

Lackawanna County Hazard Mitigation Plan 2014 Update



Prepared for:
Lackawanna County Planning Commission
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Chapter 1 – Introduction

1.1 Background

Hazard Mitigation is defined by the Federal Emergency Management Agency (FEMA) as “sustained action taken to reduce or eliminate long-term risk to people and property from hazards and their effects”. The hazard mitigation planning process involves the coordination of actions taken to reduce injuries, deaths, property damage, economic losses, and degradation of natural resources caused by natural and man-made disasters. Hazard mitigation is considered one of four phases in the emergency management cycle. Others include: emergency preparedness, emergency response, and recovery.

- Hazard mitigation activities involve actions that reduce or eliminate the probability of an occurrence or reduce the impact of a disaster. The goal of the mitigation phase is to make communities more resistant to disasters and thereby decrease the need for a response. Mitigation occurs long before a disaster.
- Preparedness activities include planning and preparing for when a disaster strikes and includes response capability actions to ensure an effective and efficient use of resources and efforts to minimize damage. Preparedness occurs just before a disaster.
- Emergency response activities include providing emergency assistance to victims and minimizing property loss. The response phase begins during or immediately after the onset of a disaster.
- Recovery activities include short and long-term activities that help return individuals and communities to normalcy as soon as possible. Recovery actions involve clean-up efforts, temporary housing, and replacement of infrastructure. Recovery activities typically commence several days or weeks after a disaster and are long-term.



1.2 Purpose

The original Hazard Mitigation Plan for Lackawanna County was developed in 2009 as a Bi-County Mitigation Plan for Luzerne and Lackawanna Counties and their 76 and 40 municipalities, respectively. The Initial Plan document includes the planning process, community profile, hazard identification and analysis, vulnerability assessment, capability assessment, mitigation strategy, and plan maintenance sections. A total of 39 out of the Lackawanna County's 40 municipalities participated in the planning process via questionnaires, meetings and identification of mitigation projects. The 2009 Plan identified the Bi-County region as being susceptible to a range of natural hazards including floods, high wind, winter storms, mine related hazards, and drought. The purpose of the 2014 Plan is to serve as an update to the 2009 Plan and various hazards and vulnerabilities have been investigated and mitigation actions revisited, as part of the 2014 Plan Update.

The Plan Update is intended to enable the County and its municipalities to effectively respond to hazards as they occur and reduce the potential risks of these hazards to the health, safety and welfare of the residents. The overall goal for the Update is to continue to allow Lackawanna County municipalities to be eligible for a range of financial assistance following hazard events.

The 2014 Plan Update consists of a thorough review of the 2009 Plan, which was used as a base document. Each chapter in the 2014 has been updated as necessary. A summary is included at the beginning of each chapter to indicate how this Plan was updated from the 2009 version. The Plan Update involves the review of data on potential hazards and prioritization of these hazards in terms of frequency and severity. The Plan Update includes a review of mitigation actions, which were revised, deleted, or modified to address the high priority hazards as well as a Plan Maintenance and Monitoring section.

1.3 Scope

In December of 2013, the Lackawanna County EMA contracted with the Vision Planning and Consulting Team (comprised of Vision Planning and Consulting (VPC) from Fulton, Maryland and Borton-Lawson Engineering (BLE) from Wilkes-Barre, Pennsylvania) to develop the Plan Update in compliance with the requirements of the Disaster Mitigation Act of 2000. The Hazard Mitigation Plan Update was funded by Hazard Mitigation Assistance (HMA) funds from the Federal Emergency Management Agency (FEMA) and administered by the Pennsylvania Emergency Management Agency (PEMA). The Plan Update is a multi-jurisdictional plan that covers Lackawanna County and its 40 municipalities. During the same period, Luzerne County performed its plan update under a separate contract with Vision Planning and Consulting.

It must be noted that future funding for mitigation projects will be contingent upon having each jurisdiction in Lackawanna County adopt the plan after the County adopts the Update. Any jurisdiction that does not adopt the 2014 Plan Update will become ineligible for pre- and post-disaster mitigation funds.

1.4 Organization of the Plan

The 2014 Hazard Mitigation Plan Update comprises seven chapters. Chapter 1 includes the prerequisites of the Plan, including letters of adoption by the County Commission and the individual municipalities. Chapter 2 provides an introduction to the plan update process and includes an overview of the socio-economic and demographic characteristics. Chapter 3 discusses the planning process. Chapter 4 contains a capability assessment, including a review of existing plans and ordinances from the counties and municipalities. Chapter 5 comprises the hazard identification and risk assessment and examines vulnerability and the potential losses from the top priority hazards. Chapter 5 also includes a historic profile of hazard types and associated losses, and a vulnerability assessment, which analyzes the potential for future damages due to the hazards identified. Chapter 6 discusses the mitigation strategy including updated mitigation goals and objectives, mitigation actions, and the method for prioritization and implementation of mitigation actions. Chapter 7 outlines how Lackawanna County and its municipalities will implement the Plan once it is adopted and ways to monitor progress and ensure continued public involvement.

1.5 Authority and Reference

Authority for this Plan originates from the following federal sources:

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

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

- Commonwealth of Pennsylvania Standard All-Hazard Mitigation Plan, revised October 2013.

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

- FEMA. Local Mitigation Planning Tool and Guide. March 2012.
- FEMA. Local Mitigation Planning Handbook. March 2013.

Chapter 2 – Community Profile

This section includes a profile of Lackawanna County and its municipalities. Information on the County's geographic profile, climate, demographic profile, and employment and industry profile are included below. While some information such as the study area boundaries and geography have remained unchanged, and derived from the 2009 Plan, other information such as the demographic and employment and industry information has been developed using the latest U.S. Census, the Comprehensive Plan, and other recent Planning documents.

2.1 Geography and Environment

Lackawanna County is located in the northeastern region of Pennsylvania and consists of 40 municipalities (21 townships, 17 boroughs, and 2 cities) and is bordered by Susquehanna County to the north, Wayne County to the east, Monroe County to the southeast, Carbon County to the southeast, Luzerne County to the southwest, and Wyoming County to the west (see Location Map).

Lackawanna County experiences an average annual temperature of about 49 degrees Fahrenheit and an average annual precipitation of approximately 36 inches. During the winter months (December through February), the average temperature is around 27° F, and the average precipitation is about 6.7 inches in which fluctuations during dry and wet years are not noticeably extreme. Spring months (March through May) bring moderate average temperatures of 48° F and precipitation levels of 9.4 inches. Average summer (June through August) temperatures are 70° F and average precipitation values are about 10.6 inches. As the year enters the fall season (September through November), moderate temperatures and precipitation levels are prevalent. The average temperature is 52° F and the average precipitation is 9.7 inches.

DATA SOURCES:
 Critical Infrastructure - Lackawanna County
 Roads - PennDOT
 Streams - PADEP



SQUEHANNA

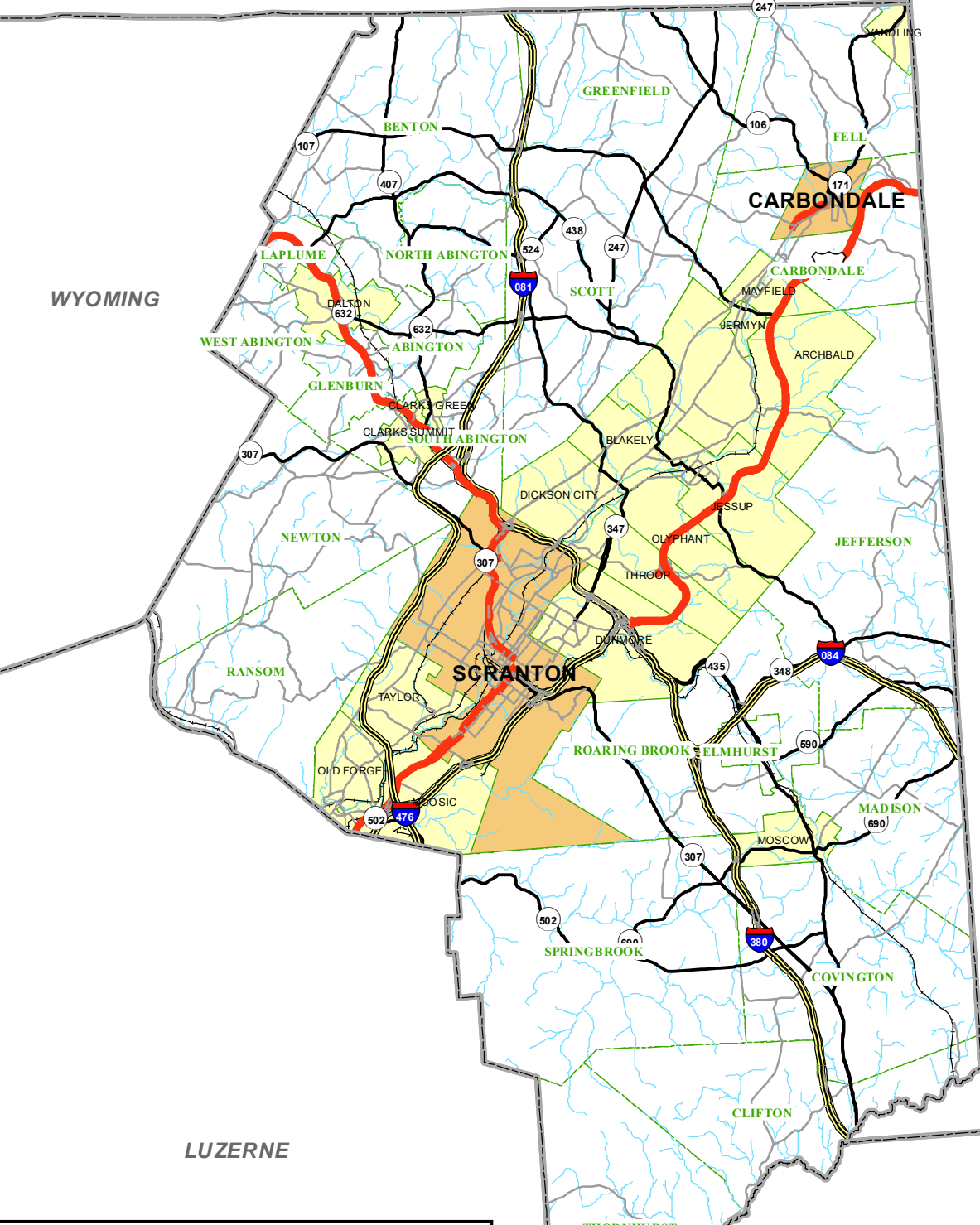
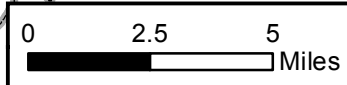
WYOMING

WAYNE

PIKE

LUZERNE

ON



Legend

- County
- Other Roads
- Interstate
- PA State Road
- US Highway
- Township Boundary
- Boroughs
- Cities
- rail_active
- Streams

Location Map

**HAZARD MITIGATION PLAN
 2014 UPDATE**

Lackawanna County, PA

Project: 1000-0662-00

Date: May 21, 2014

Prepared By: ELF



2.2 Community Profile/Facts

Three rivers flow through Luzerne County. The Susquehanna River runs for approximately 44 miles in a southwest direction through Luzerne County. The Lackawanna River runs for about 31 miles in a southwest direction through Lackawanna County and continues for approximately 2.5 miles through Luzerne County before its confluence with the Susquehanna River near the City of Pittston. The Lehigh River flows in a southwest direction for approximately 14 miles along the southern border of Lackawanna County and continues for about 22 miles along a portion of Luzerne County's eastern border.

2.3 Population and Demographics

The demographics of a community – population, labor force, employment, and housing is a reflection of how a community has evolved in the past and has a direct bearing on how and where a community wants to develop in the future. The past population trends and projections as well as the employment characteristics help us to better understand the socio-economic characteristics that have and will continue to shape the future of this county. Some of Lackawanna County's demographic characteristics have been examined to provide an insight on how the community has changed over the last 40-45 years.

In 2000, Lackawanna County's population was 213,295 (1.7 percent of the State's total population). Overall, the County's population declined by 9 percent between 1960 and 2000; the largest decrease in population was from 1980 to 1990 (3.9 percent). Despite a steady decrease in population, the total housing units within Lackawanna County rose 4 percent during the 1990s.

The County's Comprehensive Plan indicates that during the 1990 to 2000 period, population growth in the region's non-urban townships was generally greater than that for boroughs and cities. The county seat, the City of Scranton, is the most populous municipality, with 76,415 residents. The county's second-largest city, Carbondale, has 9,800 residents. Township populations range between 8,705 residents in South Abington Township to 298 residents in West Abington Township. Boroughs range in size from 14,018 inhabitants in Dunmore Borough to Vandling Borough, with 733 residents.

Between 1990 and 2000, in Lackawanna County, the three highest population increases occurred in South Abington Township, with 2,328 new residents; Springbrook Township, with 243 new residents; Madison Township, with 359 new residents, and Moscow Borough with 356 new residents. Most other municipalities indicated a decrease in population during that period. Percent change indicates that the majority of the fastest growing municipalities were also townships, except for Moscow Borough. In Lackawanna County, Thornhurst Township was the fastest growing, with a 61.2 percent increase; followed by South Abington Township, with a 36.5 percent increase; and Moscow Borough, with a 23.3 percent increase.

The estimated population increase in Lackawanna County from 2010 to 2012 was 41 people while Northeastern Pennsylvania experienced a regional decrease of 3,701 people during this same time period. Source Report: 2013 - 2018 Comprehensive Economic Development Strategy Five-Year Plan for Northeastern Pennsylvania; Source: U.S. Census Bureau, Population Division, "Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, Pennsylvania and Pennsylvania Counties: April 1, 2010 to July 1, 2012." Release Date: May 2013, <<http://www.census.gov/popest/>>

The 2009 County Business Patterns indicates a total of 5,325 businesses in the County. Of this, 971 are in Retail Trade, 710 in Healthcare and Social Assistance, 562 in Accommodation and Food Services, and 567 in Other Services (except Public Administration). Lackawanna County's largest employers are the Educational, Health, and Social Service sector (24.2%), followed by Manufacturing (15.7%), and Retail Trade (13.4%). Source: US Census Bureau Decennial Census.

2.4 Employment and Industry Profile

The top employers in Lackawanna County, according to the Pennsylvania Center for Workforce Information and Analysis in 2013 were the State and Federal Government. The top manufacturer was Pride Mobility Products Corporation. Retaining and expanding business in the area is a primary goal for the Wilkes-Barre Metropolitan Statistical Area, consisting of Lackawanna, Luzerne, and Wyoming Counties. The three counties experienced the highest rates of unemployment in Pennsylvania from 2011 to 2013. Growing industries include new business start-ups at incubator facilities. A substantial increase in the Transportation and Warehousing industry was experienced between 2001 and 2011 in Lackawanna, Luzerne, and Monroe counties. This is attributed to Warehousing firms locating in the region to take advantage of close proximity to neighboring metropolitan cities and transportation interstates. Source: 2013 - 2018 Comprehensive Economic Development Strategy Five-Year Plan for Northeastern Pennsylvania.

Major traffic routes that traverse Lackawanna County include Interstates 81, 84, 380, and 476 and U.S. Routes 6 and 11. Interstate 81 runs in a north-south direction for approximately 30 miles, while Interstate 84 runs in an east-west direction for about 15 miles through the southeastern portion of the county. Interstate 380 runs for approximately 11 miles through the southeastern portion of the county. Interstate 476 runs in a north-south direction for about 13 miles and terminates at the intersection of Routes 6, 11, and 81 in Clarks Summit Borough. U.S. Route 6 runs in a northwest-southeast direction for approximately 10 miles and U.S. Route 11 runs in a northeast-southwest direction for about 16 miles through the county. Major State Routes that traverse Lackawanna County include SR106, SR107, SR247, SR307, SR347, SR407, SR435, SR438, SR502, and SR690.

2.5 Land Use and Development

For the first time since the 1930 census, Lackawanna County saw an increase in population in 2010. The 2010 census for the county was 214,437 – a 0.5% increase from the 2000 census. However, the Census Bureau's 2013 annual estimate showed a decrease from 2010 to 213,931. The county has also seen an increase in minority population from the 2000 to 2010 censuses, 2.8% of the total population in 2000 to 8% of total population in 2010.

The most prevalent land uses in Lackawanna County are Agriculture and Vacant Land, residential development, and protected open space. These three land-uses account for 90% of the land in the county.

Table 2.1 – Existing Land Use for Lackawanna County.

Land Use	Area (acres)	% of Total
Agricultural and Vacant	161,215.28	57.5%
Commercial	10,183.12	3.7%
Industrial	2,764.22	0.9%
Institutional	6,220.39	2.2%
Private Open Space	6,150.00	2.2%
Protected Open Space	22,500.00	8.1%
Quarry/Mine/Landfill	2,615.59	0.9%
Residential	66,349.50	23.8%
Transportation and Utilities	1,740.96	0.6%
Urban Center	176.68	0.1%
Total	279,915.74	100.0%

Table 2.1 displays the land use categories and corresponding percent for each type of land use. The urbanized spine in Lackawanna County lies along the Lackawanna River in a northeast to southwest direction, including the cities of Carbondale and Scranton, 12 boroughs, and 2 townships.

Private development (activity over the last five years) in Lackawanna County has been sluggish; however, the development that did occur consisted primarily of residential development (71%). Significant new industrial development was only noted in Covington Township at the Covington Industrial Park during the five-year period from 2009-2014.

In terms of public open-space preservation, approximately 22,500 total acres are protected in two state parks, four county parks, five state game lands, and one state forest. In addition, 1,740 acres are protected through conservation easements on private land, and 4,410 acres are protected through agricultural easements on 53 active farms. Thornhurst, Clifton, and Jefferson townships contain large areas of state forest and state game lands, while Benton and Greenfield townships have large swaths of agricultural land protected through easements.

Based on county planning data, there were only two major single-family residential developments in the five-year period from 2009-2014 and five multi-family residential developments ranging from private townhomes to affordable public housing. All of these developments occurred within the urbanized area of the county.

In terms of future development, residential development will continue to account for the largest amount of land to be developed; however, the trend is leaning toward more multi-family units as opposed to single-family lots.

2.6 Data Sources and Limitations

The following are data sources utilized for the preparation of this Plan Update:

- Existing county hazard mitigation plan
- Uniform Construction Code
- Comprehensive Planning – Commonwealth of Pennsylvania Governor’s Executive Order 1999-1
- The Pennsylvania Code – Chapter 102 Title 25 – Sediment and Erosion Control
- Growing Greener
- Pennsylvania State All-Hazard Mitigation Plan 2013
- 2004 Open Space, Greenways, and Outdoors Master Plan for Lackawanna and Luzerne Counties
- Article VI – Zoning Ordinance Lackawanna County
- Article V – Subdivision and Land Development Ordinance Lackawanna County
- Floodplain Ordinance
- Lackawanna River Watershed Act 167 Stormwater Management Ordinance
- Lackawanna County Continuity of Operations Plan
- 2011 Lackawanna-Luzerne Regional Plan – Comprehensive Plan and Long-Range Transportation for Lackawanna-Luzerne Counties, PA
- Subdivision and Land Development Ordinance, 2010 – Moscow Borough
- Carbondale Regional Comprehensive Plan 2003-2013 – Carbondale City, Carbondale Township, and Fell Township
- Spring Brook Township Floodplain Management Ordinance 2007 Update
- 2013-2018 Comprehensive Economic Development Strategy Five-Year Plan for Northeastern Pennsylvania
- United States Census Bureau Population Division
- United States Census Bureau Decennial Census
- 2009 County Business Patterns
- United States Census Bureau-American Community Survey: <http://www.census.gov/acs/>

A variety of data sources were utilized as part of the effort to obtain best available data for use in the preparation of the Hazard Identification and Risk Assessment. This data collection effort included the following sources:

- Lackawanna County GIS data – Lackawanna County Planning Commission (structures and critical facilities)
- FEMA Digital Flood Rate Insurance Maps (DFIRM)
- National Climatic Data Center
- Spatial Hazards and Events Losses Database for the United States
- Pennsylvania Emergency Management Agency Disaster Declarations
- National Weather Service

- United States Geologic Survey
- Department of Conservation and Natural Resources

Understanding that this Plan Update is the first 5-year cycle of the initial 2009 Plan, certain data limitations are inherent, and improvements and refinements to data can be made in the future. One improvement will be the availability of digital underground and abandoned mine data, which is currently being developed by the State. In future Plan Updates, this dataset should be used for a better understanding of the mine hazards risk to critical infrastructure and property owners. A second improvement will be that of identifying properties that have been acquired for removal from the floodplain, and updating the county GIS structures dataset to reflect where buy-outs have occurred. Additionally, as FEMA regularly updates DFIRMS and RiskMap flood hazard areas, these maps should continue to be acquired and implemented at the local level as more accurate flood mapping becomes available in the future.

Chapter 3 – Planning Process

3.1 Update Process and Participation Summary

Requirement §201.6(c)(1): The Plan must document the planning process, including how it was prepared and who was involved in the process for each jurisdiction.

The Hazard Mitigation Plan Update process was conducted over a 11-month period (December 2013 to October 2014) and comprised the following four main phases which are elaborated below: Phase 1 – Organize Work Group and Process; Phase 2 – Assess Hazards, Risks, Vulnerability, and Mitigation Capability; Phase 3 – Develop a Mitigation Plan; and Phase 4 – Implement the Plan. While the basic phases were similar to the ones followed in the 2009 Plan, each phase was adjusted slightly to obtain maximum participation from steering committee members, municipalities, and residents. Members of the Steering Committee from the 2009 Planning Process were approached and invited to be on the Committee for the 2014 Plan Update Process in order to ensure continuity as well as to capitalize on their knowledge of the community and process. As in the original planning process, a Letter of Intent to Participate was mailed to all jurisdictions to inform them of the Plan Update. A municipal workshop was held to maximize participation from all 40 municipalities and to educate them throughout the Plan Update process.

Phase 1 – Organize Work Group and Process: The first phase involved reenergizing residents to become interested, involved, and educated in the plan update process. In order to achieve this goal, input was solicited throughout the planning process via three avenues: 1) Steering Committee Meetings; 2) Municipal Workshops; and 3) Open Houses. Each of these avenues for public involvement served its own purpose and required a different tier of involvement to ensure participation from local, county, state, and regional levels. Each of these will be discussed in detail in the next section of this chapter.

