Comprehensive Plan and the Subdivision and Land Development Ordinance. The Planning Commission's meetings are open to the public and are advertised according to the Pennsylvania Sunshine Act (65 PA C.S.A.). All 52 municipalities are covered by the County Comprehensive Plan.

Technical assistance on community planning matters is provided to the Lycoming County Planning Commission and the County Board of Commissioners through the Lycoming County Planning and Community Development Department. The Planning and Community Development Department administers the County Comprehensive Plan, along with the County Subdivision and Land Development Ordinance. The Planning and Community Development Department also performs technical reviews of municipal subdivision and land development plans, municipal floodplain ordinances, municipal stormwater management plans and ordinances, and other community planning and development matters. Since the adoption of the existing HMP, these reviews have included informal cross-referencing of the planned development or regulatory activity with the provisions of the HMP. This practice will continue using the information in the updated HMP.

7.3.1.2. *Maintenance Schedule*

Article III of the Pennsylvania Municipalities Planning Code (Act 247 of 1968, as reenacted and amended) requires all Pennsylvania counties (except Philadelphia) to adopt a comprehensive plan and update it at least every 10 years. Coupling this requirement with the DMA 2000-required five-year update cycle for HMPs, when possible, will allow the County to better

integrate the County Comprehensive Plan and Multi-Jurisdictional HMP planning processes and strengthen public participation for both efforts.

Lycoming County's current Comprehensive Plan was adopted on September 22, 1994, and last amended on December 18, 1997. This plan provides general direction and a blueprint for the future of Lycoming County and constituent communities. As required by the Municipalities Planning Code, the Comprehensive Plan currently needs to be updated. Recommendations from the HMP can be incorporated into the document.

7.3.2. Lycoming County Emergency Operations Plan

7.3.2.1. *Method*

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). The Lycoming County Emergency Management Agency is responsible for preparing and maintaining the County EOP. The risk assessment information presented in the existing HMP was used to update the hazard vulnerability assessment section of the County EOP. The updated risk assessment information will affect subsequent updates to the EOP.

7.3.2.2. *Maintenance Schedule*

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 52 local Emergency Management Coordinators (EMCs) for safekeeping.

The Lycoming County Emergency Management Agency should consider the County's HMP during its biennial review of the County EOP. Recommended changes to the HMP will then be coordinated with the Steering Committee.

7.3.3. Lycoming County Act 167 Stormwater Management Plan

7.3.3.1. *Method*

Act 167 requires that all stormwater management plans include an analysis of present and projected land development in flood hazard areas, and its sensitivity to damages from future flooding or increased runoff. In drafting the Lycoming County Act 167 Stormwater Management Plan, this HMP's hazard profile on floods, flash floods, and ice jams was consulted to identify the location and extent of flooding, range of magnitude, past occurrences, likelihood of future occurrences, and vulnerability assessment due to flooding events. The floodplain maps included in this HMP were also used as a reference to meet Act 167 requirements.

In addition, Act 167 requires the identification of existing and proposed state, federal, and local flood control projects located in the watershed and their design capacities. Appendix I of this HMP, which contains maps and summaries of federal, state, and local flood control projects, was referenced in the drafting of the Plan.

7.3.3.2. *Maintenance Schedule*

Like the HMP, stormwater management plans must be reviewed (and revised, if necessary) every five years. The stormwater management plan was adopted in May 2010, so it is likely that its updates will coincide with updates to this HMP. As both plans are maintained by the Lycoming County Planning and Community Development Department, information gathered in the revision of one plan will be incorporated into the revision of the other.

7.3.4. Old Mill Corridor Plan

7.3.4.1. *Method*

The Old Mill Corridor Plan is one section of the Lycoming County Municipal Corridor Plans (the other section addressing the I-80 Corridor in Williamsport, Pennsylvania). This plan is "designed to provide a comprehensive understanding of the future use and redevelopment potential"[15] of the Old Mill Corridor in Montgomery Borough. In creating this plan, both the Lycoming County Comprehensive Plan and the HMP were consulted. From these plans, the County determined that the Old Mill Corridor exists almost entirely in the 1%-chance floodplain, and as such is subject to Montgomery Borough's floodplain regulations. The Old Mill Corridor Plan lists several restrictions on development in the corridor based on those regulations, including elevation of the first floor 1.5 feet above the base flood elevation (BFE), prohibition of basements or crawl spaces below grade, and elevation of utilities above the BFE.