Phase 2 – Assess Hazards, Risks, Vulnerability, and Mitigation Capability: In this step, information on past hazard events that affected Lackawanna County was gathered and specific hazard areas were identified. This step also involved a literature review of publications addressing historical hazard events, an internet search for data related to historic events, and an inventory and review of the existing GIS coverage and other documentation pertinent to the County. The hazard identification included summaries on past occurrences and the probability of future events. The vulnerability analysis identified specific areas including critical facilities that were vulnerable to hazards and included estimates of potential losses. Past and future development trends were also analyzed as part of this step. This phase also discussed land uses and development trends in the County and identified high hazard areas that were not suitable for future development.

The Mitigation Capability Assessment was conducted to identify the roles and capabilities of various departments/agencies in the County, areas for coordination and/or improvement; and provide a platform to integrate plans and other documents so recommendations and strategies are not in contradiction with one another. The Assessment also involved a review of sample county and municipal plans and ordinances that addressed or had the potential to address hazard mitigation issues.

Phase 3 – Develop a Mitigation Plan: Based on data from the hazard, vulnerability, and capability assessments, mitigation goals were developed that were aimed at protecting Lackawanna County from long-term vulnerability to the identified hazards. A comprehensive range of mitigation actions and projects to reduce the effects of each hazard, with emphasis on new and existing buildings and infrastructure, was developed in this step.

The Plan explored mitigation actions in the following six categories to attain the goals:

- Planning Mechanisms – e.g., zoning, floodplain, stormwater, and other ordinances;
- Structural Projects – e.g., levees, reservoirs, channel improvements;
- Natural Resource Protection – e.g., wetlands protection, best management practices for stormwater management;

- Education and Outreach – e.g., outreach projects, technical assistance, and
- Other Strategies - emergency services (warning, sandbagging, evacuation, retrofitting, etc.)

While some mitigation actions are more 'broad' in nature and cover the entire County, others are specific to each municipality. It was ensured that each of the 40 municipalities' actions from 2009 were revisited and that each municipality had at least one or more mitigation actions identified in the plan update, along with a timeline and entity(ies) responsible for implementation.

Phase 4 – Implement the Plan - In the final phase, an action plan was developed that described how the mitigation strategies and activities identified would be prioritized, implemented, funded, and administered by the County and its municipalities. Cost estimates and possible funding sources to implement recommended projects were identified. This phase also included methods to monitor, evaluate, and update the mitigation plan within a five-year cycle as well as recommendations on how to incorporate community participation into the plan maintenance process.

The message that "each jurisdiction must participate on their own, adhere to the hazard mitigation planning process, or they cannot adopt the Plan and will not be eligible for pre- and post-disaster funding" was emphasized to all 40 jurisdictions to solicit their participation in the plan update process. An extensive municipal participation strategy was established to allow for maximum participation throughout the process.

As in the original planning process, a Letter of Intent to Participate was mailed to all jurisdictions in December 2013 that explained the hazard mitigation process, Federal requirements, and deliverables. Municipalities were required to sign onto or opt-in to the County planning process (and commit to participation) or opt-out of the process (in which case, they would be responsible for developing their own plan in order to obtain Federal funding following a disaster). Those who decided to opt-in were required to identify and provide information for a local point of contact. All 40 municipalities in Lackawanna County opted to participate in the Hazard Mitigation planning process.

In September 2013, an introduction letter for the Plan Update was sent to all jurisdictions in the County that explained the plan update process, Federal requirements, and expected level of participation. A Mitigation Capability Assessment feedback form was sent to all municipalities. The feedback forms include questions related to: past hazard events; critical facilities in high hazard areas; mitigation projects, and municipal mitigation capabilities (technical and staffing). The Consultants sent reminder emails and made follow-up phone calls to encourage municipalities to complete their feedback forms and attend a Municipal Mitigation Workshop scheduled for 19 March 2014. A total of 33 municipalities completed and returned their questionnaires and 14 municipalities were represented at the workshop.

3.2 The Planning Team

In December of 2013, the Lackawanna County EMA contracted with the Vision Planning and Consulting Team (comprised of Vision Planning and Consulting (VPC) from Fulton, Maryland and Borton-Lawson Engineering (BLE) from Wilkes-Barre, Pennsylvania) to develop the Plan Update in compliance with the requirements of the Disaster Mitigation Act of 2000. The Steering Committee from the 2009 Plan was updated for the purposes of this planning process. The original Steering Committee represented various departments from the two counties, representatives from municipalities, and the Pennsylvania Emergency Management Agency. Table 3.1 includes the members of the Lackawanna County Steering Committee and representative agencies for this Plan Update.

Table 3.1 – Hazard Mitigation Plan Update Steering Committee

Name	Agency
Don King	City of Scranton
Germaine Carey	Borough of Clarks Summit
Tony Jordan	Roaring Brook Township
Bill White	Waverly Township
Bernie McGurl	Lackawanna River Corridor Association
Mary Liz Donato	Lackawanna County Planning Commission
Steve Pitoniak	Lackawanna County Planning Commission
Richard Barbolish	Lackawanna County Emergency Management Agency

Invitations were also sent to the following individuals and stakeholders from neighboring communities, regional and state agencies, and private organizations, to participate on the steering committee and play a part in the Plan Update process.

Table 3.2 – Neighboring Communities and Regional Agencies

Name	Agency
Steve Bekanich	Luzerne County, EMA
Guy Miller	Monroe County EMA
Paul Johnson	Susquehanna County EMA
Steven Price	Wayne County EMA
Eugene Dziak	Wyoming County EMA
Tess Grubb	FEMA Region III
Anthony Camillocci	PEMA – Eastern Area Office

Two Steering Committee meetings were held during the Plan Update Process:

The first Steering Committee Meeting was held on 19 March 2014 at the Emergency Management Agency in Jessup. At this meeting, VPC Consultants:

- Finalized schedule and deliverables;
- Reviewed sections of the 2009 Plan with the Committee and identified sections that needed to be updated;
- Presented data on the hazard identification;
- Solicited input on risks from various hazards;
- Discussed data from the hazard vulnerability and risk assessment;
- Reviewed goals and objectives, and
- Discussed mitigation questionnaire responses.

The second Committee meeting was held on 19 March 2014 at the County Planning Commission Building in Jessup. At this meeting, VPC Consultants:

- Examined a range of mitigation actions that address goals;
- Prioritized mitigation actions, and
- Developed an implementation strategy for each mitigation action.

3.3 Meetings and Documentation

Meeting invitations and reminders for the Municipal Mitigation Workshop were sent via e-mail and follow up calls were made to further urge municipal participation. The Municipal Mitigation Workshop was held at the Emergency Management Agency in Jessup on the same evening as the first Steering Committee Meeting and was facilitated by the Consultants, providing an opportunity for municipal officials to attend and become educated about the plan update, planning process, hazard identification, and vulnerability assessment.

A series of exhibits were developed for the workshop including maps of critical facilities, floodplains, and steep slopes. Attendees were encouraged to stimulate discussion and mark up maps to indicate updated or missing data. Examples of potential mitigation projects were shared and municipalities were encouraged to recommend additional mitigation projects based on past hazard experiences.

At the workshop, municipal officials:

- Reviewed maps and identified high-hazard areas by marking up maps;
- Identified critical facilities within their municipality;
- Discussed risks and vulnerabilities within their municipality;
- Identified past mitigation projects and discussed potential mitigation projects; and
- Discussed future participation opportunities and next steps.

3.4 Public & Stakeholder Participation

Requirement §201.6(b): *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

- (1) *An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*
- (2) *An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process;*

A Public Meeting was held on 21 August 2014 at the Emergency Management Building. The meeting was advertised in the local newspaper. A PowerPoint was developed and presented by VPC Consultants. The public was provided an opportunity to:

- Review the results of the updated Hazard Risk and Vulnerability Assessment;
- Review updated goals and objectives;
- Examine options for mitigation actions and projects, and
- Review proposed prioritization criteria for mitigation projects.

Copies of the draft Plan Update were made available at the Lackawanna County Planning Commission for a period of four weeks for public comment. No comments were received. Comments received during the public meeting were incorporated into the final version of the Plan Update.

3.5 Multi-Jurisdictional Planning

Requirement §201.6(a)(3): *Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process ... Statewide plans will not be accepted as multi-jurisdictional plans.*

The Consultant team and Lackawanna County planners met on 20 March 2014 for a project kick-off meeting at the County Emergency Management Building in Jessup. This meeting officially initiated the planning process and included discussions on the project tasks, project schedule, deliverables, and Steering Committee composition.

Table 3.3 identifies the level of participation of each municipality during the Plan Update process.

Table 3.3. Municipal Participation Summary.

Municipality	Agreed to Participate in Plan	Returned Questionnaire	Attendance at Workshop	Returned Local Mitigation Actions Form
Archbald Borough	1	1	1	
Benton Township	1	1		
Blakely Borough	1	1		
City of Carbondale	1	1		1
Carbondale Township	1	1	1	1
Clarks Green Borough	1	1		
Clarks Summit Borough	1			
Clifton Township	1	1		
Covington Township	1	1		1
Dalton Borough	1	1		
Dickson City Borough	1	1		1
Dunmore Borough	1	1		
Elmhurst Township	1		1	1
Fell Township	1	1		
Glenburn Township	1	1		1
Greenfield Township	1			
Jefferson Township	1	1		
Jermyn Borough	1	1		
Jessup Borough	1	1		
LaPlume Township	1	1	1	
Madison Township	1	1	1	
Mayfield Borough	1	1	1	1
Moosic Borough	1	1	1	1
Moscow Borough	1	1	1	1
Newton Township	1	1		
North Abington Township	1			
Old Forge Borough	1			
Olyphant Borough	1	1		
Ransom Township	1	1	1	1
Roaring Brook Township	1	1	1	1
Scott Township	1			
City of Scranton	1	1	1	1
South Abington Township	1	1	1	1
Spring Brook Township	1	1		1
Taylor Borough	1	1		
Thornhurst Township	1	1	1	1
Throop Borough	1	1	1	1
Vandling Borough	1	1		
Waverly Township	1	1		1
West Abington Township	1	1		1
Total	40	34	14	18

Chapter 4 – Risk Assessment

4.1 Update Process Summary

A Hazard Identification and Risk Assessment (HIRA) is a vital step in preparing a hazard mitigation plan and in identifying the appropriate mitigation actions. This HIRA includes the identification of all hazards affecting the County and its municipalities, profiling of hazards based on historical data, and assessing vulnerability.

According to the *Commonwealth of Pennsylvania 2013 Standard All-Hazard Mitigation Plan* (2010), “risk” is defined as: “the potential for damage, injury, or death as a result of natural or human-made hazard events.” The risk assessment included in this Plan Update: seeks to determine which hazards pose the greatest threat to communities in Luzerne County, characterizes each hazard by location specific events and historic data, and provides direct linkages between risks and mitigation actions in the Mitigation Strategy section of this Plan.

The procedure outlined in *Pennsylvania’s All-Hazard Mitigation Planning Standard Operating Guide* (2013) consists of three (3) main components to the Risk Assessment:

1) Identifying Hazards:

Requirement 201.6(c)(2)(i): *The risk assessment shall include a description of the type of all hazards that can affect the jurisdiction.*

2) Profiling Hazards:

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

3) Assessing Vulnerability:

Requirement 201.6(c)(2)(ii): *The risk assessment shall include a description of the jurisdiction’s vulnerability to the hazards described in (c)(2)(i) of this section. The description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: 1) the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas and, 2) an estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate; 3) providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*

Updating the risk assessment from the 2009 Plan was based on the following methodology:

- Hazards identified and assessed in the 2009 Plan were reviewed with the Steering Committee to determine which hazards have had the greatest impact on the community over the past five years, and to identify additional hazards to be assessed as part of the 2014 Plan Update.
- A municipal workshop was held with local community representatives to review hazard areas mapped as part of the 2009 Plan; municipalities were asked to map locations of hazard areas, provide a description of each problem area, and provide additional information or revise descriptions of the existing hazard areas.
- Historic hazard event data was collected from the National Climatic Data Center (NCDC) and the Spatial Hazards Events and Losses Database for the United States (SHELDUS) to include hazard data through 2014.
- Updated flooding vulnerability maps were prepared based on the Federal Emergency Management Agency – Digital Flood Insurance Rate Map (FEMA – DFIRM) mapping update in 2012, to determine if additional critical facilities and infrastructure are vulnerable based on the updated floodplain boundaries.
- All hazards identified by the Steering Committee were assessed according to the *Pennsylvania All-Hazard Mitigation Planning Standard Operating Guide* (2013), and risk factors were calculated for each hazard as part of the hazard vulnerability assessment and prioritization ranking.

Adhering to the above requirements and methodology, each hazard identified in this chapter contains the following information as part of the hazard profiling and hazard vulnerability assessment – Description; Location and Geographic Extent; Range of Magnitude; Previous Occurrences; NFIP Structures and Repetitive Loss Structures (flooding only); Probability of Future Events; Environmental Impacts; Inventory and Summary of Vulnerable Assets; Estimate of Losses; Risk Factor; Impact on Future Development.

4.2 Hazard Identification

4.2.1 Presidential and Gubernatorial Disaster Declarations

As a first step in identifying hazards, a list of Presidential and Gubernatorial declarations of emergencies issued for Lackawanna County in the past fifty (50) years was developed. This is presented in Table 4.1.

Table 4.1. Presidential and Gubernatorial Declarations of Emergencies for Lackawanna County.

Date of Hazard	Type of Hazard	Affected Area	Type of Declaration
Oct 2012	Hurricane Sandy	Regional	Gubernatorial
Sep 2011	Flooding – Hurricane Irene and Tropical Storm Lee	Regional	Presidential; Gubernatorial
Apr 2007	Proclamation of Emergency - Severe Winter Storm	All 67 Counties	Gubernatorial
Feb 2007	Proclamation of Emergency - Severe Winter Storm	All 67 Counties	Gubernatorial
Feb 2007	Proclamation of Emergency - Regulations	All 67 Counties	Gubernatorial
Dec 2006	Severe Storms and Tornadoes	Lackawanna	SBA Physical Damage and Economic Injury
Nov 2006	Severe Storms and Flooding	Lackawanna	SBA Physical Damage and Economic Injury
Sep 2006	Proclamation of Emergency - Tropical Depression Ernesto	All 67 Counties	Gubernatorial
Jun 2006	Proclamation of Emergency - Flooding	Lackawanna	Gubernatorial & Presidential
Sep 2005	Proclamation of Emergency - Hurricane Katrina	All 67 Counties	Gubernatorial & Presidential
Sep 2005	Proclamation of Emergency - Hurricane Katrina	All 67 Counties	Gubernatorial
Apr 2005	Severe Storms, Flooding, and Mudslides	Lackawanna	Gubernatorial & Presidential
Sep 2003	Hurricane Isabel/Henri	All 67 Counties	Gubernatorial & Presidential
Aug 2003	High Winds and Heavy Rains	Lackawanna	Gubernatorial & Presidential
Sep 1999	Hurricane Floyd	All 67 Counties	Gubernatorial & Presidential
Jul 1999	Drought	Lackawanna	Gubernatorial
Apr 1997	Snowstorm	Lackawanna	Gubernatorial
Jan 1996	Flooding	All 67 Counties	Gubernatorial & Presidential
Sep 1995	Drought	Lackawanna	Gubernatorial
Jan 1994	Severe Winter Storms	All 67 Counties	Gubernatorial & Presidential
Mar 1993	Blizzard	All 67 Counties	Gubernatorial & Presidential
Jul 1991	Drought	Lackawanna	Gubernatorial
Sep 1985	Flood	Lackawanna	Gubernatorial & Presidential
Sep 1985	Flood	Lackawanna	SBA - Physical Disaster Loans & Economic Injury Disaster Loan
Nov 1980	Drought Emergency	Lackawanna	Gubernatorial
Jan 1979	Flood	Lackawanna	Gubernatorial
Feb 1978	Blizzard	All 67 Counties	Gubernatorial
Jan 1978	Heavy Snow	All 67 Counties	Gubernatorial
Oct 1976	Flood	Lackawanna	Gubernatorial & Presidential
Sep 1975	Flood (Eloise)	Lackawanna	Gubernatorial & Presidential
Apr 1975	High Winds	All 67 Counties	Gubernatorial
Feb 1974	Truckers Strike	All 67 Counties	Gubernatorial
Jun 1972	Flood (Agnes)	All 67 Counties	Gubernatorial & Presidential
Feb 1972	Heavy Snow	All 67 Counties	Gubernatorial
Jan 1966	Heavy Snow	All 67 Counties	Gubernatorial
Sep 1963	Drought	All 67 Counties	Gubernatorial & Presidential
Aug 1955	Flood (Diane)	Northeastern counties	Presidential

Source: Pennsylvania Emergency Management Agency.

4.2.2 Summary of Hazards

Multiple sources were referenced to obtain a comprehensive identification of all potential hazards affecting the County. These include the Spatial Hazards and Events Losses Database for the U.S. (SHELDUS), United States Geologic Survey (USGS), Department of Conservation and Natural Resources (DCNR), P.A. Department of Environmental Protection (DEP), *Luzerne and Lackawanna Joint-County Hazard Mitigation Plan* (2009), and the *Commonwealth of Pennsylvania 2010 Standard All-Hazard Mitigation Plan* (2013).

The Consultants facilitated a Municipal Mitigation Workshop on March 20, 2014 to offer municipal representatives the opportunity to identify hazard locations and the impacts to their jurisdiction. Municipal officials marked up maps and noted specific problem areas. Once the data was compiled, the Consultants discussed their preliminary findings with the Steering Committee. The discussion led to examining the following hazards:

- 1) Flooding (regional events)
- 2) Winter Weather
- 3) Wind Events
- 4) Flooding (local annual events)
- 5) Hazardous Material Incidents
- 6) Wildfires
- 7) Drought and Crop Failure
- 8) Nuclear Release
- 9) Earthquakes
- 10) Land/Mine Subsidence
- 11) Dam Failure
- 12) Landslides
- 13) Radon

The Risk Assessment, in conjunction with the Capability Assessment in Chapter 5, enables us to understand the County's vulnerabilities to specific hazards, as well as the level of ability to respond to, or prevent, hazard events. The following list summarizes issues faced by the County and municipalities:

- Frequent Flooding
 - Regional flooding issues associated with the Lackawanna River and Tunkhannock Creek, impacting communities in the River corridor.
 - Common concerns among most municipalities are local flooding issues resulting in stream damages, sedimentation and debris issues, and damaged or undersized culverts and bridges.
- Winter Weather
 - Lackawanna County experiences annual winter events that have the potential to disrupt traffic and cause power outages.
- Hazardous Materials Incidents
 - Due to the intensification of industrial activity in the County, and in surrounding counties, including natural gas operations, there has been an increase in the transport of hazardous materials through Lackawanna County.
 - Over the first four months of 2014, approximately 439 incidents occurred involving a hazardous material release, many of which resulted from truck accidents/spills.
- Wildfires
 - The Steering Committee expressed concern that new homes, particularly high-value homes, are being constructed in forested areas, increasing the potential for wildfire impacts. Although numbers and exact locations of new homes are unknown as many have not been constructed at the time of this Plan Update, the Steering Committee expressed that the problem is county-wide.

Recognizing the issues provides a vital first step to addressing and preventing future losses from hazards. The following section, "Mitigation Strategy", outlines goals, objectives, and specific mitigation actions corresponding to the issues associated with the identified hazards on both a county-wide and local municipal level.

4.3 Hazard Profiles

4.3.1 Flooding

Description

Flooding occurs when stream capacities are exceeded due to large volumes of water from precipitation or from winter snow melt enters streams as surface run-off. Flooding can also occur from undersized culverts, bridges, or storm pipes that cannot accept the increased flow of water during storm events. This causes water to back up behind the structures and overtop the natural stream channel banks in what is referred to as the "backwater effect". Another form of flooding, flash flooding, occurs during a short but intense rainfall event. Although the total amount of precipitation is often much less than standard 24-hour design storm (1-year, 2-year, 5-year, 10-year, 25-year, 50-year, or 100-year) precipitation depths, the precipitation falls in a short time period. This leads to intense surface runoff and stream levels rise quickly in response to the run-off. The effects of flash flooding are exacerbated by increases in impervious surfaces from new developments.

Location and Geographic Extent

Severe flooding is generally restricted to the 100-year floodplain boundary (2012 FEMA DFIRM), which is identified on the Base Map (provided in the Appendix). The County is essentially comprised of two distinct flood hazard areas; 1) communities within the Lackawanna River flood zone and large stream flood zones, and 2) communities not adjacent to the River or large streams, but are impacted by local flooding or flash flooding as described above. Additionally, FEMA, in conjunction with the U.S. Army Corps of Engineers, updated the flood hazard along the Susquehanna River corridor based on Tropical Storm Lee flooding that occurred in 2011 on the Susquehanna River. Known as "RiskMap", the communities along the Susquehanna River should use the RiskMap data for a better understanding of the increased flood risk. The Susquehanna River only impacts the very southern limits of Newton and Ransom Townships, which are sparsely populated. However, the RiskMap data is provided in the Appendix as a reference to those communities with the potential increased flood risk. A map of the flood hazard areas and a corresponding table of number of structures within flood hazard areas per municipality is provided in the Appendix.

Based on the 2009 Plan, several municipalities identified a variety of issues as a result of flooding, including stream damage, roadway and culvert washouts, and flooded homes and businesses. At the March 20, 2014 Municipal Mitigation Workshop, municipalities were given an opportunity to review the 2009 Plan problem areas, update accordingly, and provide additional problem areas due to hazard events which have occurred in the past five years. Municipalities continued to identify flood issues as their number one concern. A map of the locations identified by the municipalities and a summary of each problem is provided in the Appendix.

Range of Magnitude

Table 4.2 summarizes the range of magnitude for flood hazards.

Table 4.2. Range of Magnitude – Flood Hazards.

Severity	Causes	Frequency	Damage Extents
Minimum	Local Storms – Flash Floods	Annual	Minor road washouts; storm pipe failure
Medium	Regional Storms – Heavy Rainfall	5 to 10 years	Bridge and culvert damage; some properties flooded
Maximum	Large Multi-Day Storms - Hurricanes	10 to 100 years	Major rivers and large streams experience overbank flooding; properties flooded; bridge and culvert failure

Previous Occurrences

Lackawanna County has experienced some of the worst flooding as the result of precipitation from tropical storms and hurricanes and from snowmelt events. Tropical storms and hurricanes have historically occurred between the months of June and November (peak season September-October). These storms have brought torrential rains and high winds, and have caused flash flooding, as well as overbank flooding of inland streams and rivers.

NCDC and SHELDUS historic hazard data list forty-seven (47) flooding events that resulted in damages from 1970 to 2013.

NFIP Structures and Repetitive Loss Structures

A *repetitive loss property* is defined by FEMA as any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Furthermore, the NFIP definition for a *severe repetitive loss structure* is any property for which four or more flood insurance claims of more than \$5,000 have been paid, or at least two claims where the building portion of the total payment exceeds the property value. These structures are important indicators of flooding in flood-prone areas, as they show the potential that a hazard could re-occur.

Table 4.3 presents a summary of the repetitive loss and severe repetitive loss structures by municipality, total number of structures by type, and total payments.

Table 4.3. Lackawanna County NFIP Structures by Municipality.

Municipality	# of Rep. Losses	Total Rep. Loss Payments	# of Severe Rep. Losses	Total Severe Rep. Loss Payments	Total Losses	Total Payments
Archbald Borough	2	\$107,035	1	\$66,722	3	\$173,757
Blakely Borough	1	\$30,929	-	-	1	\$30,929
Carbondale City	7	\$183,307	-	-	7	\$183,307
Clarks Summit Borough	2	\$164,117	1	\$140,827	3	\$304,944
Fell Township	1	\$13,410	-	-	1	\$13,410
Jermyn Borough	3	\$22,825	-	-	3	\$22,825
Mayfield Borough	2	\$1,437,969	2	\$1,437,969	4	\$2,875,939
Moosic Borough	2	\$33,806	-	-	2	\$33,806
Old Forge Borough	2	\$59,247	-	-	2	\$59,247
Olyphant Borough	5	\$45,648	-	-	5	\$45,648
Scranton City	113	\$7,596,346	7	\$2,969,126	120	\$10,565,472
South Abington Township	1	\$46,494	1	\$46,494	2	\$92,989
Thornhurst Township	4	\$204,558	-	-	4	\$204,558
Totals	145	\$9,945,691	12	\$4,661,139	157	\$14,606,831

Probability of Future Events

Large-scale river flood event probabilities are measured by the inverse of the return period. Therefore, the 100-year flood event has a 1 in 100 or 1 percent chance of occurring in any given year. Based on the historic data, however, it is clear that municipalities traversed by smaller streams experience flooding from smaller, more frequent storms. The average frequency of a flood resulting in some form of damage over the 43-year period presented in the NCDC and SHELDUS dataset is approximately 1.1 floods per year. This essentially equates to a 100 percent annual probability of a local flood event occurring somewhere in the County.

Environmental Impacts

Potential environmental impacts from flooding include:

- Stream pollution from roadway/parking lot runoff (oils, grease, dirt, etc.)
- Streambank erosion and sediment deposits
- Unnatural debris deposits such as washed out bridges/culverts, homes, vehicles, etc.

Inventory and Summary of Vulnerable Assets

In order to determine the structures in the County that are vulnerable to flooding, all structures and critical facilities were overlain with the 100-year floodplain (current 2012 DFIRM data) using GIS tools. The analysis indicated that 6,621 structures and 28 critical facilities are located in the 100-year floodplain in the County. A map of the critical facilities in the 100-year floodplain, and a summary of the results by municipality are presented in the Appendix.

Estimate of Losses

The total estimated economic damage associated with the 47 flooding events in the period from 1970 to 2013 as reported by NCDL and SHELDC is approximately \$112 million (\$177 million in current dollars). This equates to an annual economic loss of approximately \$4.1 million (in current dollars). Refer to the Appendix for a full listing of flood events and damages as cited by NCDL and SHELDC data.

In addition to historic losses, total economic exposure to the 100-year flood was determined using the current 2012 DFIRM data, economic data from census tracts, and the structures identified in the 100-year floodplain. There is approximately \$2.6 billion of economic exposure due to flooding in the County. A summary of economic exposure by municipality is provided in the Appendix.

Risk Factor

Risk Factor = 3.3 (for regional less frequent events), and Risk Factor = 2.6 (for local annual events). Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

Per discussions with the Steering Committee, no new development is anticipated in floodplains or other flood hazard areas.

4.3.2 Winter Weather

Description

A variety of weather types and precipitation methods are associated with winter weather: snowfall, freezing rain, and sleet. Winter weather poses threats to the safety of people and infrastructure in the following ways:

- Medical conditions such as frostbite, and serious injury or loss of life
- Disruptions in electrical/utility systems, transportation systems and business activities
- Failure of power lines due to the weight or force of snow, wintry mix, etc. or indirectly because of the higher demand for electricity during these types of events
- Prevention of the delivery of fuel sources such as oil and propane for heating purposes when roads close or become too dangerous to traverse
- Increase in traffic accidents and blocking of evacuation routes.

Winter weather leaves the County vulnerable not only during the winter months, but also has an effect on the upcoming spring months. After a season of snow and ice, ice-melt brings with it a flood threat.

Location and Geographic Extent

Winter weather is a regional hazard, with county-wide impacts.

Range of Magnitude

Table 4.4 summarizes the range of magnitude for winter weather hazards.

Table 4.4. Range of Magnitude – Winter Weather Hazards.

Severity	Causes	Frequency	Damage Extents
Minimum	Light Snowfall	Annual	Minor traffic disruptions
Medium	Heavy Snowfall; Freezing Rain	1 to 2 years	Road closures; some downed trees and power lines
Maximum	Excess Heavy Snowfall; Severe Icing	2 to 5 years	Substantial road closures; extensive power outages

Previous Occurrences

NCDC and SHELDUS data lists 72 winter weather events that resulted in damages from 1960 to 2014. Lackawanna County Emergency Management Agency staff indicated that winter weather impacts have been typical over the past five years.

Probability of Future Events

The average frequency of a winter weather event resulting in some form of damage over the 54-year period presented in the NCDC and SHELDUS dataset is approximately 1.3 winter events per year. Therefore, it can be expected that winter weather will affect the County on an annual frequency.

Environmental Impacts

Potential environmental impacts from winter weather include:

- Stream pollution which is a result of de-icing materials (i.e. granular or liquid road salts) used to clear roadways from snow and ice that enter waterways.

Inventory and Summary of Vulnerable Assets

Primary impacts from winter weather include power outages due to downed trees and power lines, and infrastructure impacts due to road closures. Approximately 770 miles of State and Federal highways, and approximately 1,530 miles of secondary and municipal roads are located in Lackawanna County.

Estimate of Losses

The total estimated economic damage associated with the 72 winter weather events in the period from 1960 to 2014 is approximately \$1.8 million (\$3.3 million in current dollars). This equates to an annual economic loss of approximately \$60,000 (in current dollars). Refer to the Appendix for a full listing of winter weather events and damages as cited by NCDC and SHELDUS data.

Risk Factor

Risk Factor = 3.0. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

New development is required to adhere to international building codes, which specify design standards for snow loadings. Therefore, the impact of winter weather on new structures is generally low. In order to accommodate the increased population associated with new development, it must be ensured that emergency response services, such as road clearing crews, are adequate.

4.3.3 Wind Events

Description

High winds most frequently occur during strong storm events and hurricanes or tropical storms. Hurricanes that affect Northeastern Pennsylvania typically originate in the Atlantic Ocean or Gulf of Mexico between June and November. Pennsylvania is located far north and inland compared with the areas where hurricanes typically reach landfall. Since a hurricane needs warm seawater to retain its strength, once it is over land, it dissipates energy, and will typically be downgraded to a tropical storm system before it reaches Pennsylvania.

High winds can also develop from the general west to east movement of the jet stream, and as frontal systems move through the area. Although often less intense than hurricane force winds, winds developed by these storm systems or

pressure systems occur more frequently. Tornadoes can also spawn from these frontal systems under the right atmospheric conditions. Tornado activity has been witnessed and documented in Lackawanna County in the past.

Location and Geographic Extent

Although tornadoes and severe thunderstorms generally impact an isolated area in any given event, there is the potential for these events to impact any part of the County.

Range of Magnitude

Tornadoes and “microbursts” can occur during thunderstorms and other weather systems where relatively high winds prevail. Tornadoes are classified according to the Enhanced Fujita (EF) scale which is based on wind speed and degrees of damages applied to various structure types. There are six categories of tornadoes with the weakest labeled as EF0 and the most intense, as EF5. Hurricanes are classified according to the Saffir-Simpson scale, ranging from Category 1 (weakest) to Category 5 (strongest).

Table 4.5. Enhanced Fujita Scale.

Category	Wind Speed (mph)	Damage Level	Type of Damage Done
EF0	65-85	Light	Some damage to chimneys; breaks branches off trees.
EF1	86-110	Moderate	Peels surface off roofs; mobile homes pushed off foundations or overturned.
EF2	111-135	Considerable	Roofs torn off frame houses; mobile homes demolished; large trees snapped or uprooted.
EF3	136-165	Severe	Roof and some walls torn off well-constructed houses; trains overturned; most trees uprooted.
EF4	166-200	Devastating	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	>200	Incredible	Strong frame houses lifted off foundations; automobile sized missiles carried in excess of 100 meters; steel reinforced concrete structures badly damaged.

*Source: <http://www.tornadoproject.com/alltorns/patorm.htm>

Table 4.6. Saffir-Simpson Hurricane Wind Scale.

Category	Sustained Winds (mph)	Type of Damage Done
1	74-95	Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111-129	Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130-156	Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	>157	A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

*Source: National Weather Service – National Hurricane Center

Previous Occurrences

NCDC and SHELDUS data list 193 wind events that resulted in damages from 1960 to 2013. It should be noted that although hurricanes have caused flooding issues, no hurricane events have resulted in significant damages due to wind.

Probability of Future Events

FEMA has developed wind zones in the United States that designate regions susceptible to high winds based on wind speed. Luzerne County falls in Zone II and Zone III, which are classified as 160 mph and 200 mph wind zones, respectively. Figure 4.A displays the FEMA wind zone map.

Figure 4.A. FEMA Wind Zone Map of the United States.

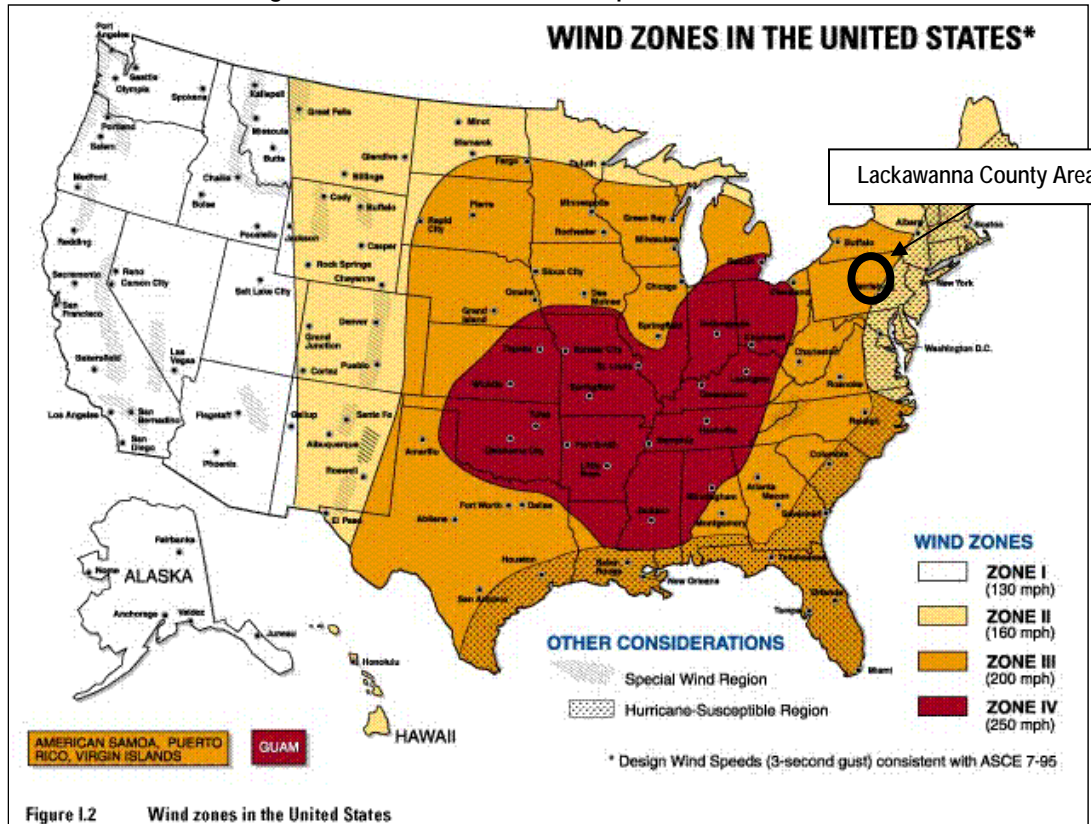


Figure 1.2 Wind zones in the United States

Source: <http://www.fema.gov/graphics/library/wmap.gif>

The average frequency of a wind event resulting in some form of damage over the 53-year period presented in the NCDC and SHELDDUS dataset is approximately 3.6 wind events per year. Therefore, it can be expected that wind events will affect the County on an annual frequency. It must also be noted that tornadoes have occurred in Lackawanna County in the past, and will likely continue to impact the County, although infrequently, in the future.

Environmental Impacts

Potential environmental impacts from high wind events include:

- Debris in streams, wetlands, or other sensitive environmental features

Inventory and Summary of Vulnerable Assets

Wind impacts and associated damages are generally greatest on utility transmission lines, specifically overhead electric power lines and communication lines.

Estimate of Losses

The total estimated economic damage associated with the 193 wind events in the period from 1960 to 2013 is approximately \$4.4 million (\$10 million in current dollars). This equates to an annual economic loss of approximately \$190,000 (in current dollars). Refer to the Appendices of this Plan for a full listing of wind events and damages as cited by NCDC and SHELDDUS data.

Risk Factor

Risk Factor = 2.6. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

All new residential and commercial structures are required to be constructed per the International Building Code, which requires structures to be designed to a 90 mph wind speed (in Lackawanna County). Therefore, the impact to future development due to high wind events is expected to be minimal.

4.4.4 Hazardous Material ReleasesDescription

A hazardous material can be released into the environment from a variety of sources. Most often, the source is from vehicular accidents involving transportation of the hazardous materials. Other sources include the unintentional release from production facilities, and negligence. These types of unintentional releases are often through stored material being leaked into groundwater or surface water systems when storage containers corrode over time.

Location and Geographic Extent

There are approximately seventy (70) sites within Lackawanna County which store hazardous materials ranging from heavy metals to chemical manufacturing, with the majority of the sites located in Carbondale City, Dunmore Borough, Scott Township, the City of Scranton, and Throop Borough. In addition to hazardous material storage sites, the Steering Committee expressed concern about the intensification of transporting hazardous materials via truck and rail through the County due to natural gas operations in and around the County. Waste material resulting from drilling operations is transported via rail to Carbondale City, and then via truck by way of Interstate-81, and State Routes 6, 106, and 187. The Keystone Landfill, in Dunmore Borough and Throop Borough, takes waste material from natural gas drilling operations.

Range of Magnitude

Table 4.7 summarizes the range of magnitude for transportation issues related to local industry.

Table 4.7. Range of Magnitude – Transportation Issues Related to Local Industry.

Severity	Causes	Damage Extents
Minimum	Single truck accidents or local site leak	Minor traffic disruptions; no loss of life
Maximum	Train derailments and material spills	Road closures; injuries and fatalities; release of hazardous chemicals into streams and groundwater systems

Previous Occurrences

As reported in the *Commonwealth of Pennsylvania 2013 Standard All-Hazard Mitigation Plan* (2013), there were forty-eight (48) hazardous material related incidents in Lackawanna County over a six- year period from 2006 to 2011. However, with the increase in industrial activity associated with natural gas operations in the region over the past three years, the number of hazardous materials incidents has also increased. In the first four months of 2014, there were 439 reports of a hazardous material spill. Limited data is available on the impacts associated with these events.

Probability of Future Events

Based on the previous occurrences data, there is an average of approximately eight (8) hazardous material release incidents per year.

Environmental Impacts

Potential environmental impacts from hazardous material release incidents include:

- Stream pollution from spills and releases of hazardous chemicals;
- Leaching of hazardous chemicals into groundwater systems.

Inventory and Summary of Vulnerable Assets

This hazard does not generally affect structures or critical facilities. Rather, the impact is measured by disruption to traffic and effort associated with cleaning chemical spills.

Estimate of Losses

The total estimated economic damage associated with the aforementioned transportation incidents is approximately \$20,000, with costs mainly arising from spill clean-up.

Risk Factor

Risk Factor = 2.5. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

The impact of hazardous material- related incidents will mainly be to emergency management resource allocation and personnel.

4.4.5 Wildfires

Description

Wildfires occur as a result of human negligence, lightning strikes, prolonged droughts and dry conditions or, in rare cases, by spontaneous combustion. Wildfires typically occur in more rural areas or in agricultural areas that contain a high concentration of shrub-like vegetation. The County is most susceptible to wildfires during hot, dry weather. Wildfires pose a safety risk to humans and can also kill wildlife and livestock. They also pose the threat of damage to property and are most dangerous in locations where forest and open grassland are adjacent to residential or urban areas.

Location and Geographic Extent

Lackawanna County is generally rural in nature, consisting of large tracts of undeveloped and forest lands. Therefore, a wildfire could potentially develop in any portion of the County. The most high risk areas of the County are at the forest-urban interface, where the potential for wildfire to spread to structures is greatest. The County contains approximately 39,756 acres of farmland, 10,868 acres of woodland, and 4,699 acres of idle cropland. Figure 4.C also shows the fire potential to be approximately evenly distributed throughout the County.

Range of Magnitude

Table 4.8 summarizes the range of magnitude for wildfire hazards.

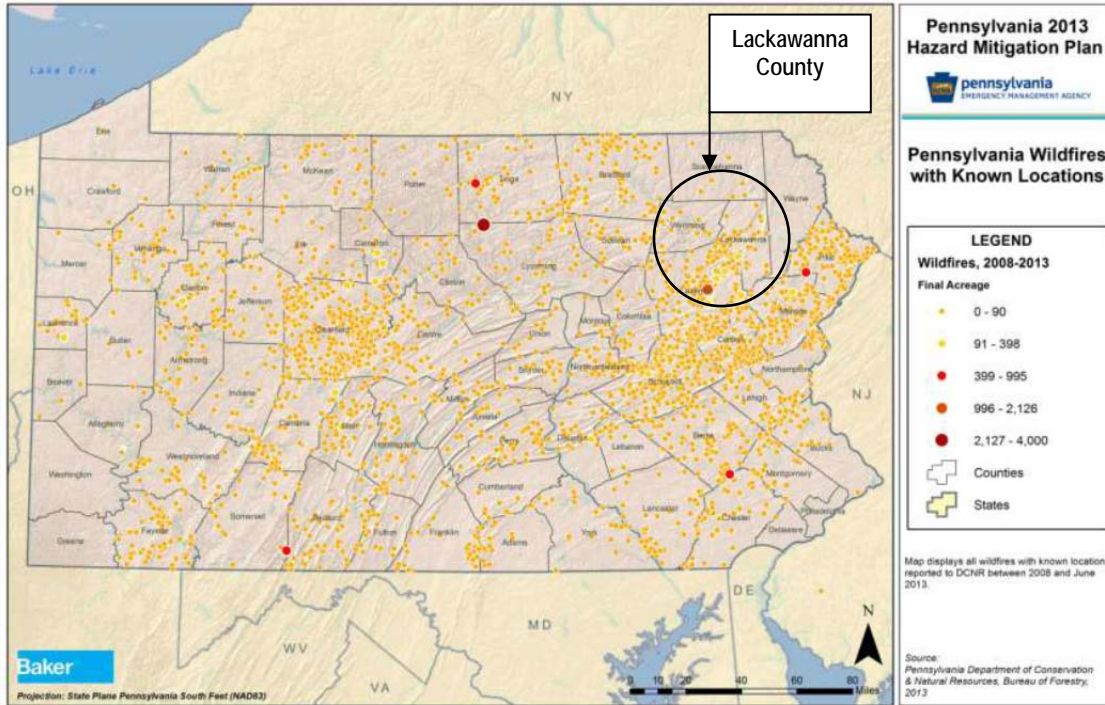
Table 4.8. Range of Magnitude – Wildfire Hazards.

Severity	Causes	Frequency	Damage Extents
Minimum	Localized brush burning; contained naturally or by emergency response team	Annual	Minor loss of forest/vegetation; no damage to structures
Maximum	Extreme drought conditions prevent extinguishing and containing a fire	None Recorded	Major loss of forest, agricultural land; damage to structures

Previous Occurrences

From 2002 to 2013, 59 wildfires occurred in Lackawanna County, burning a total of approximately 730 acres. Figure 4.B displays a map of wildfire locations in the period from 2002 to 2013.