7.3.4.2. *Maintenance Schedule*

There is no required maintenance schedule for this plan. It will be reviewed and updated on an as-needed basis during its implementation. Any changes will be in consonance with the HMP and the Comprehensive Plan.

7.3.5. Plan Interrelationships

Figure 4 illustrates the interrelationships between the HMP, County Comprehensive Plan, County EOP, and other community planning mechanisms. 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,

[15] *Lycoming County Municipal Corridor Plans* (draft). The final version is anticipated to be released in December 2010 or January 2011.

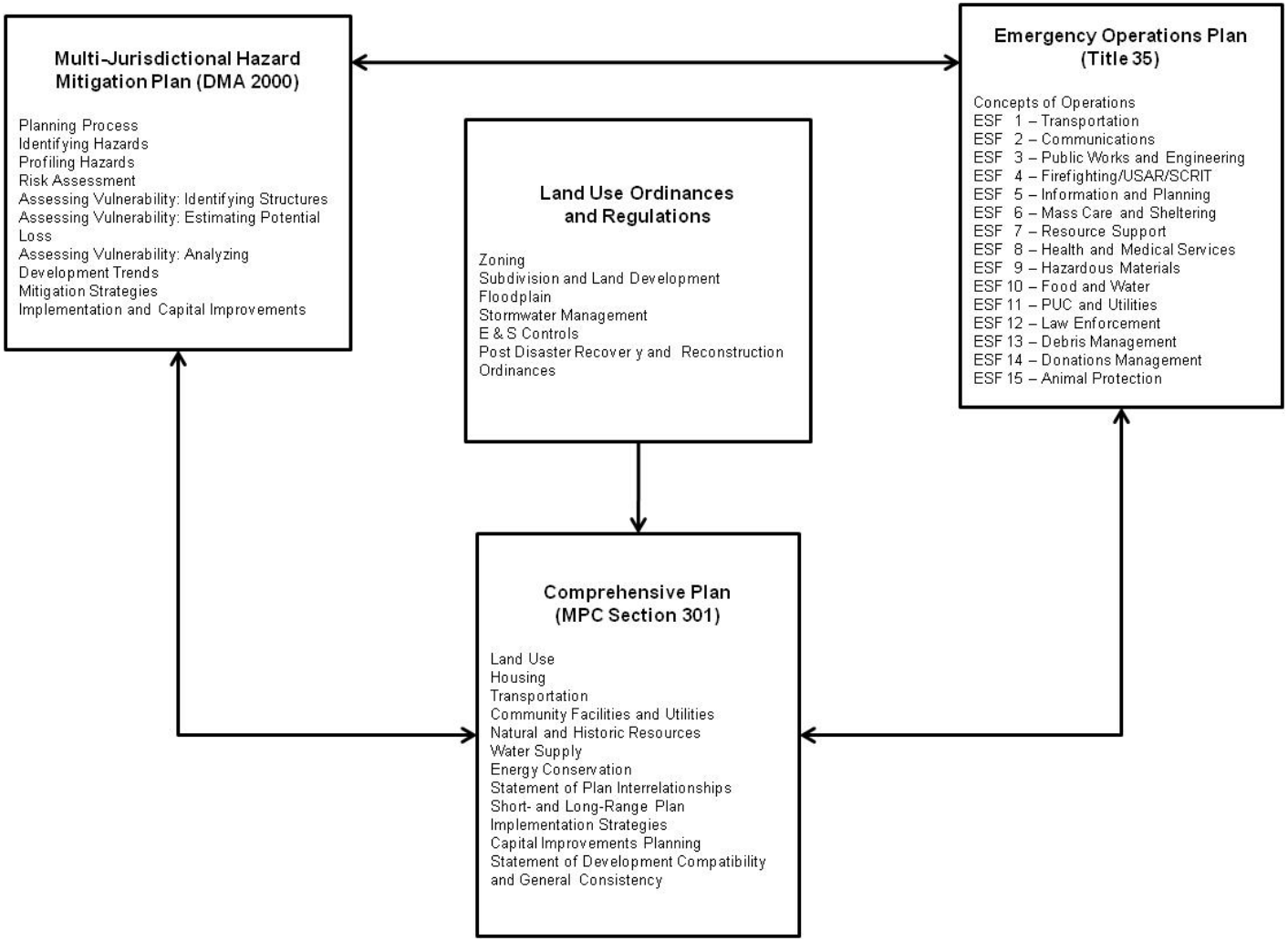
energy conservation, fiscal, economic development, and social consequences on the environment."