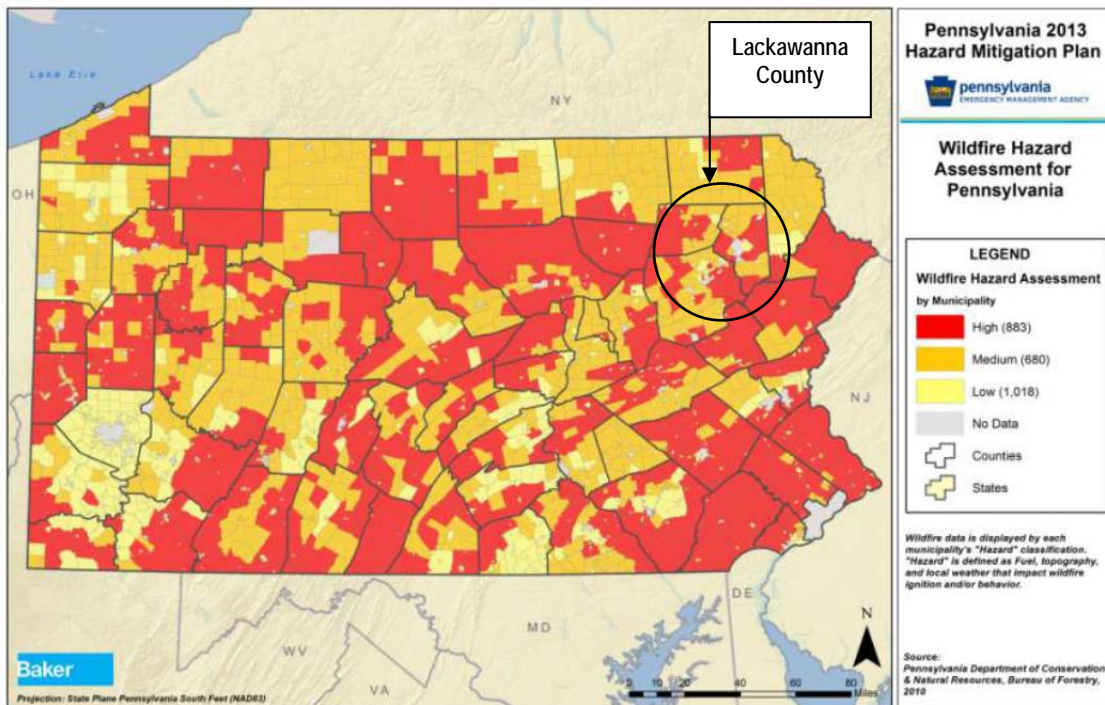
Figure 4.B. Wildfires in Pennsylvania 2002 to 2013.



Probability of Future Events

Based on the historic information of 59 wildfires occurring over an 11-year period, the average annual occurrence of wildfires in Lackawanna County is approximately five (5) per year. Figure 4.C displays wildfire potential based on local conditions.

Figure 4.C. Wildfire Potential Based on Fuel, Topography, and Local Weather Conditions.



Environmental Impacts

Potential environmental impacts from wildfires include:

- Loss of forest/grassland habitat and ecosystems
- Severe erosion, streambed siltation, and flooding as the vegetation that helps to reduce surface runoff from rainfall is destroyed

Inventory and Summary of Vulnerable Assets

The main impact of wildfires is agricultural damage due to the spread of fire to croplands. Lackawanna County has approximately 39,756 acres of farmland with an annual market value of approximately \$16 million. Additionally, all structures and critical facilities within the County were overlain with forested areas (i.e. urban/forest interface) using GIS tools. The analysis indicated that 39,628 structures and 39 critical facilities are located in wildfire potential areas. A map of the critical facilities in wildfire potential areas, and a summary of the results by municipality are presented in the Appendix.

Estimate of Losses

Historically, no substantial economic losses have resulted from wildfires in Lackawanna County.

Risk Factor

Risk Factor = 2.5. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

The Steering Committee expressed concern that new homes, particularly high-value homes, are being constructed in forested areas, increasing the potential for wildfire impacts. The problem is two-fold; first, there is a higher probability of a wildfire impacting residential property, and secondly, new homes are being constructed in areas that may be difficult for emergency services to access during a fire event. Although numbers and exact locations of new homes are unknown as many have not been constructed at the time of this Plan Update, the Steering Committee expressed that the problem is county-wide.

4.4.6 Drought and Crop Failure

Description

Drought is the result of a natural reduction in precipitation expected to fall over a period of time, and is generally defined by three categories: 1) A *meteorological drought* occurs when there is a deficiency in atmospheric moisture. Depending on pre-drought conditions, a meteorological drought typically has little effect on crops or water resources; 2) A more serious drought is an *agricultural drought*, which occurs when the lack of sufficient moisture starts to inhibit crop growth; 3) Should an agricultural drought last on the order of months, it could develop into a *hydrologic drought*. The hydrologic drought is the most devastating of the three types, as water resources can become significantly depleted and crops can be greatly damaged.

Location and Geographic Extent

Drought and crop failure are regional hazards, with county-wide impacts.

Range of Magnitude

As described above, there are three general categories pertaining to the severity of a drought. To further understand drought potential and severity, the Palmer Drought Severity Index (PDSI) is typically used for tracking moisture levels and predicting droughts. The PDSI is an indicator of moisture conditions for prolonged periods of time, and ranges from -4.0 (extreme drought) to +4.0 (extremely moist). A map of current drought PDSI is provided by the National Weather Service Climate Prediction Center:

http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml

Previous Occurrences

NCDC and SHELDUS list nine (9) drought events that resulted in damages from 1988 to 1999. The Commonwealth of Pennsylvania 2013 Standard All-Hazard Mitigation Plan cites Lackawanna County experiencing five (5) drought *emergencies* from 1980 – 2009. Agricultural damages and water supply deficiencies resulted from these events.

Probability of Future Events

Drought probability is calculated in a similar manner to flooding probability. The probability of a drought occurring in any given year is the inverse of the return period. For example, a 25-year drought has a 1/25, or 4 percent, chance of occurring in any year. Based on the historic data provided by NCDC and SHELDUS, it was determined that the frequency of drought resulting in damages is approximately one to three years.

Environmental Impacts

Potential environmental impacts from drought include:

- Loss of vegetation;
- Impacts to wetlands and wetland ecosystems;
- Low stream flow conditions resulting in fish and aquatic habitat damage.

Inventory and Summary of Vulnerable Assets

The main impact of droughts is agricultural damage due to water supply shortages. Lackawanna County has approximately 39,756 acres of farmland with an annual market value of approximately \$16 million.

Estimate of Losses

The total estimated economic damage associated with the nine (9) drought events in the period from 1988 to 1999 is approximately \$30 million (\$51 million in current dollars). This equates to an annual economic loss of approximately \$4.6 million (in current dollars). Refer to the Appendix for a full listing of drought events and damages as cited by NCDC and SHELDUS data.

Risk Factor

Risk Factor = 2.2. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

Approximately 70% of Lackawanna County's water supply is provided by surface water sources (i.e. reservoirs) and 30% through groundwater, (either through private wells, municipal water authorities or community water systems). As future development increases, water supply systems should be evaluated for maximum capacity during drought conditions to ensure adequate water resources are available under increased demand and decreased supply.

4.4.7 Nuclear Release

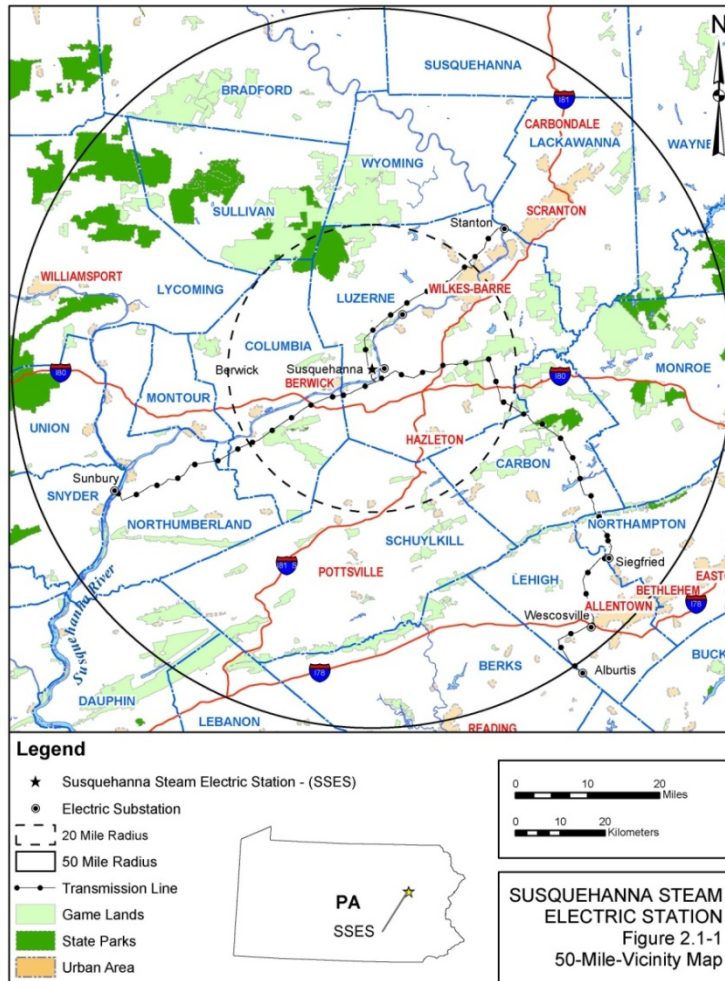
Description

Nuclear release refers to the unintended release of radioactive material from a power generation facility. Although the most notable occurrence was the Three Mile Island incident in Middletown, Pennsylvania in 1979, other minor accidents and accidental releases due to various component failures has occurred in plants throughout the U.S. Most often, an accidental release of radioactive material occurs when contaminated water or steam is leaked either directly from the facility or from storage containers that are mishandled.

Location and Geographic Extent

The only nuclear power generation facility within 50 miles of Luzerne County is the Susquehanna Steam Electric nuclear facility in Salem Township, Luzerne County. This facility is powered by a boiling water reactor (BWR) which is notably one of the safest nuclear power systems, and component failures in any part of the system will automatically shut down the plant. Figure 4.D displays Lackawanna County in relation to the Susquehanna Steam Electric facility, and the 20-mile and 50-mile fallout zones.

Figure 4.D. 20-Mile and 50-Mile Radii from Susquehanna Steam Electric Nuclear Power Station.



Range of Magnitude

Should a failure of the Susquehanna Steam Electric Station occur, the severity of impacts in the 50-mile radius would require evacuation of Lackawanna County.

Previous Occurrences

No failures have occurred at the plant resulting in damages, injuries, or fatalities. One (1) "alert" was declared at the station on March 2, 2006. "An Alert is the second-lowest of four emergency classifications for nuclear power plants. It is declared when an event has occurred that could reduce the plant's level of safety, but backup plant systems still work." (PEMA News Archive)

Probability of Future Events

The history of nuclear power plant failure in the U.S includes very few incidents relative to the number of active power plants (2 failures for 100+ plants). Thus, the probability of a well-monitored, well-regulated nuclear facility experiencing a failure is low. The Susquehanna Steam Electric Station is regulated by the Nuclear Regulatory Commission (NRC), and is inspected by resident inspectors, who are permanently stationed at the site.

Environmental Impacts

Potential environmental impacts from nuclear release include:

- Damage to aquatic ecosystems from radiation;
- Loss of vegetation and forest habitat from radiation.

Inventory and Summary of Vulnerable Assets

The failure of a nuclear power facility can result in devastating and far-reaching effects. Problems and health effects from nuclear power failure are from the high levels of radioactive material that is used or produced during the power generation process. Proactive evacuation measures will ensure minimal impact to health and well-being.

Estimate of Losses

Nuclear release would not directly impact structures or critical facilities. Economic losses would mainly arise from damage to water supply systems and agriculture. As mentioned previously, Lackawanna County has approximately 39,756 acres of farmland with an annual market value of approximately \$16 million.

Risk Factor

Risk Factor = 2.1. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

Risk to future development is no different than risk to existing infrastructure, property, or citizen health. Where development is planned, evacuation routes should be adjusted as necessary to accommodate increased traffic flow.

4.4.8 Earthquakes

Description

Earthquakes result from the generation of seismic waves in the Earth's surface. Earthquakes are most commonly caused by geological fault rupture, gas migration (typically methane deep within the earth) through the Earth's crust, volcanic activity, landslides, mine blasts, and nuclear experiments.

The main effects of earthquakes are shaking and ground rupture. These can often result in damage to buildings or other rigid superstructures on the Earth's surface, depending on several factors which control the local effects of an earthquake. These factors include the earthquake magnitude, the distance of the local area to the earthquake epicenter, and the local geologic conditions.

In northeast Pennsylvania, the cause of earthquakes is still being researched. A likely explanation is the "pre-existing zones of weakness" model, in which the cause of earthquakes in the northeast U.S. is the failure of old fault lines created millions of years ago. It remains incredibly difficult to predict when and where an earthquake will occur in the northeast U.S. and Pennsylvania.

Location and Geographic Extent

Earthquakes are a regional hazard, with countywide impacts.

Range of Magnitude

The magnitude of an earthquake was traditionally measured by the now obsolete Richter scale. Earthquake intensity is now more frequently measured by the modified Mercalli scale, which utilizes 12 categories ranging from I – Instrumental (felt by few people) to XII - Catastrophic.

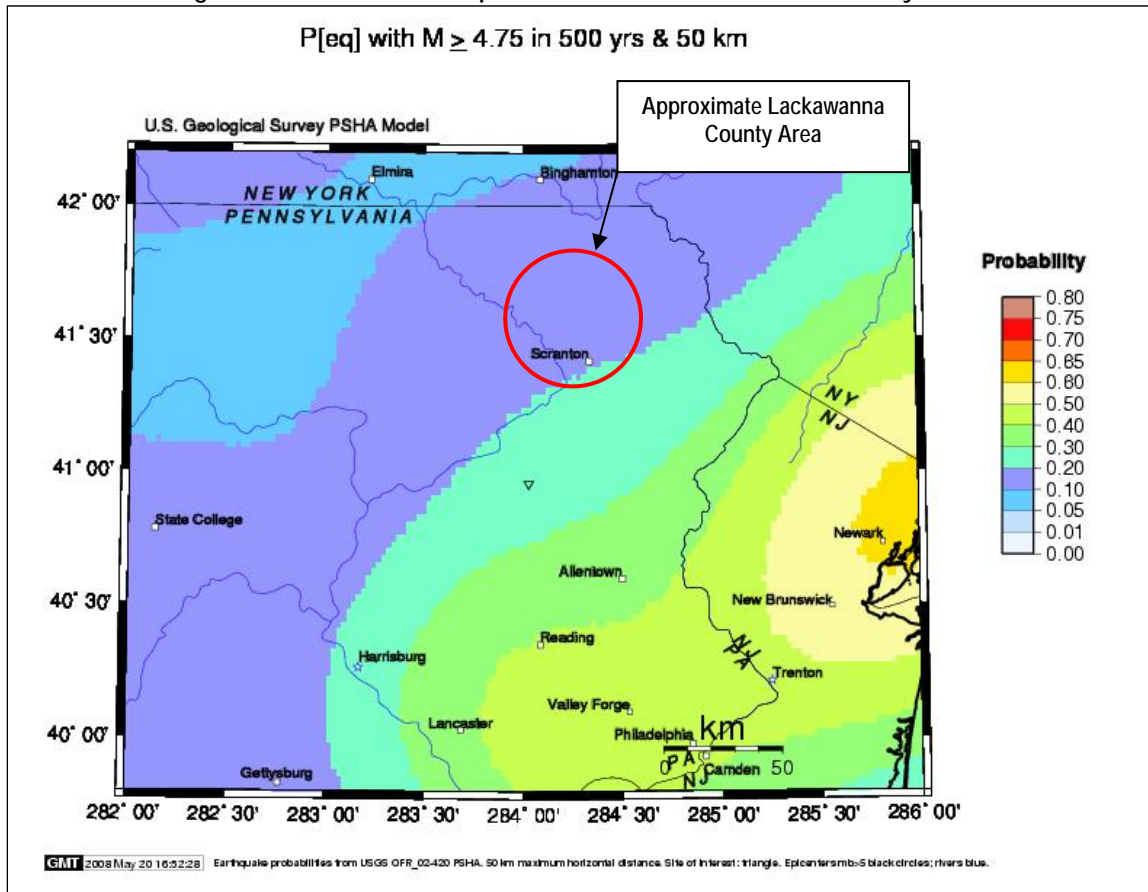
Previous Occurrences

Excepting the earthquake that occurred in Virginia in 2011 which was felt as far north as Ontario, Canada (but did not result in damages in Lackawanna County), no occurrences of earthquakes have been recorded in the County.

Probability of Future Events

Using the United States Geologic Survey (USGS) model for calculating earthquake potential, it was determined that the probability of a magnitude 5.0 earthquake occurring in the next 500 years is 20 percent for Lackawanna County. Figure 4.E displays the 500-year / 5.0 magnitude earthquake probability map.

Figure 4.E. 500-Year Earthquake Potential – Northeastern Pennsylvania.



Source: United States Geologic Survey.

Environmental Impacts

Potential environmental impacts from earthquakes include:

- Pipeline ruptures releasing gas or sewage into surface water and groundwater systems.

Inventory and Summary of Vulnerable Assets

FEMA’s HAZUS-MH software was used to determine the types and numbers of structures vulnerable to earthquakes. The results of the HAZUS-MH analysis indicate that a magnitude 5.0 earthquake would damage approximately 962 structures, but that no damage would be sustained by critical facilities.

Estimate of Losses

According to the HAZUS-MH analysis for the magnitude 5.0 event, a total economic loss of approximately \$50 million (including business interruptions) could be anticipated.

Risk Factor

Risk Factor = 2.0. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

Risk to future development is no different than risk to existing infrastructure, property, or citizen health. Where development is planned, emergency services should be adjusted as necessary to accommodate increased population.

4.4.9 Land Subsidence/Mine Related IssuesDescription

Land subsidence is the movement of the ground surface as a result of the collapse or failure of underground mine workings, or sinkhole formation. Subsidence occurs in areas overlying underground mines that are relatively close to the ground surface. This type of subsidence is fairly localized in extent and is usually recognized by an abrupt depression evident at the ground surface as overburden materials collapse into the mine void. Lackawanna County also has underground and surface mine fires, as a result of combustible material igniting after mining operations cease.

Location and Geographic Extent

Lackawanna County has a history of mining activities throughout the County. The most intense historic mining operations were generally conducted along the Lackawanna River corridor and from the City of Scranton north to the City of Carbondale. Three current notable mine fires are located in Carbondale Township, Fell Township, and Olyphant Borough.

Range of Magnitude

Table 4.9 summarizes the range of magnitude for landslide hazards.

Table 4.9. Range of Magnitude – Land Subsidence Hazards.

Severity	Causes	Frequency	Damage Extents
Minimum	Local mine void collapse	2 – 5 years	Single residential structure impacts
Maximum	Large scale mine collapse; mine pool disruption via earth movement	>10 years	Multiple residential structures, community impacts

Previous Occurrences

The Steering Committee estimates that approximately five (5) subsidence events occur annually, and these are mainly triggered by precipitation events.

Probability of Future Events

Due to the geologic condition underlying Lackawanna County from historic mining operations, and the frequency of historic events, land subsidence events can be expected to occur with an approximate recurrence interval of five (5) years.

Environmental Impacts

Environmental impacts associated with land subsidence events are minimal.

Inventory and Summary of Vulnerable Assets

Overlaying the structures in the County with historic mining areas using GIS tools, it was determined that approximately 13,284 structures are located in the historic mining areas of Lackawanna County. Of those structures, approximately thirty-four (34) are critical facilities. A summary of the results by municipality are presented in the Appendix.

Estimate of Losses

Generally, the annual occurrence of subsidence events as expressed by the Steering Committee does not result in significant damage to structures or economic losses. The Office of Surface Mining (OSM) performs flushing and grouting operations to mitigate the subsidence. However, occasionally the grouting is washed out due to heavy precipitation. Over the past five years, one structural impact to an 8-story public housing facility resulted from a subsidence event. The total economic exposure to land subsidence of the 13,284 structures located in historic mining areas is approximately \$5.2 billion. A summary of economic exposure by municipality is provided in the Appendix.

Risk Factor

Risk Factor = 1.8. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

Planned future development should take into consideration the underlying geologic conditions, especially those areas which have historic mining operations and where surface conditions such as depressions and voids indicate that subsurface sinking is occurring.

4.4.10 Dam Failure

Description

Dam failure typically occurs when a large storm event creates surface runoff that exceeds the storage capacity of an impoundment, which causes a dam to be overtopped by the excess water (i.e., weir flow). Emergency spillways are generally designed to pass flow rates between the 100-year 24-hour storm event and the full Probable Maximum Flood (PMF); therefore, a storm larger than these events would usually be required to develop enough run-off to cause prolonged overtopping. This overtopping can cause erosion in the earthen portion of the dam, potentially resulting in a dam breach. Dam breaches result in flood waves that often flood the downstream channel to a greater extent than the 100-year flood. This can cause significant destruction to residential and developed areas.

Location and Geographic Extent

There are 82 dams within Lackawanna County registered with the Department of Environmental Protection (DEP) Division of Dam Safety, of which 33 are considered to be high-hazard. Locations of dams are displayed on the base map provided in the Appendix. The Elmhurst Reservoir, located in Madison and Roaring Brook Townships, is slated for a spillway enlargement, which will improve the ability of the impoundment to pass flood flows without overtopping.

Range of Magnitude

A dam breach typically results in severe damages to structures in the inundation area due to the volume of water displaced in a short time period. However, the impacts of a dam breach are confined to the downstream stream corridor and overbank areas, resulting in localized impacts.

Previous Occurrences

There have been no occurrences of a dam breach in Lackawanna County.

Probability of Future Events

High hazard dams are required to maintain yearly inspections and up-to-date Emergency Action Plans (EAPs), and warnings are posted by the media that will allow evacuations to take place before a breach occurs. For those dams that have an EAP in place, the probability of loss of life or injuries resulting from a dam breach is low. The probability for casualties is higher for those dams without an EAP because media warning systems have not been identified, nor has the downstream inundation area.

Environmental Impacts

Potential environmental impacts from a dam breach include:

- Stream channel erosion and debris deposition.

Inventory and Summary of Vulnerable Assets and Estimate of Losses

It is beyond the purview of this Plan Update to develop inundation areas for dam breach events. Inundation maps associated with high-hazard dams can be posted at municipal buildings and are on file with the Department of Environmental Protection – Northeast Regional Office.

Risk Factor

Risk Factor = 1.6. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

As new development is planned, emergency action plans (EAPs) should be updated to include any development changes downstream of a dam to ensure minimal impact in the event of a dam breach. At this time, no new development is planned downstream of dams in the County.

4.4.11 LandslidesDescription

Landslides occur due to a variety of geologic instabilities in the Earth's crust. However, the primary cause of landslides is when colluvial (loose) soil and old landslide debris on steep slopes give way. The geologic instabilities that cause landslides to occur are often exacerbated by highway projects in which the earth is cut and soil is loosened. Other primary causes of landslides are rainfall or rain-on-snow events that can weaken debris on steep mountain slopes.