When developing the HMP, certain sections of the County Comprehensive Plan, EOP, and various land use ordinances and regulations provided key information. Moving forward, each of these documents should not be treated as unrelated and updated separately. The County and each participating municipality are responsible for incorporating the specific mitigation actions recommended in this Plan into the necessary planning documents, including the appropriate comprehensive plan, the County EOP, and any land use ordinances and regulations.

For example, zoning and other land use regulations will be amended to reflect the newly identified hazard areas, to ensure that development in those areas is minimized or at least conducted in a way that otherwise mitigates against the effects of hazards (e.g., requiring structures built in the floodplain to be elevated). As proposed changes to building codes are presented, their potential for mitigating damage due to hazards will be examined, and the changes will only be adopted if they are shown to lower risk. Changes to stormwater management plans will incorporate identified mitigation actions and will encourage increased participation in the NFIP.

To that end, Lycoming County and its municipalities must ensure that the components of the HMP are integrated into existing community planning mechanisms and are generally consistent with goals, policies, or recommended actions. Lycoming County and the Hazard Mitigation Steering Committee will utilize the existing maintenance schedule of each plan to incorporate the goals, policies, or recommended actions as each plan is updated.

Figure 4: Plan Interrelationships



7.4. *Continued Public Involvement*

The Lycoming County Planning and Community Development Department will ensure that the HMP is posted and maintained on the County Web site, and will continue to encourage public review and comment on the plan through information posted to the Web site and public notices in the local newspaper.

The citizens of Lycoming County are encouraged to submit their comments to elected officials and/or members of the Hazard Mitigation Steering Committee. To promote public participation, Lycoming County welcomed comments on the HMP for a 45-day period. This offered the public the opportunity to share their comments and observations. All comments received will be maintained and considered by the Hazard Mitigation Steering Committee when updating the HMP.

As additional measures to increase public involvement in the mitigation planning and implementation processes, the County of Lycoming is in the process of developing the “Risk Portal,” and uses the GeoPlan system, as described in Section 6.1.2.3.

Lycoming County will continue to reach out to municipalities via telephone, mail, and e-mail regarding mitigation projects, especially those municipalities that did not submit projects for inclusion in this HMP. Any additional Hazard Mitigation Project Opportunity Forms received during the life of this five-year HMP will be incorporated into the Plan as an interim, updated and included in the next five-year Plan update.

8. Plan Adoption

Resolutions reflecting formal adoption of this HMP by the County and participating municipalities can be found in Appendix A. The template resolutions used by the County and municipalities are shown on the following pages.

Lycoming County Hazard Mitigation Plan

County Adoption Resolution

Resolution No. _____

Lycoming County, Pennsylvania

WHEREAS, the municipalities of Lycoming County, Pennsylvania, are most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, Lycoming County acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Lycoming County Hazard Mitigation Plan has been developed by the Lycoming County Planning and Community Development Department and the Lycoming County Emergency Management Agency, in cooperation with other County departments, local municipal officials, and the citizens of Lycoming County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Lycoming County Hazard Mitigation Plan, and

WHEREAS, the Lycoming County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the County of Lycoming that:

- The Lycoming County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the County, and
- The respective officials and agencies identified in the implementation strategy of the Lycoming County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2010

ATTEST:

_____

LYCOMING COUNTY COMMISSIONERS

By _____

By _____

By _____

Lycoming County Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. _____

<Borough/Township of Municipality Name>, Lycoming County, Pennsylvania

WHEREAS, the <*Borough/Township of Municipality Name*>, Lycoming County, Pennsylvania, is most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the <*Borough/Township of Municipality Name*> acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Lycoming County Hazard Mitigation Plan has been developed by the Lycoming County Planning and Community Development Department and the Lycoming County Emergency Management Agency in cooperation with other County departments, and officials and citizens of <*Borough/Township of Municipality Name*>, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Lycoming County Hazard Mitigation Plan, and

WHEREAS, the Lycoming County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the <*Borough/Township of Municipality Name*>:

- The Lycoming County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the <*Borough/Township*>, and
- The respective officials and agencies identified in the implementation strategy of the Lycoming County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2010

ATTEST: ***<BOROUGH/TOWNSHIP OF MUNICIPALITY NAME>***

_____ By _____

By _____

By _____