Location and Geographic Extent

Given the right conditions, landslides can occur anywhere in the County. The Susquehanna River and Lackawanna River valleys are prone to larger landslides triggered by the rivers' undercutting of the slope material consisting of stratified sedimentary rock. A 1989 report by the Geological Society of America identified thirteen potential "rock block" slides on Shickshinny Mountain. At the time when the report was written, one rock block slide had occurred when slopes were undercut by the construction of a roadway.

Range of Magnitude

Table 4.10 summarizes the range of magnitude for landslide hazards.

Table 4.10. Range of Magnitude – Landslide Hazards.

Severity	Causes	Frequency	Damage Extents
Minimum	Rock falls from steep roadway cuts	Annual	Minor traffic disruptions; damage to vehicles
Medium	Heavy rainfall resulting in slope failure	>10 years	Substantial road closures
Maximum	Rock block slide from River Valley	Millenia	Catastrophic

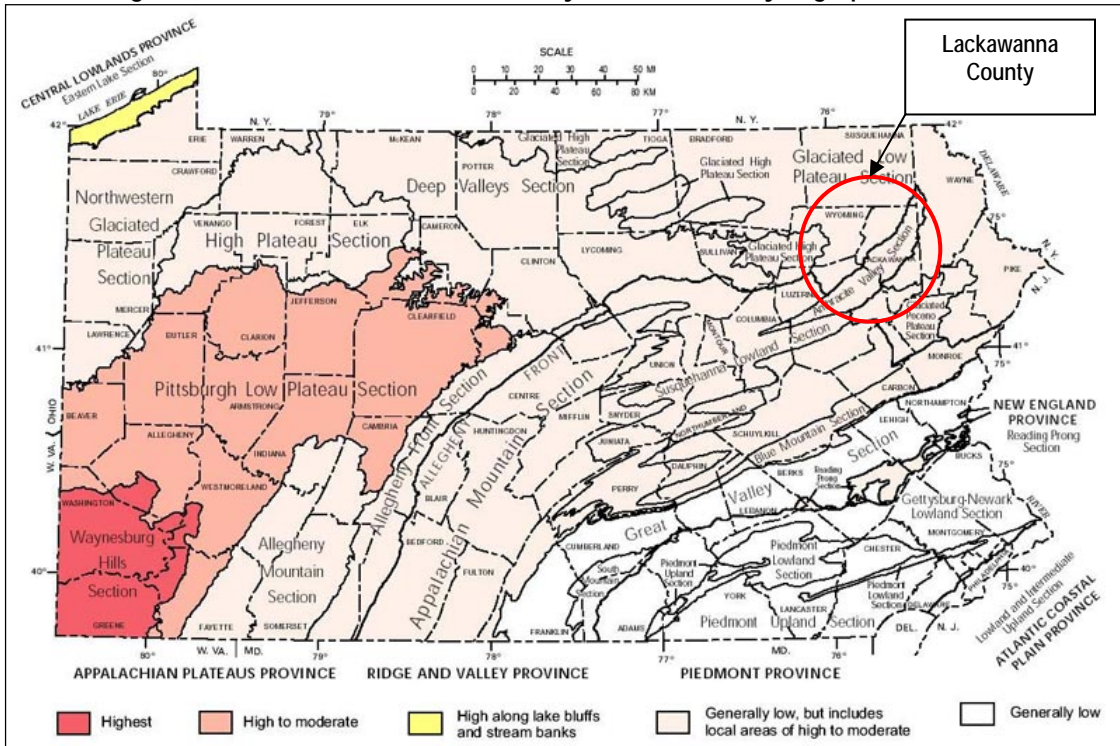
Previous Occurrences

Historically, there have been several reports of small landslides within the County. All of the reports have been isolated to roadway rock falls, two of which and have resulted in minor road closures (less than a day) along secondary routes.

Probability of Future Events

The probability of large-scale future landslide events in Lackawanna County is considered low due to the County's position over the glaciated low plateau physiographic province (geologic formation with low landslide potential). A landslide potential map for Pennsylvania from the Department of Conservation and Natural Resources (DCNR) is provided in Figure 4.F. The map indicates that Lackawanna County is located within the low probability area with local areas of high to moderate risk from landslides.

Figure 4.F. Landslide Potential in Pennsylvania for the Physiographic Provinces



Source: Department of Conservation and Natural Resources.

Environmental Impacts

Potential environmental impacts from landslides include:

- Stream blockages and sedimentation issues from debris deposition.

Inventory and Summary of Vulnerable Assets

Most of the damage caused by landslides is to transportation routes, utility systems, and structures, but the side effects such as traffic delays and clean-up can greatly accumulate. As aforementioned, approximately 770 of state and federal highways, and approximately 1,530 miles of secondary and municipal roads are located in Lackawanna County.

Estimate of Losses

Historically, no substantial economic losses have resulted from landslides in Lackawanna County. A 1991 estimate from the Pennsylvania Department of Transportation states that approximately \$10 million (\$17 million in current dollars) is needed statewide on an annual basis for highway repair work associated with landslides.

Risk Factor

Risk Factor = 1.3. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

Risk to future development is no different than risk to existing infrastructure, property, or citizen health. Where development is planned, emergency services should be adjusted as necessary to accommodate increased population.

4.4.12 Radon

Description

Radon is a naturally occurring, invisible, and odorless radioactive gas. It originates from natural deposits of radium in the soil. As the radium decays, it turns into radon gas which can enter a home due to indoor air vacuums that cause radon laden soil gas to enter through the foundation.

Location and Geographic Extent

The Environmental Protection Agency (EPA) has generated maps of three radon level zones: Zone 1, Zone 2 and Zone 3. These rank from Zone 1, "red zone" (highest potential), to Zone 3, "yellow zone" (lowest potential). All of Luzerne County is classified as Zone 1.

Range of Magnitude

The EPA recommends a threshold concentration of four pCi/L (pico Curies per liter) for installation of a radon mitigation system. Data shows that an exposure level of four (4) pCi/L could result in approximately seven out of 1,000 people developing health effects such as lung cancer.

Previous Occurrences

Radon levels by county are logged through the Department of Environmental Protection – Bureau of Radiation Protection. Current data available through the Bureau indicates approximately 31% of indoor tests in Luzerne County are above 4 pCi/L.

Probability of Future Events

Due to the geologic condition underlying Lackawanna County, radon will continue to be detected in existing and new homes.

Environmental Impacts

Environmental impacts associated with radon are minimal.

Inventory and Summary of Vulnerable Assets

Critical facilities in the County should be tested for radon levels, and mitigated accordingly.

Estimate of Losses

Based on information from the *Commonwealth of Pennsylvania 2013 Standard All-Hazard Mitigation Plan (2013)*, approximately 20 percent of homes have an elevated radon level. The Environmental Protection Agency estimates that the average radon mitigation system costs approximately \$1,200. Therefore, of the approximately 65,000 structures in Lackawanna County, approximately 13,000 would require a radon mitigation system totaling approximately \$15.6 million countywide.

Risk Factor

Risk Factor = 1.2. Table 4.12 summarizes the risk factor calculation.

Impact on Future Development

Due to the geologic condition underlying Lackawanna County, radon will continue to be detected in new homes. Testing should be performed for all new construction, and radon mitigation systems should be installed as appropriate.

4.4 Hazard Vulnerability Summary

4.4.1 Methodology

To aid in prioritization efforts in terms of planning needs and mitigation strategy, each of the hazards was assigned a “risk factor”. The risk factor is essentially a weighted calculation based on five variables associated with each hazard: 1) probability; 2) impact; 3) spatial extent; 4) warning time; and 5) duration. An index was then assigned to each variable depending on level: “1” – low to “4” – high. These variables, levels, and indices associated with each are summarized in Table 4.11.

Table 4.11. Risk Factor Variables and Corresponding Indices.

Probability Weight – 30%		Impact Weight – 30%		Spatial Extent Weight – 20%		Warning Time Weight – 10%		Duration Weight – 10%	
Level	Index	Level	Index	Level	Index	Level	Index	Level	Index
Unlikely	1	Minor	1	Negligible	1	>24 Hrs	1	<6 Hours	1
Possible	2	Limited	2	Small	2	12-24 Hrs	2	<24 Hours	2
Likely	3	Critical	3	Moderate	3	6-12 Hrs	3	<1 Week	3
Highly Likely	4	Catastrophic	4	Large	4	<6 Hrs	4	>1 Week	4

The risk factor for each hazard was then calculated using the following equation:

$$\text{Risk Factor} = (0.3)(\text{Probability Index}) + (0.3)(\text{Impact Index}) + (0.2)(\text{Spatial Extent Index}) + (0.1)(\text{Warning Time Index}) + (0.1)(\text{Duration Index})$$

4.4.2 Ranking Results

Table 4.12 presents the results of applying the risk factor calculation to each hazard.

Table 4.12. Hazard Risk Factors.

Hazard	Probability Index	Impact Index	Spatial Extent Index	Warning Time Index	Duration Index	Risk Factor
Flooding (regional less frequent events)	3	4	4	1	3	3.3
Winter Storms	4	2	4	1	3	3.0
Wind Events	4	2	2	2	2	2.6
Flooding (annual local events)	4	2	2	3	1	2.6
Hazardous Materials Incidents	4	1	2	4	2	2.5
Wildfires	4	2	2	2	1	2.5
Drought and Crop Failure	1	2	4	1	4	2.2
Nuclear Release	1	2	3	2	4	2.1
Earthquakes	1	2	3	4	1	2.0
Land Subsidence/Mine Related Issues	1	2	2	4	1	1.8
Dam Failure	1	3	1	1	1	1.6
Landslides	1	1	1	4	1	1.3
Radon	1	1	2	1	1	1.2

Based on the results of the risk factor analysis it was determined that the top five hazards that impact Luzerne County are: 1) Flooding (regional and local events); 2) Winter Weather; 3) Wind Events; 4) Hazardous Materials Incidents; 5) Wildfires.

4.4.3 Potential Loss Estimates

Table 4.13 presents the results a summary table of potential loss estimates for each hazard based on the analyses conducted in the hazard profiling.

Table 4.13. Potential Loss Estimates.

Hazard	Number of Exposed Structures	Number of Exposed Critical Facilities	Total Economic Exposure
Flooding	6,621	28	\$2.6 Billion
Winter Storms	N/A	N/A	\$60,000 ¹
Wind Events	N/A	N/A	\$190,000 ¹
Hazardous Materials Incidents	N/A	N/A	\$20,000 ¹
Wildfires	39,628	39	\$15.5 Billion
Drought and Crop Failure	N/A	N/A	\$16 Million ¹
Nuclear Release	N/A	N/A	N/A
Earthquakes	692	0	\$50 Million
Land Subsidence/Mine Related Issues	13,284	34	\$5.2 Billion
Dam Failure	Not Determined	Not Determined	Not Determined
Landslides	N/A	N/A	Not Determined
Radon	13,000	N/A	\$15.6 Million

Note 1) indicates annual loss estimate as opposed to total economic exposure.

4.4.4 Future Development and Vulnerability

The Steering Committee expressed concern that new homes, particularly high-value homes, are being constructed in forested areas, increasing the potential for wildfire impacts. The problem is two-fold; first, there is a higher probability of a wildfire impacting residential property, and secondly, new homes are being constructed in areas that may be difficult for emergency services to access during a fire event. Although numbers and exact locations of new homes are unknown as many have not been constructed at the time of this Plan Update, the Steering Committee expressed that the problem is county-wide.

Chapter 5 - Capability Assessment

5.1 Update Process Summary

It is important to perform a mitigation capability assessment in order to develop a comprehensive and implementable mitigation strategy. The capability assessment helps identify existing gaps, conflicts and/or shortcomings that may need to be addressed through future mitigation actions and helps to ensure that proposed mitigation actions are practical, while considering the municipalities' capacity to implement these actions. It also examines completed or in-progress actions that merit continued support and enhancement through future efforts.

This mitigation capability assessment comprises two components:

1. Document Review - an inventory of the County's existing planning and regulatory tools and a review and incorporation of existing plans and other technical information as appropriate, and
2. Municipal Capability Assessment - an analysis of municipal capacity from a planning, policy, staffing, and training standpoint.

Note: Sections of this document review have been derived from the 2009 Plan and updated where applicable.

A number of documents have been reviewed as part of this Plan Update. While some reviews have been derived the 2009 Plan and updated where applicable, other additional documents have been identified and reviewed for purposes of integration into other local planning mechanisms. Several plans and ordinances at the county and municipal level have been reviewed and a summary and options to integrate the data, information, and hazard mitigation goals and actions into other planning mechanisms are included.

The Mitigation Strategy including the goals and actions should be incorporated into relevant planning mechanisms based on their pertinence and relevance to specific plans and ordinances. For example, all structural projects should be included in the Capital Improvements Program. Land use and zoning related projects should be incorporated into the next update of the Community's Comprehensive Plan and Zoning Ordinance through collaboration with the Planning and Zoning departments. The departments and areas for coordination are listed below:

Department	Relevant Documents
Planning Department	Comprehensive Plan/Land Use Plan, Zoning/Subdivision Regulations, Floodplain Ordinance
Public Works/Transportation Department	Stormwater Management (SWM) Plan, Sediment and Erosion Control Plan, Culvert and Bridge Maintenance Plans
Emergency Management Department	Long Range Transportation Plan
Environmental Planning	Evacuation Plan, Emergency Operations/Response Plan
Parks and Recreation	Climate Change Plan, Dam Safety Regulations, Wetland Regulations
	Open Space Plan

Each year, when the jurisdictions provide an annual update of their actions and their project status, they should be encouraged to indicate how and where each mitigation effort is being implemented. For example: A structural project has been included in the Capital Improvements Program or an overlay district will be introduced in the next update of the Local Zoning Ordinance.

A Municipal Capability Assessment Questionnaire was developed for the 2014 Plan Update to obtain an understanding of the issues and gaps at the municipal level. The questionnaire contained questions on plans, policies and ordinances,

critical facilities, staffing, and training needs. In the past six years, Luzerne County has made great strides in acquisition and demolition of flood-prone properties. This information has been updated and included in the latter part of this chapter.

5.2 Capability Assessment Findings

5.2.1 Planning and Regulatory Capability

The Lackawanna County Government Structure comprise the following departments:

Department of Planning and Economic Development – This Department oversees a number of agencies including the Lackawanna County's Office of Economic and Community Development, Lackawanna County Regional Planning Commission, and the Lackawanna County Redevelopment Authority.

Office of Economic and Community Development – The Office of Economic and Community Development is responsible for coordinating Lackawanna County's economic and community development programs, including administering the Community Development Block Grant Program (CDBG). This program assists communities by providing funding for decent, safe and sanitary housing; opportunities for a suitable living environment, especially for persons of low to moderate income; and the elimination of slums, blight, and blighting influences within neighborhoods. The county contains 11 entitlement communities that receive between \$1.6 and \$1.8 million each year, in addition to the county's non-entitlement communities, which receive approximately \$300,000. The Cities of Scranton and Carbondale administer their own CDBG programs. In addition to the CDBG, the Office of Economic and Community Development administers the First Time Homebuyer Program, Housing Rehabilitation Assistance Program, and the Emergency Repair Assistance Program.

Lackawanna County Regional Planning Commission – The Lackawanna County Regional Planning Commission is responsible for making policy decisions on planning, subdivision, and land development issues, and proposals on local land use regulations. The Commission is involved in subdivision and land development, land use ordinance, and comprehensive plan reviews. The Commission is responsible for transportation and environmental planning, census data, and demographic analysis. Commission staff also provides planning and technical assistance to municipalities, and maintains the County's mapping and GIS. The Lackawanna County Regional Planning Commission is also part of the Metropolitan Planning Organization for Transportation Planning in Lackawanna and Luzerne Counties.

Lackawanna Redevelopment Authority – The Lackawanna Redevelopment Authority is responsible for acquiring and redeveloping blighted areas, so that they become available for economically and socially sound redevelopment.

Lackawanna County Emergency Management Agency – The County Emergency Management Agency is responsible for the planning, assignment, and coordination of resources in the areas of mitigation, preparedness, response, and recovery for natural or human-caused emergencies. The purpose of the Agency is to mitigate the effects of disasters, prepare to respond and recover from disasters, respond to emergency conditions, and recover from the effects of disasters. The County Emergency Management Agency is also responsible for organizing all locally available manpower, supplies, equipment, and services necessary for disaster emergency readiness, response and recovery. The EMA also contains a Local Emergency Planning Committee (LEPC) which is responsible for overseeing the Hazardous Materials Response Account and approving Off-Site Emergency Response Plans. The LEPC is comprised of the county emergency management coordinator, a county commissioner, local government representative, law enforcement official, firefighter, and emergency management personnel, among others.

Lackawanna County Emergency Communications Center – The Lackawanna County Emergency Communication Center is the designated 9-1-1 Center, responsible for the dispatch of police, fire, rescue and emergency medical services during emergency situations. The Center is staffed by professional Public Safety Telecommunicator/Emergency Medical Dispatchers. The Center provides emergency dispatch and communication services for various police, fire,

rescue, and emergency medical services throughout Lackawanna County, as well as for County and Municipal Emergency Management Agency (EMA) operations. Each of the municipalities in the County has its own police, fire, and ambulance services.

Lackawanna County Conservation District – The Lackawanna County Conservation District (LCCD) is the agency responsible for the conservation of soil and water resources through the control and prevention of soil erosion and conservation, restoration and planning of the county's watersheds. The Conservation District serves the public by being a clearinghouse for information, erosion and sedimentation control, watershed conservation, environmental education, and public outreach.

Environmental Education Programs – The County Conservation District implements educational activities through the Willary Water Resource Center. Examples of educational programs include lake and pond management workshops, the Environmental Classroom for regional educators, the Lackawanna County Envirothon, and the Water Discovery Day Camp. The Center has been successful in building cooperation and partnerships between federal, state and local government agencies, local non-profit organizations, school districts, civic groups, watershed associations, and lake associations.

Lackawanna County Department of Public Works – The Lackawanna County Department of Public Works has overall responsibility for maintenance of non-park county property including all county buildings, the county road network, and county-owned bridges. The County Roads and Bridges Department is responsible for snowplowing and salting, filling potholes, maintaining storm and drainage pipes, black-topping, repairing guide rails, and installing signs on county-owned roadways. The Department is also responsible for the 151 county-owned bridges within the county and ensures that waterways are kept open, bridge decks are replaced and repaired as needed, and railings, sidewalks, culvert pipes, and bridges are replaced as needed.

Lackawanna County Department of Buildings and Grounds – The Department of Building and Grounds is responsible for the maintenance and operation of all county-owned buildings including the County Courthouse, County Administration Building, and the Emergency Services Center.

Transportation - The County's Transportation Department's operations include the County of Lackawanna Transit System, the Lackawanna County Railroad Authority, and the Lackawanna Coordinated Transportation System.

Lackawanna Heritage Valley Authority (LHVA) – The Authority creates, supports and funds partnerships with government, business, civic and educational organizations, and individuals dedicated to the development of the valley's historic, cultural, natural, and economic resources. This strategy of "heritage development" is implemented through coordinated efforts in preservation and education, and promotion of regional heritage. The LHVA is a municipal authority under the sponsorship of Lackawanna County and is funded by the Pennsylvania Department of Conservation and Natural Resources and the National Park Service.

Communications - The Communications Office informs the public about county government, serves as a liaison with the news media, and performs various public activities for the Commissioners and county departments.

Engineering – Engineering projects are contracted to a private consulting firm, Acker Associates, located in Moscow, Pennsylvania. The firm serves as the County Engineer.

5.2.2 Administrative and Technical Capability

In terms of the County's Staffing and Training Capabilities, the Lackawanna County Regional Planning comprises four full-time staff: Transportation Planning Manager, Regional Planning Manager, GIS Coordinator, Transportation Planner and an Assistant Planner position that is currently vacant.

Table 5.1 identifies the various types of training received by county personnel and how specific programs are administered.

Table 5.1. Services by County Department.

Training	Staff Position
GIS	Planning Department
Floodplain Management/NFIP Regulations	Planning Department
Community Rating System	No County service
Building Inspection	No County service
Building Code Administration	No County service
Building Retrofits	No County service

5.3 Plan Integration

5.3.1 Document Review

Requirement §201.6(b): Review and incorporate, if appropriate, existing plans, studies, reports, and technical information.

The purpose of a plan/ordinance review as part of this planning process is tri-fold:

- To identify existing county initiatives;
- To provide an inventory and review of sample plans and ordinances and identify sections in these documents that address hazard mitigation-related issues; and
- To provide a platform to integrate plans and other documents so recommendations and strategies are not in contradiction with one another (e.g., between the hazard mitigation plan and comprehensive plan).

Consultants reviewed updates to existing zoning and subdivision ordinances, comprehensive plans, open space and recreation plans, stormwater management plans, sediment and erosion control plans, and emergency operations plans, among others, and summarized their connections with hazard mitigation.

5.3.1.a Commonwealth of Pennsylvania Document Review

Uniform Construction Code - The Uniform Construction Code (UCC) is the statewide building code (Act 45 of 1999) that took effect in April of 2004. The UCC is mandated by the State for all municipalities in Pennsylvania and establishes minimum regulations for most new construction, including additions and renovations to existing structures. All new construction is required to meet the UCC requirements statewide. In Pennsylvania, approximately 800 of the state's 2,567 communities have adopted the national model building code developed by the Building Officials and Code Administrators (BOCA) or another national code. The building code consists of most of the International Code Council's 2003 code series, including the International Building Code (IBC) and the International Residential Code (IRC) that replace the BOCA and CABO building codes, respectively.

Options for Incorporating Hazard Mitigation Principles into municipal Plans and Ordinances: Continue to build to Code or adopt higher standards.

Comprehensive Planning - Commonwealth of Pennsylvania Governor's Executive Order 1999-1 (Land Use Planning) provides the basis for the requirement to integrate hazard mitigation into comprehensive land use planning. As part of this executive order, the Interagency Land Use Team was established, comprising the following state agencies: Department of Agriculture; Department of Community and Economic Development; Department of Conservation and Natural Resources; Department of Environmental Protection; Governor's Green Government Council; Fish and Boat Commission; Game Commission; Department of Transportation; and the Pennsylvania Emergency Management Agency.

The purpose of the team is to improve communication and coordination between those state agencies most involved in land use and land use management. Major land use policy decisions (as well as hazard mitigation projects) are reviewed by each agency to determine their appropriateness, benefits, and shortfalls. One of the most significant outcomes of PEMA's participation on the team is the integration of hazard mitigation goals and objectives (sustainable communities through hazard avoidance and reduction) into the comprehensive land use planning process. Some highly developed and flood-prone counties (Allegheny, Lycoming, Lehigh, and Northampton) have included hazard mitigation planning as an integral part of their county land use plans.

Options for Incorporating Hazard Mitigation Principles into municipal Plans and Ordinances: Consider including hazard mitigation as an element in the next County Comprehensive Plan Update.

The Pennsylvania Code – Chapter 102 Title 25 Sediment and Erosion Control - This Code requires all earthmoving projects in the Commonwealth to develop an erosion and sediment pollution control plan to ensure that proper site development practices are employed for land development and implement best management practices for the control of sediment pollution during construction. Pennsylvania DEP requires a National Pollution Discharge Elimination System (NPDES) permit for earthmoving activities exceeding five acres. In 2002, DEP reduced the permitted threshold to one acre and required the post-construction stormwater management component under the Phase II NPDES Program. The permit provides for additional assurance of water quality protection at construction sites.

Projects which disturb between 1.0 and 5.0 acres, and have a point-source discharge to waters of the Commonwealth, require a NPDES permit for storm water discharges associated with construction activities. As part of this permit, an approved erosion control plan is required. Projects that disturb more than 5.0 acres require an NPDES permit for stormwater discharges associated with construction activities, as well as an approved erosion control plan.

Options for Incorporating Hazard Mitigation Principles into municipal Plans and Ordinances: Continue to construct projects in accordance with the Title 25 Sediment and Erosion Control Code.

Growing Greener - Growing Greener is a State program that addresses critical environmental concerns. Projects include farmland preservation projects; protection of open space; restoration of watersheds; funding for recreational trails and local parks; land use; and provision of new and upgraded water and sewer systems. Projects of special interest include those that implement stormwater management, particularly innovative approaches consistent with the Stormwater Best Management Practices Manual (December 2006) including construction and post-construction management, projects that address flood mitigation, and projects that implement stormwater management. Recognizing that there was great similarity between the goals of the Hazard Mitigation Grant Program and Growing Greener, PEMA and the Department of Environmental Protection entered into a cooperative agreement in which Growing Greener funding would be used to pay the non-federal share for HMGP projects that resulted in creating open space. This infusion of funds provides financial leverage for the Commonwealth's property acquisition program, the goal of which is to return the floodplain to its natural function.

Options for Incorporating Hazard Mitigation Principles into municipal Plans and Ordinances: Continue to construct projects in accordance with the Title 25 Sediment and Erosion Control Code.

Pennsylvania State All-Hazard Mitigation Plan, 2013

Hazard identification and risk assessment (HIRA) data for Lackawanna County has been incorporated into the HIRA section of this Plan Update.

The following goals and objectives from the 2010 and 2013 State Plans are applicable to the Lackawanna County Hazard Mitigation Plan Update and have been taken into consideration during development of the plan:

Goal 1: Protect lives, property, environmental quality, and resources of the Commonwealth, including RL and SRL properties.

- Objective 1-1: By 2016, reduce flood-related losses (with an emphasis on reducing repetitive loss and severe repetitive loss properties by 5%) through promotion of the Commonwealth's flood protection program through county, state, and federal partners.

- Objective 1-2: Increase by 5% the number of projects implemented by the Commonwealth that will mitigate the most vulnerable structures against hazards by 2013.
- Objective 1-3: Identify and work toward implementation of five feasible and cost-effective projects related to the mitigation of critical buildings, state facilities, and infrastructure.
- Objective 1-7: Increase coordination, prioritization, and funding availability to address community needs for dam hazards with special emphasis on inundation zone evaluation by 2013.
- Objective 1-8: Encourage aggressive enforcement of floodplain and stormwater management ordinances and other all-hazards regulations within the Commonwealth to reduce losses in high risk areas by 10% by 2013.
- Objective 1-9: Promote increased implementation of urban-wild land interface (wildfire) mitigation projects by local communities by 2011.
- Objective 1-10: Enhance Commonwealth efforts to address surface mine-related hazards by increasing interagency cooperation by 2011.
- Objective 1-11: Enable the Department of Environmental Protection to fully characterize hazard issues from Marcellus Shale natural gas extraction operations and explore mitigation options by 2012.
- Objective 1-12: Manage all Repetitive Loss and Severe Repetitive Loss databases, providing updates to FEMA at least annually, in order to more efficiently identify properties to be mitigated.

Goal 2: Enhance consistent coordination, collaboration, and communications among stakeholders.

- Objective 2-2: Promote integration of mitigation goals, objectives, and actions where appropriate in other Federal, state and local planning initiatives by 2013.

Goal 3: Provide a framework for active hazard mitigation planning and implementation.

- Objective 3-2: Enable the Pennsylvania Emergency Management Agency to encourage each participating jurisdiction to secure funding and initiate one mitigation action by 2016.

Goal 5: Increase awareness, understanding, and preparedness across all sectors.

Objective 5-2: Prioritize outreach efforts that will result in a 10% increase in RL and SRL related grant applications between 2013 and 2016.

- Objective 5-3: Prioritize outreach efforts that will result in a 10% increase in RL and SRL related grant applications by 2016.

Options for Incorporating Hazard Mitigation Principles into municipal Plans and Ordinances: Continue to ensure that Lackawanna County Hazard Mitigation Plan Updates incorporate goals and objectives as well as risk assessment data from the Pennsylvania State Hazard Mitigation Plan.

2004 Open Space, Greenways, and Outdoors Master Plan for Lackawanna and Luzerne Counties – The Open Space, Greenways and Outdoor Recreation Master Plan provides recommendations for achieving a balance between natural resources and the built environment in Lackawanna County. While the Plan does not address existing or future land use or other components of a comprehensive plan and does not consider future development areas, it looks at the resources of the land, irrespective of future plans, and identifies areas that offer opportunities for preserving and protecting valuable natural resources.

The Plan recommends a number of different approaches that should be pursued by county and local governments, landowners, conservation groups, not-for-profit organizations, and other interested parties, to protect, conserve or acquire the recommended conservation lands.

Options for Incorporating Hazard Mitigation Principles into municipal Plans and Ordinances: Implementation includes a combination of conservation tools including land management plans and easements; regulatory methods like density transfers, zoning overlays, buffer zones, subdivision exactions, land acquisition made possible through donation and purchase, and purchase of development rights. Continue to encourage these principles.

5.3.1.b Lackawanna County Document Review

Zoning – Article VI of Act 247 governs the implementation of zoning ordinances in the Commonwealth of Pennsylvania. There is no County zoning ordinance in place. All 40 municipalities have zoning ordinances.

Subdivision and Land Development Ordinance - Article V of Act 247 governs the implementation of the subdivision and land development ordinance in the Commonwealth of Pennsylvania. Similar to zoning, there is no subdivision and land development ordinance for the County. The 40 municipalities implement their own subdivision and land development ordinances.

Stormwater drainage systems are required to be designed to provide protection from a 10- to 100-year storm. No new buildings or additions are allowed within any delineated floodway.

All sanitary sewer and water systems and other public utilities and facilities in the 100-year floodplains are required to be flood-proofed 1.5 feet above the 100-year base flood elevation. At a minimum, the finished elevation of proposed streets is required to be at the 100-year base flood elevation. Drainage openings are required to be adequate to discharge flood flows within unduly increasing flood heights.

Options for Incorporating Hazard Mitigation Principles into municipal Plans and Ordinances: No specific language is included for forest stands, wetlands, soil types, land for active/passive recreation, or slopes. The only references to these issues are in the Subdivision/Land Development Ordinance (Access-Drainage-Geology, Public Uses, and Street Grades). The only other regulation of these items is through the State and Federal regulations. However, these issues are considered by the County Engineer and County Planning Department in the review and approval process. Consider adding language in the next update of the SALDO.

Floodplain Ordinance – The floodplain ordinance is included in the individual municipalities' zoning ordinances. The required freeboard is 1.5 feet above base flood elevation and no building permits are issued for structures in the floodway. Elevation certificates are required by all municipalities for structures in the floodplain.

Options for Incorporating Hazard Mitigation Principles into municipal Plans and Ordinances:

- Consider strengthening the municipal floodplain ordinance provisions to go beyond the minimum requirements of the state and Federal program.
- Continue to prohibit buildings, structures and large amounts of impervious surfaces within the 100-year floodplain to prevent damage to life and property through stronger provisions in municipal land use ordinances particularly floodplain ordinances.
- Consider a requirement for all critical facilities to be protected and/or prohibited in identified floodplain areas.
- Work closely with the municipalities on urging better floodplain management techniques, strengthening of floodplain regulations, purchase and relocation of repetitive loss properties.

Building Code – All municipalities within Lackawanna County are covered by the Uniform Construction Code (UCC). The UCC sets uniform standards for construction of new residential and commercial structures and certain renovations to existing buildings. The UCC also contains minimum construction standards for wind loads and snow loads to ensure the strength of structures and the ability to withstand storms. Manufactured homes are required to meet specific UCC criteria as well.

Local governments have a number of options in administering the UCC. If a local government chooses to provide code services for residential structures (one- and two-family), the municipality must still provide for non-residential code services using the variety of options available to them. Under the regulations, if a local government chooses not to administer the UCC, that municipality will no longer have the right to issue building permits. In that case, a contractor or building owner would have to retain a certified third-party agency (for one-and two-family homes) or go to the Department of Labor and Industry (for all non-residential structures) to obtain a UCC construction permit, all necessary inspections and a Certificate of Occupancy. The municipality can "contract" with the Department of Labor and Industry to provide non-residential inspection and plan review services pending a mutually acceptable agreement and availability of

personnel at the Department. A total of 39 of the 40 municipalities issue permits and have a building code that is based on the UCC code. One municipality does not issue permits or perform UCC functions.

- Municipality issues permits; separate entity performs UCC function – 33 municipalities
- Municipality issues permits; performs UCC function – 6 municipalities
- Municipality does not issue permits; does not perform UCC functions – 1 municipality (issues a zoning permit only but no building permit. Property Owner is responsible for his/her own inspections.

Options for Incorporating Hazard Mitigation Principles into the Building Code:

- The codes are not retroactive codes, and do not include older buildings. Only pre-existing structures are subject to the codes that exist at the time of construction and when there are major additions to structures, they need to be brought up to the new code's standards.
- Explore requirements that address older buildings that are more vulnerable to damage from natural hazards unless they are brought up to the current code's standards.

Lackawanna River Watershed Act 167 Stormwater Management Ordinance –The purpose of the Lackawanna River Watershed Act 167 Stormwater Management Ordinance is to promote the public health, safety and welfare within the Lackawanna River Watershed by minimizing stormwater-related damages through provisions designed to: control accelerated runoff and erosion and sedimentation problems at their source by regulating activities which cause such problems; preserve and restore the flood-carrying capacity of streams, and provide for proper maintenance of all permanent municipal stormwater management structures.

The stormwater management regulations include a number of provisions for the safe conveyance of excess stormwater and floodwaters:

- Water obstructions (e.g. culverts, bridges, outfalls, or stream enclosures) designed in accordance with Chapter 105 do require a permit from Pennsylvania Department of Environmental Resources. However, all other drainage conveyance facilities that do not fall under Chapter 105 regulations must be able to convey, without damage to the drainage structure or roadway, runoff from the 25-year design storm with a minimum of 1 foot of freeboard measured below the lowest point along the top of the roadway.
- Roadway crossings located within designated floodplain areas must be able to convey runoff from a 100-year design storm with a minimum 1.1 feet of freeboard measured below the lowest point along the top of the roadway. Any facility located within a PennDOT right-of-way must meet PennDOT minimum design standards and permit submission requirements.
- All stormwater management facilities are required to be designed to provide a minimum 1 foot of freeboard above the maximum 100-year water surface elevation for post-development conditions.
- Any regulated activity which would create 10,000 square feet or less of additional impervious cover is exempt from preparing a Drainage Plan.
- New land development controls are required to incorporate infiltration of the first 1.5 inches of runoff from impervious surfaces. At a minimum, infiltration facilities design/overflow capacity should be for the 10-year event.

Options for Incorporating Hazard Mitigation Principles into the local planning mechanisms: Continue to enforce these regulations.

Lackawanna County Continuity of Operations Plan (COOP)

Page 5 – One of the goals of the Plan is to Preserve, maintain or reconstitute government's ability to function and provide service under the threat or occurrence from a terrorist attack or a catastrophic disaster. The end of the sentence could be extended to include 'in the form of natural hazards'.

Page 6 – the objective Ensure the continuous performance of the County's essential functions and operations during an emergency could be extended to include – 'or in the aftermath of a natural disaster'.

Page 7 – Under Situation, the Plan provides a detailed listing of natural and manmade disasters. This list is comprehensive.

Page 38 - This section defines mitigation, preparedness, and response responsibilities necessary to prevent a COOP (Continuity of Operations Plan) event, or to ensure in the event of a disaster that essential functions are resumed within 12 hours.

The COOP references the hazard vulnerability analysis and opportunities identified to reduce or eliminate risks threatening personnel and/or critical facilities and assets. Mitigation objectives are identified to minimize the vulnerabilities that could result in a COOP event. These mitigation measures address the identification and protection of personnel, facilities, business assets, and vital records, equipment, and systems. Mitigation plans and programs include the development and maintenance of the following, on a department-specific basis: Emergency Response or Event Plan; Vital Record Identification and Protection Program; Employee and Family Preparedness Program [AWARENESS], and Security and Access Control Plan (Identification Cards for Employees).

Options for Incorporating Hazard Mitigation Principles into the local planning mechanisms: None

5.3.1.c Regional Plans Document Review

2011 Lackawanna-Luzerne Regional Plan – Comprehensive Plan and Long-Range Transportation for Lackawanna-Luzerne Counties, PA

The comprehensive plan and the long-range transportation plan for Lackawanna and Luzerne Counties have been combined and together are known as the Lackawanna-Luzerne Regional Plan.

The introduction section discusses the Hazard Mitigation Plan for Lackawanna and Luzerne Counties that was developed in conjunction with this Regional Plan and states that “as a result of this collaborative effort, future development is being directed to avoid known or possible hazard areas. In addition, identifying possible mitigation areas for future purchase and developing transportation planning to incorporate improving evacuation routes into and out of the area was part of the overall strategy in these planning efforts. This is the first time that all three planning emphasis areas – the Comprehensive Plan, Long-Range Transportation Plan, and Hazard Mitigation Plan – have been addressed concurrently for two counties in Pennsylvania.”

Page 2-3 discusses the objectives of the land use plan. It should include an objective to discourage development in high hazard areas so future development does not increase risk in these areas.

Page 2-37 discusses the objectives of the transportation plan. It should include an objective to improve evacuations routes and also to avoid transportation infrastructure investments that avoid new development in high hazard areas. Page 2-40 discusses infill areas. The plan promotes integration of infill areas with transit and neighboring Priority Areas and discusses that the emergence of multimodal corridors with characteristics of “complete streets” – corridors with sidewalks, crosswalks, bike lanes, transit shelters, and pedestrian-oriented lighting and amenities (and perhaps even transit lanes) – will promote this integration. The discussion should include discouraging development in high-hazard infill areas.

Page 2-55 discusses housing objectives. The section reads: Changes in future residential development patterns are a key ingredient toward ensuring a higher quality of life and a more sustainable future for the counties. Objective 2.3F Reads: Ensure a high level of housing quality, both for new construction and for the existing housing stock. A related objective should be added: Existing housing stock to be strengthened, elevated, or relocated during the redevelopment process in order to improve the housing stock.

The Plan identifies 30 Priority Areas located throughout Lackawanna and Luzerne Counties which represent significant opportunities to develop and redevelop properties for mixed uses, including residential components. Parcels in these areas are suitable for higher-density residential uses, such as multi-family (apartment) and single-family attached

(townhouse) units, and perhaps specialized residential uses such as life-care facilities. Therefore it is vital that the above-mentioned objective be added.

Page 2-63 Objective 2.4D discusses the construction of public facilities in a manner that is resistant to hazards: Construct new public safety and emergency service facilities in a manner consistent with the International Building Code for high wind, snow and flood damage prevention.

Page 2-67 Objective 2.5D states: Promote prospective development in Priority and Infill Areas that will result in the creation of permanent and contiguous open space and significant publicly accessible parks and civic spaces. This should be expanded to read:

Promote prospective development in Priority and Infill Areas in safer and less vulnerable areas that will result in the creation of permanent and contiguous open space and significant publicly accessible parks and civic spaces in the high-hazard areas. The plan discusses reinvestment and new development within all three types of Priority Areas and both Mixed Density and Low Density Infill Areas to also include access to green space. This should include a policy to discourage development or redevelopment within hazard areas and preserve those areas as green spaces.

Page 2-71 Objective 2.6 A should be extended to read: Promote and protect Lackawanna County's area's historic and cultural resources and ensure they are not vulnerable to natural hazards.

Page 2-87 Objective 2.8A: Protect groundwater, floodplains, creeks, wetlands, mature woodlands and specimen trees, steep slopes, ridge lines, scenic viewsheds, wildlife habitat, and other environmental features of the two-county area. This is a good catch-all objective.

Page 2-89 discusses stormwater management and that the two-county area should prepare and promote the adoption of model ordinances and design guidelines for the retention of stormwater from new development and for temporary and permanent sedimentation and erosion control. This can be extended to read that a policy should be added to strengthen stormwater management retention (retaining more stormwater onsite) during the redevelopment process.

Page 2-89 discusses the Resource Conservation Ordinance and that each county should prepare a comprehensive model Natural Features and Resources Conservation Ordinance and should promote its adoption by the municipalities and the County. This ordinance should compile all zoning and subdivision and land development provisions related to the conservation of natural features and resources. It would include provisions regulating land disturbance and the removal and management of vegetation. This is a good recommendation.

Page 2-90 discusses Cluster Development: Development in Low Density Infill Areas is recommended to be highly clustered over the planning period, using a development strategy commonly referred to as "conservation development" that concentrates the location for development and limits the disturbance of land for dwelling construction. This should be extended to read: in order to restrict the density of new development in high hazard areas, relocate vulnerable existing development to safer/less vulnerable areas, and preserve high-hazard areas as open space.

Page 2-95 Stormwater Management: It is recommended that the two counties' municipalities identify stormwater management and control structures that may need repair or replacement, as well as stream segments that may need clearing, riprap, bank improvements, or other measures to handle anticipated stormwater flows that may occur over the course of the next 10 to 20 years. Part of the stormwater management planning process was the identification of problem areas. This is a good recommendation that should be implemented.

Page 3-1 – Under Benefits of the Plan add: Addresses safe growth objectives in Lackawanna County.

Page 3-3 County Outreach to Municipalities – The plan recommends possible methods that can be used to help overcome these shortcomings and states that each county should identify groupings of municipalities that could function as a set for planning outreach, communication, and education and organize certain Plan implementation activities around those groupings. This outreach and education should also include the communication of safe growth techniques

that can be developed and implemented at the municipal level.

Page 3-7 Implementation Strategy – Land Use: Add an objective to focus on safe growth in Lackawanna County. Options for Incorporating Hazard Mitigation Principles into the local planning mechanisms: Listed above.

5.3.1.d Municipal Plans and Ordinances

Subdivision and Land Development Ordinance, 2010 – Moscow Borough

Where provisions of this SALDO impose greater restrictions than those of any statute, other ordinance, or regulations, the provisions of this Ordinance prevail. Where provisions of any statute, other ordinance, or regulations impose greater restrictions than those of this Ordinance, the provisions of the statute, ordinance, or regulation prevails.

For all major subdivisions, a comprehensive analysis of existing conditions, both on the development site and within five hundred (500) feet of the site is required and the delineation of ponds, streams, 100-year floodplains, and wetlands is required.

Options for Incorporating Hazard Mitigation Principles into the local planning mechanisms: The regulations should provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources and this may be something the Borough could consider. The regulations do not allow density transfers where hazard areas exist; this could also be for further consideration. No mitigating measures such as additional setbacks in critical erosion areas, conservation of dunes and vegetation, floodproofing of utilities, and structural wind resistance and floodplain management are included in the SALDO. This should be included in the next update.

Carbondale Regional Comprehensive Plan 2003-2013 – Carbondale City, Carbondale Township, and Fell Township

General goals for the region include preserving harmonious land use relationships and neighborhood amenities for residential and non-residential development and providing for a broad mix of uses including residential, commercial, manufacturing, and open space. No specific goals that relate to preserving the natural environment or developing away from environmentally sensitive areas such as steep slopes, floodplains, or land subsidence areas are included.

Carbondale Township - The Plan identifies a need to study areas subject to flooding and create proposals for remedial actions to address issues including the lack of storm sewers in the South Side and Childs neighborhoods.

Fell Township - Under environmental goals, the Plan identifies dredging the Lackawanna River to remove the flooding hazards. The Plan recommends studying areas subject to flooding and developing proposals for remedial actions. The Fell Township Future Land Use Plan has a conservation category, the goal of which is to conserve areas of steep slope, woodlands, aquifer recharge areas, and cultural resources. The proposed uses of these areas would include a variety of residential and recreational uses that support the basic principle of conserving land and maintaining open space areas for non-urban purposes, such as clustering.

The Plan includes a stormwater drainage study that identifies major watersheds and stormwater facilities in Carbondale City, Carbondale Township, and Fell Township, delineates problem drainage areas, and includes the following action plan:

- Installation of inlets and storm piping to the Lackawanna River;
- Installation of inlets and storm piping to Racket Brook;
- Construction of a drainage ditch and storm drain system to Powderly Creek;
- Installation of inlets and storm piping to Fallbrook Creek to correct flooding of North Scott Street and Shamrock Avenue;
- Flooding and backup problems along 7th and 8th Street;
- Drainage study for Main Street, and
- New stormwater drainage collection system and inlets on Morse Avenue.
- Special projects for Carbondale Township include: storm sewer improvements; a storm drainage study to address runoff related to Casey Highway; and a need for dry hydrants on Salem Road.

Options for Incorporating Hazard Mitigation Principles into the local planning mechanisms: Strive to implement the action plan above to mitigate drainage and flooding problems.

Spring Brook Township Floodplain Management Ordinance 2007 Update

All plans for any proposed development in the floodplain to be considered for approval are also required to be reviewed by the County Conservation District. Development within the 100-year floodplain is permitted as long as it is in compliance with the requirements in the codes and ordinances, and buildings are elevated to 1.5 feet above the base flood elevation. Within the floodway, no development is permitted that would cause any increase in the 100-year flood elevation. Non-residential structures that have the lowest floor that is not elevated to at least 1.5 feet above the base flood elevation are required to be flood-proofed based on flood-proofing regulations by the Army Corps of Engineers.

No part of any on-site sewage system can be located within any identified floodplain area unless it is in strict compliance with state and local regulations. Electrical distribution panels are required to be at least 3 feet above the 100-year flood elevation.

Buildings are required to be firmly anchored in accordance with accepted engineering practices (UCC standards) to prevent flotation, collapse, or lateral movement. Manufactured homes are required to be 1.5 feet above the base flood elevation in the 100-year floodplain and anchored to resist flotation, collapse, or lateral movement and are required to be installed based on requirements of the 2003 International Building Code.

Improvements to existing structures in the floodplain are allowed only if the expansion would not cause any increase in the elevation of the 100-year floodplain. No variances are granted for any construction, development, use or activity within any floodway area if it causes an increase in the elevation of the 100-year floodplain.

Other floodplain ordinances for Lackawanna County municipalities contain similar language, as they were prepared by the same consultant during the same time period.

2012 Spring Brook Township Zoning Ordinance <http://www.springbrooktownship.org/documents/ordinances/2012-zoning-ordinance.pdf>

Article II – Community Development Objectives

- To encourage the development of land in an efficient manner and in accordance with an overall land use control program which considers the character of the community and the suitability of the land area for particular uses and structures, and
- To protect and encourage the conservation of natural resources and agricultural uses, particularly including the overall water supply with the minimum disturbance of aquifers.

Thornhurst Zoning Ordinance. <http://www.keystatepub.com/Go> to Code of Ordinances online and search for Thornhurst – Chapter 27

Section 27-105 Statement of Community Development Objectives

The Township Zoning Ordinance and Map is intended to promote the following Community Development Objectives with respect to hazards.

1. The existing character and limited development of the Township and its location relative to the Lehigh River;
2. The development constraints which exist in the Township due to the presence of extensive areas of seep slopes, high water tables, floodplains, wetlands, and soils with severe limitations for development, and
3. The predominance of State Forest and State Game lands in the Township which occupies approximately two-thirds of the 21-square miles of land area in the entire Township.

The objective is to establish appropriate densities of development for residential and other uses, satisfying the needs of various age groups, income levels, family sizes, and individual preferences with consideration given to the development constraints imposed by environmental factors and the physical characteristics of the terrain and soil conditions.

To preserve the environmental character of the Township and protect encroachment of major water bodies, including the Lehigh River and its tributaries; to protect wetland areas and areas subject to flooding, and to limit development of steep slopes and other areas not environmentally suitable for development.

All development proposed in any flood-prone areas based on FEMA studies are required to be designed with sound floodplain management principles that are in the Township's Floodplain Management Ordinance. Any portion of the 100-year floodplain which is not suited for development based on the above principles may be used for uses which do not encroach, obstruct, or limit the flow of water.

5.3.2 Municipal Capability Assessment

In order to get an understanding of the issues and gaps at the municipal level, the consultants developed a municipal capability assessment questionnaire. The questionnaire contained questions on plans, policies and ordinances, critical facilities, staffing, and training needs. A copy of the questionnaire is included in the Appendix.

Municipal Plans and Policies

Of those who responded to the survey,

- Fifteen municipalities stated they had a freeboard requirement while 18 municipalities stated they did not have a freeboard requirement.
- Eleven municipalities stated they had new/improved development restrictions while 22 municipalities stated they did not have development restrictions.
- Ten municipalities stated they had restrictions to fill in the floodplain while 23 municipalities stated they did not have fill restrictions.
- Seven municipalities stated they had critical facilities protection requirements while 26 municipalities stated they did not have requirements for the protection of critical facilities.
- Four municipalities stated they had incentives for cluster development while 29 municipalities stated they did not have cluster development incentives.

While many of municipalities indicated that they enforced some of the following policies related to freeboard requirement, new/improved development restrictions, floodplain fill restrictions, critical facility protection, and cluster development incentives in their ordinances, Carbondale, Clarks Green Borough, Dalton Borough, Jefferson Township, Newton Township, Throop Borough, and West Abington Township indicated they did not enforce any of these policies.

Table 5.2. Municipal Plans and Policies.

Municipality	Freeboard Requirement	New/ Improved Development Restrictions	Floodplain Filling Restrictions	Critical Facility Protection	Cluster Development Incentives	Other
Archbald Borough	Yes	No	No	Yes	No	Yes
Benton Township	No	Yes	No	No	No	Yes
Blakely Borough						
City of Carbondale	Yes	Yes	Yes	No	No	No
Carbondale Township	No	No	No	No	No	No
Clarks Green Borough	No	No	No	No	No	No
Clarks Summit Borough						
Clifton Township						
Covington Township	Yes	No	No	No	No	Yes
Dalton Borough	No	No	No	No	No	No
Dickson City Borough	No	Yes	Yes	Yes	No	Yes
Dunmore Borough	Yes	No	No	No	No	No
Elmhurst Township						
Fell Township	Yes	Yes	Yes	Yes	Yes	No
Glenburn Township	No	Yes	Yes	No	No	Yes
Greenfield Township						
Jefferson Township	No	No	No	No	No	No
Jermyn Borough			No	No	No	No
Jessup Borough	Yes	No	No	No	No	
LaPlume Township	Yes	No	No	No	No	No
Madison Township	Yes	No	No	No	No	No
Mayfield Borough	Yes	Yes	Yes	Yes	No	No
Moosic Borough	No	No	No	No	No	Yes
Moscow Borough	Yes	Yes	No	No	No	Yes
Newton Township	No	No	No	No	No	No
North Abington Township						
Old Forge Borough						
Olyphant Borough	Yes	Yes	Yes	Yes	No	Yes
Ransom Township	No	No	No	Yes	Yes	No
Roaring Brook Township	No	No	No	No	Yes	No
Scott Township						
City of Scranton	Yes	No	Yes	No	No	No
South Abington Township	Yes	No	Yes	No	No	No
Spring Brook Township	Yes	No	No	No	No	No
Taylor Borough		Yes	Yes			
Thornhurst Township		Yes				
Throop Borough	No	No	No	No	No	No
Vandling Borough						
Waverly Township	Yes	Yes	Yes	Yes	Yes	Yes
West Abington Township	No	No	No	No	No	No

Mitigation Actions

Of those who responded to the survey,

- Five municipalities reported property protection measures including buyouts, elevation of structures, floodwalls.
- Five municipalities reported a structural retrofit.
- Six municipalities reported emergency response activities.
- Nine municipalities reported natural resource projects including erosion and sediment control, wetland protection, etc.

- Two municipalities reported outreach projects including promoting flood insurance policies, etc.
- Ten municipalities reported future mitigation projects.

Various municipalities reported action in one or more of the categories – property protection, structural, emergency services, natural resources, and public outreach. The majority of the projects completed were erosion control and post disaster recovery projects. Many municipalities reported desired actions to implement in the future.

Table 5.3. Hazard Mitigation Actions.

Municipality	Property Protection	Structural	Emergency Services	Natural Resources	Public Outreach	Desired Action
Archbald Borough	None	None	None	None	None	Channelization of two creeks and Levee for Lackawanna River
Benton Township	None	None	None	None	None	None
Blakely Borough						
City of Carbondale	None	None	None	None	None	
Carbondale Township	None	None	None	None	None	Bank Stabilization on Brookside Creek
Clarks Green Borough	None	None	None	None	None	None
Clarks Summit Borough						
Clifton Township	None	None	None	None	None	None
Covington Township	None	Retention/detention basins	None	None	None	
Dalton Borough	None	None	None	None	None	Creek dredging
Dickson City Borough	None	None	None	None	None	Clean, repair storm water collection systems
Dunmore Borough	None	None	None	None	None	None
Elmhurst Township						
Fell Township	Yes	No	Yes	No	Yes	Restore stream bank, road improvement
Glenburn Township	Berms/floodwalls	None	None	Erosion Control	None	Stream bank restoration
Greenfield Township						
Jefferson Township	None	None	None	None	None	None
Jermyn Borough	Floodproofing, Berms/floodwalls	None	None	None	None	None
Jessup Borough	None	None	None	None	None	None
LaPlume Township	None	None	Post Disaster Recovery	None	None	None
Madison Township	None	None	None	None	None	None
Mayfield Borough	None	None	Hazard Warning	Erosion Control	None	Construct levee extension, install new storm sewer, dredge Lackawanna River
Moosic Borough	None	None	None	None	None	Detention Basin, Outreach
Moscow Borough	None	Retrofit, Retention basins	None	Erosion Control	None	None
Newton Township	None	None	None	None	None	
North Abington Township						
Old Forge Borough						

Olyphant Borough	None	Retention/ detention basins	None	None	None	Pumping station
Ransom Township	None	None	Post Disaster Recovery	Erosion Control	none	
Roaring Brook Township	None	None	None	None		
Scott Township						
City of Scranton	Buy-outs	Levees		Wetland protection, Erosion control		
South Abington Township	None	None	Post Disaster Recovery	None	None	
Spring Brook Township	None	None	Post Disaster Recovery	None	None	Culvert Replacement
Taylor Borough		Berms/ floodwalls	Retrofit			Creek improvement
Thornhurst Township	None	None	None	None	None	None
Throop Borough	Berms/ floodwalls	None	Hazard response, Post Disaster Recovery	None	None	Increase drainage pipe outlet size, capacity
Vandling Borough	None	None	None	None	None	None
Waverly Township	None	None	Post Disaster Recovery, Critical facility protection	Erosion Control	Outreach	
West Abington Township	None	None	None	None	None	None

Structures of Concern

Of those who responded to the survey,

- Seven municipalities reported critical facilities that have been damaged. 25 municipalities reported that they had no critical facilities damaged.
- Seven municipalities reported buildings in the floodplain. 25 municipalities reported that they did not have any buildings in the floodplain.
- A total of 2,314 buildings were reported in the floodplain, while five said they were unsure.
- A total of 619 flood insurance policies were reported while 11 said this information was unknown.
- Sixteen repetitive loss structures were reported while four municipalities said they were unsure of their repetitive loss count.

Dalton Borough, Moscow Borough, and Waverly Township reported having critical facilities and other buildings in the floodplain. A number of municipalities left some fields blank.

Table 5.4. Structures of Concern.

Municipality	Critical Facilities Damaged	Critical Facilities in Floodplain	Buildings in Floodplain	Flood Insurance Policies	Repetitive Loss Properties
Archbald Borough	Archbald Hose Co. #1	Archbald Hose Co. #1	None	None	None
Benton Township	None	None	None	Unknown	None
Blakely Borough					
City of Carbondale	Police Station, City Hall		None	None	None
Carbondale Township	None	None	Unknown	Unknown	Unknown
Clarks Green Borough	None	None	None	None	None
Clarks Summit Borough					
Clifton Township	None	None	Unknown	Unknown	Unknown
Covington Township	None	None	Unknown	Unknown	Unknown
Dalton Borough	Fire Department Offices	Fire Department Offices, Borough Offices, Borough Garage	Approx. 10-15		
Dickson City Borough	None	None	Approx. 85	Unknown	None
Dunmore Borough					
Elmhurst Township					
Fell Township	None	None	5	5	None
Glenburn Township	None	None	None	None	None
Greenfield Township					
Jefferson Township	None	None	None	None	None
Jermyn Borough	None	None	Unknown	Unknown	None
Jessup Borough	None	Jessup Hose Co. #1			
LaPlume Township	None	None	5	Unknown	None
Madison Township	None	None	7	Unknown	None
Mayfield Borough	Lakeland - Mayfield Elementary	Lakeland - Mayfield Elementary	None	None	None
Moosic Borough	None	None			
Moscow Borough	N.P. Intermediate School	None	Approx. 18	Unknown	Unknown
Newton Township	None	None	None	None	None
North Abington Township					
Old Forge Borough					
Olyphant Borough	None	None	Unknown	111	5
Ransom Township			None	None	None
Roaring Brook Township	None	None	None	None	None
Scott Township					
City of Scranton	No	Public Works Complex	2170	503	11
South Abington Township	Municipal Building	Municipal Building, Chinchilla Hose Co., South Abington Police, South Abington Elementary			
Spring Brook Township	None	None	Approx. 13	Unknown	No
Taylor Borough	None	None	None	None	None
Thornhurst Township					
Throop Borough	None	None	None	Unknown	None
Vandling Borough	None	None	None	None	None
Waverly Township	Sewer Pump Station	Sewer Pump Station	1	None	None
West Abington Township	None	None	None	None	None

Staff Capabilities

Of those who responded to the survey,

- Ten municipalities stated they have a floodplain administrator and 12 municipalities stated they didn't have a floodplain administrator.
- Twenty-nine municipalities stated they have a building inspector and seven municipalities stated they didn't have a building inspector.
- Twenty-two municipalities stated they have a site plan reviewer and 14 municipalities stated they didn't have a site plan reviewer.
- Twenty-nine municipalities stated they have an engineer while six stated they didn't have a surveyor.

All municipalities indicated that they had emergency services (police, fire, EMS). Clarks Green Borough indicated they did not have any of these staff positions – Floodplain Administrator, Building Inspector, Site Plan Reviewer, Surveyor, or GIS Specialist. Other municipalities indicated that they had some of these staff positions.

Table 5.5. Staff Capabilities.

Municipality	Floodplain Administrator	Building Inspector	Site Plan Reviewer	Engineer	Training In Floodplain Management?	Training in Building Inspection?	Emergency Services
Archbald Borough	No	Yes	Yes	Yes	Yes	Yes	Yes
Benton Township	No	Yes	Yes	Yes	No	No	Yes
Blakely Borough							
City of Carbondale	No	Yes	Yes	Yes	No	Yes	Yes
Carbondale Township		Yes	Yes	Yes	No	No	Yes
Clarks Green Borough	No	No	No	No	No	No	Yes
Clarks Summit Borough							
Clifton Township	Yes				No	No	Yes
Covington Township	No	Yes	Yes	Yes	No	Yes	Yes
Dalton Borough	No	Yes	No	Yes	No	Yes	Yes
Dickson City Borough	No	Yes	Yes	Yes	Yes	Yes	Yes
Dunmore Borough	Yes	No	No	No			
Elmhurst Township							
Fell Township	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Glenburn Township	No	Yes	Yes	Yes	No	No	Yes
Greenfield Township							
Jefferson Township	No	Yes		Yes	No	No	Yes
Jermyn Borough	No	Yes	Yes	Yes	No	No	Yes
Jessup Borough				Yes		Yes	Yes
LaPlume Township	Yes	Yes	No	Yes	No	Yes	Yes
Madison Township	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mayfield Borough	No	Yes	No	Yes	No	No	Yes
Moosic Borough	Yes	Yes	Yes	Yes		Yes	Yes
Moscow Borough	No	Yes	Yes	Yes	No	Yes	Yes
Newton Township	No	Yes	Yes	Yes	No	Yes	Yes
North Abington Township							
Old Forge Borough							
Olyphant Borough	Yes	Yes	Yes	Yes	No	No	Yes
Ransom Township	No	Yes	No	Yes	No	Yes	Yes
Roaring Brook Township	No	Yes	Yes	Yes	No	Yes	Yes
Scott Township							
City of Scranton	Yes	Yes	Yes	Yes	Yes	Yes	Yes
South Abington Township	Yes	Yes	Yes	Yes	No	No	Yes
Spring Brook Township	Yes	Yes	Yes	Yes	No	Yes	Yes
Taylor Borough		Yes	Yes	Yes		Yes	Yes
Thornhurst Township		Yes				Yes	Yes
Throop Borough	No	Yes	Unknown	Yes	No	Yes	Yes
Vandling Borough	No	Yes	Yes	Yes	No	No	Yes
Waverly Township	No	Yes	Yes	Yes	No	Yes	Yes
West Abington Township	No	Yes	Yes	Yes	No	No	Yes

Chapter 6 – Mitigation Strategy

6.1 Update Process Summary

Requirement §201.6(c)(3): *The Plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

The mitigation strategy serves as the long-term road map to reduce the potential losses, vulnerabilities, and shortcomings identified in the Hazard Identification and Risk Assessment section. A typical mitigation strategy includes a list of goals and objectives, along with specific mitigation actions to address the goals and objectives. Actions are then prioritized, based on the community's requirements.

The mitigation strategy in this Plan comprises the following five subsections:

- Local Hazard Mitigation Goals and Objectives;
- Identification and Analysis of Mitigation Actions (County level);
- Implementation of Mitigation Actions;
- Implementation of the National Flood Insurance Program;
- Multi-jurisdictional Mitigation Actions (municipal level); and
- Prioritization of Mitigation Actions.

6.2 Mitigation Goals and Objectives

Requirement §201.6(c)(3)(i): *[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

For the purposes of this Plan, goals are defined as general policy guidelines or broad statements that represent a vision for a community. Lackawanna County's Vision is to *"Protect the residents and their property and reduce related costs of disaster response and recovery, and minimize the disruption and damage that any disaster will cause to the Lackawanna County community."*

Objectives define strategies or implementation steps to attain the identified goals. Compared to goals, objectives are more specific and measurable. The goals for this planning process have been developed in close coordination with the Steering Committee based on the following: findings from the HIRA (issues), mitigation capability assessment (gaps); and original goals and objectives from the 2009 plan (revisited and revised by the Steering Committee).

The goals and objectives have been reorganized and categorized as: preventive measures, natural resources and open space protection, outreach and coordination, and other (includes emergency services). The goals and objectives are also designed to serve as the basis for the mitigation actions at the County and municipal levels. Each mitigation action (in the next section) is linked to one or more goals and objectives in this chapter.

A. Preventative Measures

Goal A: Ensure hazard mitigation goals and objectives are consistent with goals of other plans and ordinances in the counties and municipalities:

Objectives:

- A1: Promote responsible growth and development via proper enforcement and through the incorporation of hazard mitigation principals in municipal plans, and zoning, subdivision and land development, stormwater ordinances, and floodplain ordinances, as appropriate
- A2: Incorporate hazard mitigation planning projects into capital improvement plans
- A3: Continue to regulate development in conservation areas and within floodplains to prevent flood damage
- A4: Work with municipalities to continue to be compliant with the National Flood Insurance Program (NFIP) through periodic training of municipal officials
- A5: Better integrate plans and ordinances to ensure concurrency and harmony between them.

B. Natural Resources and Open Space Protection

Goal B: Promote sustainable development to improve the quality of life in Lackawanna County.

Objectives:

- B1: Ensure that existing drainage systems (pipes, culverts, and channels) are adequate and functioning properly through regular maintenance or upgrades
- B2: Protect natural resources and open space, including parks and wetlands within the floodplain and watersheds.

C. Outreach and Coordination

Goal C: Promote public understanding, support and involvement in mitigation related activities.

Objectives:

- C1: Work with television, radio, and newspaper partners as well as the Internet and website to promote public awareness on the potential impacts of natural hazards and actions to reduce those impacts
- C2: Consider education campaigns and workshops to promote 'safe' development and other hazard mitigation principles.

D. Projects

Goal D1: Encourage high construction standards on structural projects

Goal D2: Minimize structural damage caused by flooding, wind events, winter storms, transportation incidents, and wildfires;

Objectives:

- D1: Minimize damage to critical facilities in high hazard areas, (i.e. 100-year floodplain, heavily forested areas, areas of geologic subsidence) and develop measures to prevent future damages.
- D2: Remove or retrofit repeatedly flooded structures to reduce the flood risk.

E. Other (Emergency Management)

Goal E1: Ensure continuity of emergency management services during hazard events.

Goal E2: Ensure adequacy of shelters and efficiency of evacuation routes within the County.

Objectives:

- E1: Ensure that hazards do not interrupt emergency response services and critical functions.
 E2: Identify safe and efficient evacuation routes during hazard events to ensure continued service;
 E3: Continue to provide residents with adequate warning of potential hazards
 E4: Provide for adequate shelters during hazard events.

6.3 Identification and Analysis of Mitigation Techniques

Requirement §201.6(c)(3)(ii): *[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

Mitigation actions have been developed for the entire County as well as for each participating jurisdiction. While some actions may be more general in nature and could apply to more than one jurisdiction, most actions are specific to a jurisdiction. The mitigation actions that were developed were based on the following: issues identified in the Hazard Identification and Risk Assessment, gaps identified in the mitigation capability analysis, input from the Steering Committee on actions in the 2009 Plan, and feedback from the municipal workshop.

The actions in the 2009 Plan were reviewed and each action was examined by the Steering Committee and assigned one of the following categories:

- “Not Started” – Actions that had not been initiated since the adoption of the 2009 Plan
- “In Progress” – Work has been initiated on these actions; these projects have a definite end-date
- “On-Going” – Actions that are performed on a regular and continuous basis by the department
- “Not Applicable” – Actions that were deemed by the Steering Committee to not apply to the Hazard Mitigation Plan
- “Completed” – Actions that were completed since the adoption of the 2009 Plan
- “Cancelled” – Actions that were terminated.

Municipal actions from the 2009 Plan were also revisited and updated based on municipal input. These mitigation actions may be implemented through a variety of local tools such as: changes in ordinances and policies, inclusion into capital improvements budgets, and grant funding.

In formulating the Mitigation Strategy, the Steering Committee considered four mitigation categories, similar to those used to develop the Plan’s goal and objectives. They include: Preventative Measures, Outreach and Coordination, and Open Space and Natural Resource Protection and Other projects. These categories formed the basis of the mitigation actions in the Plan Update and descriptions of these categories and examples for each category are included below:

- Preventative Measures - Preventative activities are those that are performed to keep hazard-related issues from exacerbating in the community. They are effective in reducing a community’s future vulnerability, particularly in areas where development has not occurred. Examples of preventative activities include: zoning and subdivision regulations; building codes; hazard mapping; floodplain regulations; stormwater management; drainage system maintenance, and capital improvements programming.
- Natural Resource Protection - Natural resource protection activities include those actions that can reduce the impact of hazards by preserving or restoring the function of natural systems. Natural systems that can be

classified as high hazard areas include floodplains, wetlands, and barrier islands. Thus, natural resource protection can serve the dual purpose of protecting lives and property while enhancing water quality or recreational opportunities. These actions are usually implemented by parks, recreation, or conservation agencies. Examples include: erosion and sediment control; stream and wetland restoration; habitat preservation, and slope stabilization.

- Outreach and Coordination - Public Information and awareness activities are conducted to advise and educate residents, business owners, potential property buyers, and visitors about hazards and mitigation techniques that can be used to protect lives and property. Examples of measures used to educate and inform the public include: outreach and education; training; demonstrations; real estate disclosure; hazard expositions, and State/ Federal Program Coordination (StormReady, Firewise, NFIP, CRS).
- Projects - Property protection measures include those actions that can be undertaken by private homeowners so their structures can: better withstand hazard events; be removed from hazardous locations, or can be insured to cover potential losses. Examples include: acquisition; building elevation; retrofitting (i.e., wind proofing, flood proofing, seismic design standards, etc.), drainage, etc.
- Other Mitigation Actions (emergency services, etc.) - Although emergency services are not necessarily considered mitigation techniques, these services minimize the impact of a hazard on people and property. Actions taken immediately prior to, during, or in response to a hazard event include: warning systems; search and rescue operations; evacuation planning and management, and flood fighting techniques.

6.4 Mitigation Action Plan

Mitigation actions have been developed for the entire County as well as for each participating jurisdiction. While some actions may apply to more than one jurisdiction, most actions are specific to each jurisdiction. The mitigation actions that have been developed can be implemented through a variety of local tools such as changes in ordinances and policies, capital improvements budgets, and applying for grant funding.

The mitigation actions that were developed were based on results from the Hazard Identification and Risk Assessment; mitigation capability analysis; input from the Steering Committee; actions that have been completed in the past; recent past hazard occurrences, and feedback from the Municipal Workshop.

Table 6.1 identifies County-level mitigation actions. The projects described refer to the hazard(s) mitigated and the specific goal and objective(s) addressed, lead agency for implementation, and possible funding sources.

Table 6.1. Lackawanna County Mitigation Actions.

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Possible Funding Source	Approx. Cost	Project Timeline*	Status/Evaluation
Other Mitigation Actions (Emergency Management)							
1	Update the evacuation strategy for Lackawanna County and municipalities in conjunction with the Long Range Transportation Plan. The Plan should include issues such as staging areas, feeding plan for displaced persons, signs, temporary housing, decontamination, and destination points such as shelters. Involve experts in emergency planning, transportation planning, and traffic engineering in developing the plan.	All hazards	County Emergency Management Agency	HMGP, EMPG, PENNDOT funds	\$75,000 - \$100,000	3-5 years	Ongoing
2	Continue to work with the Red Cross to conduct an annual assessment of existing shelters in the county to determine their condition and adequacy with respect to beds, etc. and determine which ones would need to be retrofitted. Identify additional locations that could be equipped and identified as shelters based on the needs and the population centers in the county.	All hazards	County Emergency Management Agency	HMGP, EMPG	\$10,000 per year	Ongoing	Ongoing
3	Conduct a Commodity Flow Study for the County and its municipalities.	Hazardous Materials	County Emergency Management Agency			1-2 years	New Action
Preventative Measures							
4	Identify a point-of-contact to property owners and municipalities who have flooding problems and provide advise to municipalities on the flood hazard, availability of flood insurance, flood protection, and stormwater management methods. Also provide inquirers with technical advice and information from the community's FIRM, RiskMAP information, and FEMA's website on a property's location in a Special Flood Hazard Area, zone, and its base flood elevation.	Flood	County Regional Planning Commission, County Emergency Management Agency	FMA, PDM, HMGP	Staff time	1-2 years	Not started
5	Encourage the individual municipalities to be firmly committed to continue compliance with the NFIP: a) Work with municipalities to encourage them to include language in their zoning ordinances to concur with the Model Floodplain Ordinance and the Subdivision/Land development Ordinance with respect to what is allowed in the floodplain. b) Conduct a training program for floodplain officials in the county and those who administer the floodplain ordinance in the municipalities to educate them on sound flood management principles. c) Regulate development and redevelopment through the adoption of provisions that exceed the minimum NFIP requirements. d) Work with communities to ensure that there are no deficiencies when the Community Assistance Visits are conducted to ensure continued compliance.	Flood	County Regional Planning Commission	LUPTAP	Staff time	1-2 years	Ongoing
6	Develop stormwater management programs for the Borough of Dunmore and City of Scranton and transfer permitting, management, and maintenance to a single agency.	Flood	County Regional Planning Commission, Borough of Dunmore, City of Scranton	User Fees	Staff time	1-2 years	Not started

Table 6.1. Lackawanna County Mitigation Actions.

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Possible Funding Source	Approx. Cost	Project Timeline*	Status/Evaluation
7	Conduct an annual workshop to encourage regional cooperation between municipalities for multi-municipal planning to reduce the impact of hazard events on adjacent municipalities.	All hazards	County Regional Planning Commission and individual municipalities	LUPTAP	Staff time	Ongoing	Not started
8	Work with the municipalities to integrate the County's Hazard Mitigation Plan into the municipalities' comprehensive plan and zoning ordinance by: a) encouraging them to include principles and strategies for safe development; b) Including language in the zoning ordinance to discourage development in the 100-year floodplain; and c) encouraging municipalities to include measures in their zoning ordinance to enhance the concept of defensible space practice; d) discourage development on permeable soils to reduce the impacts of drought; and e) best management practices in stormwater management.	All hazards	County Regional Planning Commission, County Engineer	LUPTAP, FLUAP	Staff time	3-5 years	Not started
9	Promote denser development (small lot single family development) or cluster development to preserve environmentally sensitive areas (i.e., woodlands, wetlands, floodplains, or severely steep slopes).	All hazards	County Regional Planning Commission	LUPTAP	Staff time	1-2 years	Not started
10	Coordinate the preparation of the countywide Act 167 Stormwater Management Plan with the Joint-County Comprehensive Plan and work with municipalities to adopt and enforce the ordinance requirements.	Flood, Drought	County Regional Planning Commission, County Engineer, County Conservation District	DEP	Staff time	3-5 years	Delete and combine with action 8. Act 167 is terminated.
11	Develop a Source Water Protection Plan to properly utilize and protect ground water resources in Lackawanna County.	Drought	County Regional Planning Commission, County Engineer	DEP	\$100,000	3-5 years	Deleted - Not applicable
12	Work with the City of Scranton and any municipality along large rivers and streams, to join the CRS by educating them on the benefits of CRS and also providing them with technical assistance.	Flood	County Regional Planning Commission, Municipality	PDM, FMA, HMGP	\$5,000 - \$10,000 per community	3-5 years	Not started
13	Work with the municipalities to identify a point of contact to perform an annual review of the mitigation actions for their municipality from this Hazard Mitigation Plan.	All hazards	County Regional Planning Commission	PDM	Staff time	1-2 years	Completed
14	Develop digitized mine maps in GIS format.	Earthquake, Mine related hazards	Department of Environmental Protection, County Emergency Management Agency, State Mining Office	DEP		3-5 years	Deleted - maps are being prepared by the DEP

Table 6.1. Lackawanna County Mitigation Actions.

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Possible Funding Source	Approx. Cost	Project Timeline*	Status/Evaluation
Projects							
15	Coordinate efforts between the Joint-County Comprehensive Plan and the countywide Act 167 Stormwater Management Plan to identify groundwater recharge areas and sensitive groundwater areas such as mine lands. Work closely with the municipalities to enforce infiltration and groundwater recharge requirements in these areas to reduce the impacts of drought.	Drought	County Conservation District, County Engineer	DEP	Staff time	1-2 years	Deleted - Not applicable
16	For those parties not interested in acquisition or where acquisition is not feasible, continue to work with municipalities to advise homeowners with a preferred mitigation alternative such as elevation or flood proofing.	Flood	County Office of Emergency Management	FMA, PDM, HMGP, RF	Staff time	3-5 years	Deleted - Not applicable
17	Conduct a structural assessment and engineering inspection of all County-owned critical facilities that have been identified in high hazard areas. The assessment should include the ability of each facility to sustain damage from any hazard event and recommendation of specific retrofitting measures in a technical report.	All hazards	Department of Buildings and Grounds, County Engineer	FMA, PDM, HMGP		3-5 years	Deleted
18	Encourage municipalities to reduce the vulnerability of critical facilities to wildfires by: increasing buffers and introducing defensible spaces; identifying farm roads, service roads, and other private access corridors in high hazard areas that could be used as fire breaks; and providing assistance to the County Emergency Management Agency to identify vulnerable structures (firewise communities).	Wildfire	Pennsylvania Department of Environmental Protection - Bureau of Forestry	PDM, HMGP		3-5 years	Not started
19	Work with FEMA to conduct detailed studies for Ackerly Creek, Lackawanna River, Leggetts Creek Tributary1, Mill Creek No. 2, Saint John's Creek, and Tinklepaugh Creek as identified in the FEMA Region III Post-Flood Community Flood Risk Evaluation for Lackawanna County.	Flood	County Engineer	PDM, HMGP		6-10 years	NA - Dfirms to be factored in
20	Develop methods to secure funding to initiate a structural survey for 4 older communities in the County. The survey should involve an inventory of all pre-1970 buildings - age of structure, construction material, and structural flaws.	All hazards	County Engineer, Office of Economic and Community Development	PDM, HMGP		3-5 years	Deleted - Not applicable

Table 6.1. Lackawanna County Mitigation Actions.

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Possible Funding Source	Approx. Cost	Project Timeline*	Status/Evaluation
Outreach and Coordination							
21	Designate specific locations throughout the County such as the County Emergency Management Agency, County Planning Department, municipal libraries, and events such as fairs to provide information to the public on flooding and other hazards. Encourage these locations to stock a variety of FEMA publications on various natural hazards and also the most recent FIRMs; also include information on the County's website and develop brochures on specific topics.	All hazards	County Regional Planning Commission, Public Information Office, County EMA	PDM		1-2 years	Ongoing
22	Conduct an educational campaign and develop brochures on topics such as: the impacts of drought, proper sediment and erosion control, and dangers of developing on old mines and dumps.	Drought, Flood, Mine related hazards	County Engineer, County Flood Protection Department, Communications Office, Department of Environmental Protection	PDM		1-2 years	Deleted - combined with 21
23	Continue to conduct the Municipal Engineers workshop (that is part of the ACT 167 stormwater management requirement) to educate municipal officials, engineers, and developers.	Flood	County Engineer, County Regional Planning Commission	DEP, FMA		1-2 years	Deleted - Not applicable
24	Encourage the Flood POC to stay closely involved with the activities of the Susquehanna River Basin Commission, Delaware River Basin Commission by encouraging a staff member from the County Regional Planning Commission to be present at their meetings.	Flood	County Regional Planning Commission	LUPTAP		1-2 years	Not started
25	Work with State agencies, professional organizations, real-estate agents, and non-government organizations to conduct an annual workshop at a key location in each county for private developers to involve them in hazard mitigation activities and educate them on 'safe' development principles that can be incorporated into their development proposals.	All hazards	Department of Community and Economic Development, Pennsylvania Association of Township Supervisors, County Emergency Management Agency	FMA, PDM		1-2 years	Deleted - conducted through other departments
26	Continue to provide inquirers with technical advice and information from the community's FIRM and FEMA's website on a property's location in a Special Flood Hazard Area, zone, and its base flood elevation.	Flood	County Regional Planning Commission, County Flood Protection Department	PDM	Staff time	Ongoing	Deleted - combined with action 4
27	Work with real estate agents throughout the county and encourage them to advise prospective property purchasers in flood prone and mine subsidence.	Flood, Mine Related Hazards	County Flood Protection Department, County Regional Planning Commission, County Emergency Management Agency, State agencies	PDM	Staff time	1-2 years	Ongoing

Table 6.1. Lackawanna County Mitigation Actions.

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Possible Funding Source	Approx. Cost	Project Timeline*	Status/Evaluation
Plan Implementation							
28	Monitor and evaluate mitigation actions annually and update the hazard mitigation plan every five years to reflect changes in development after a major hazard event.	All hazards	County Planning Commission	PDM	Staff time	Ongoing	Ongoing
29	Provide technical assistance to municipalities in implementing individual hazard mitigation actions.	All hazards	County Planning Commission, EMA	PDM, HMGP	Staff time	Ongoing	Ongoing

* The ability of the Lead Agency to perform the action item is dependent on the availability of non-county funds.

Gray Text = Action has either been completed or no longer applicable per discussion with the Steering Committee

Based on qualitative ranking during the Hazard Identification and Vulnerability Analysis phase, five hazards were deemed as high priority hazards by the Steering Committee. These included: flood; winter weather; traffic incidents related to local industry; wind events, and wildfires. Efforts were made to ensure that mitigation actions were included for each of these hazards.

6.4.1 Implementation of Mitigation Actions and Progress in Local Mitigation Efforts

Actions from the 2009 Plan that were categorized as "Not Started" "In Progress" and "On-Going" were carried over to the 2014 Plan Update and rephrased by the Steering Committee as needed, in addition to the new actions that were developed. Mitigation actions from the 2009 Plan that fell into the latter two categories: "In Progress" and "On-Going" were elaborated on identify progress and tweaked to demonstrate the current status of these actions. Once the actions were finalized by the Consultant and Steering Committee, an implementation strategy was developed, which identified the following for each action:

- hazard mitigated;
- goal and objective addressed;
- lead agency for implementation;
- possible funding source;
- approximate cost, and
- project timeline (short-term – 1 to 2 years; medium-term 3 to 5 years; long-term – 5 to 10 years; or continuous/ongoing).

6.4.2 Continued Compliance with the National Flood Insurance Program

While FEMA is the official administering agency for National Flood Insurance Program (NFIP) participation, it is the County's responsibility to have the capability and to serve as a resource for flood mitigation activities. Lackawanna County is NOT a participant in the NFIP (No administration of floodplain regulations. This is done strictly by local municipalities). However, the County and municipalities are committed to continuing compliance with the NFIP via three of its basic components:

- 1) floodplain identification and mapping risk;
- 2) responsible floodplain management, and
- 3) flood insurance.

After discussions with the Lackawanna County Regional Planning Commission staff, the following information is summarized to document how the County currently addresses and will continue to address NFIP compliance and requirements in the future.

Table 6.2. County Involvement in NFIP Compliance.

Flood Identification and Mapping	
Does the County make the Flood Insurance Rate Map and Flood Insurance Studies available to the public? Where are these documents housed within the County?	Yes. Planning Department.
Will the recently developed Digital Flood Insurance Rate Maps be made available to the public as well? How?	Yes. Planning Department/GIS Coordinator.
Are Letters of Map Revisions (LOMRs) reviewed and signed by County officials? If during the subdivision review process, a new development determines a reduction in the floodplain delineation of the FIRM floodplain, is the developer required to submit a LOMR submission to FEMA?	No. No, not by the county planning commission, through local municipality only.
Does the County provide advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications?	No.
Does the County maintain records of approved letters of map change?	No.
Does the County assist residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain? If yes, which department?	Yes. Planning Department.
Floodplain Management	
Are any restrictions on floodplain use enforced through the subdivision and building permit process?	Not by the county, by local municipality only.
Do all proposed developments require plans to go through the County's subdivision approval process or to acquire a building permit for new structures?	Required to be reviewed by the county planning agency; however, approval and permits are through local municipality only.
Are all new structures required to be at least 1.5 feet above the 100-year base flood elevation?	Yes, through local municipal floodplain ordinances.
Flood Insurance	
Is the County committed to educating residents about the value and availability of flood insurance? Is an annual letter sent to residents in the floodplain explaining the importance of flood insurance and where it may be obtained?	The county is committed to educating residents; however, responsibility to notify residents has been by local municipality only. The county planning department, through the GIS coordinator, will be more involved with local municipalities once DFIRMS are finalized.
Does the County assist residents in interpreting the FIRM and County flood studies to determine their property's floodplain status, and offer advice regarding elevation certificates and LOMA applications?	Yes on assistance; No on certificates and LOMAs.
When was the last Community Assistance Visit conducted and, as of that date, was Lackawanna County found to meet the requirements for continued participation in the NFIP?	N/A

6.4.3 Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

Requirement §201.6(c)(3)(ii): *[The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.*

Communities that participate in the NFIP are required to adopt flood maps and local requests for map updates; adopt and enforce minimum floodplain management regulations that help mitigate the effects of flooding on new and improved structures in the Special Flood Hazard Area; offer property owners flood insurance as a protection against flood losses in exchange for floodplain management regulations that reduce future flood damages, and perform community assistance and monitoring activities.

Currently, all 40 municipalities in Lackawanna County participate in the NFIP. Updated DFIRM mapping through FEMA's Risk Map program will become effective in 2015.

6.4.4 Multi-jurisdictional Mitigation Actions

Requirement: §201.6(c)(3)(iii): *[The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*

Requirement §201.6(c)(3)(iv): *For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*

Multi-jurisdictional plans require all municipalities to have at least one mitigation action to be included in the hazard mitigation plan. Included in Table 6.3 are the mitigation actions identified for each municipality. These actions were developed in the same manner as the county-level projects, and in addition, drew heavily from the Municipal Mitigation Workshop and suggestions from local representatives via email, and the Mitigation Capability Questionnaire. The table includes mitigation actions for each municipality; the natural hazard mitigated by the action; goals and objectives addressed; responsible entity for implementing the project; possible funding sources, and project timeline.

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Archbald Borough							
	1	Flood	Preserve the Theta Company lands in the Laurel Run Watershed through acquisition or easements to reduce flooding in the downstream portions of the watershed.	Lackawanna River Corridor Association Master Plan	Borough Council, Bureau of Abandoned Mine Reclamation	PDM, HMGP	6-10 years
	2	Flood	The headwater of Tinklepaugh Creek has numerous encroachments and mine impacts. Conduct a study to address flooding problems (eliminate flow diversion into the Gravity Slope mine outfall).	Lackawanna River Corridor Association Master Plan	Borough Council	DEP BAMR	3-5 years
	3	Flood	Consider the feasibility of constructing a levee from Gilmartin Street to South Laurel to control flooding on the Lackawanna River.	Joint County HMP	Borough Council, U.S. Army Corps of Engineers	EMPG, PDM	3-5 years
	4	Flood	Consider stream channelization on Oak Creek Run and upgrade the culvert from Ash Street to the Lackawanna River.	Joint County HMP	Borough Council	HMPG, PDM	3-5 years
	5	Flood	Consider approximately 2000 feet of stream channelization of Laurel Run from the Lackawanna River upstream.	Joint County HMP	Borough Council	HMPG, PDM	3-5 years
	6	Flood	Consider stream channelization of Tinklepaugh Creek from Kennedy Boulevard, downstream to Blakely Borough.	Joint County HMP	Borough	HMPG, PDM	3-5 years
	7	Flood	Develop mitigation measures including an implementation strategy for Archbald House #2 that is located in the floodplain. Use FEMA publication 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures, which</i> provides guidance on determining appropriate mitigation measures.	Joint County HMP	Township Board of Supervisors	EMPG, FMA, FLUAP	3-5 years
Benton Township							
	1	Flood	Develop mitigation measures including an implementation strategy for Seaman's Airport that is located in the floodplain. Use FEMA publication 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures, which</i> provides guidance on determining appropriate mitigation measures.	Joint County HMP	Township Board of Supervisors	EMPG, PDM, FMA	3-5 years
Blakely Borough							
	1	Flood	Conduct an engineering study for the design of flood control projects in Blakely Borough to mitigate flooding at the Hull Creek/Lackawanna River confluence, and maintain and restore a forested riparian buffer through this reach.	Lackawanna River Corridor Association Master Plan	Borough Council	PA DEP, US Army Corps of Engineers (USACOE)	3-5 years
	2	Flood	Identify options to reduce flooding on Riverside Drive and Adele Drive.	Joint County HMP	Borough Council	EMPG, PDM, FMA	1-2 years
		Flood	Conduct a channelization study at Tinklepaugh Creek at the Lackawanna River to avoid back up into the channel from flooding of the Lackawanna River.	Joint County HMP	Borough Council	EMPG, PDM, FMA	3-5 years

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Carbondale Township							
	1	Mine related hazards	Investigate the need for additional mine fire control measures (trenches or barriers) to contain the underground mine fire near S.R. 6, southwest of Carbondale City and prevent it from spreading to adjacent mines.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	PA DEP BAMR, US Dept. of Interior OSM	1-2 years
	2	Flood	Construct bank stabilization on Brookside Creek along Brookside Road	2014 Municipal Mitigation Workshop	Township Board of Supervisors	PADEP	1-2 years
	3	Flood	Replace the undersized bridge over Lees Creek near its confluence with the Lackawanna River.	Lackawanna River Corridor Association Master Plan	Borough Council	PDM, HMGP	3-5 years
Carbondale City							
	1	Flood	Construct retaining walls to replace the degraded flood walls at Racket Brook Creek.	Lackawanna River Corridor Association Master Plan	City of Carbondale, US Army Corps of Engineers	PDM, HMGP, DEP	3-5 years
	2	Flood	Restore the riparian corridor along Fall Brook Creek to mitigate flooding along Fall Brook Creek and the Lackawanna River.	Lackawanna River Corridor Association Master Plan	City Council, US Army Corps of Engineers	USACOE, PA DEP	3-5 years
	3	Flood	Conduct an engineering study to investigate solutions to controlling stormwater runoff from Salem Mountain / Wayne Street and 8th Avenue.	2014 Municipal Mitigation Workshop			
	4	Flood	Conduct an engineering study to investigate solutions to controlling stormwater runoff from the City which impacts the intersection of Church St and 7th Ave.	2014 Municipal Mitigation Workshop			
	5	Flood	Rear Park St near Carbondale Township line.	2014 Municipal Mitigation Workshop			
	6	All hazards	Acquire a backup emergency generator at the Fire Department (6th Ave) and Police Department (Main St)	2014 Municipal Mitigation Workshop			
Clarks Green Borough							
	1	Flood	Since Ackerly Creek has overtopped its banks on several occasions conduct a watershed study to determine the sources of the flooding problems.	Comprehensive Plan for Scranton Abingtons Planning Association	Borough Council, Lackawanna County Planning Department and the Scranton Abingtons Planning Association	Pennsylvania DEP, FMA, PDM	3-5 years
	2	Flood	Include language in the Township's zoning, land development and subdivision plans to improve the management of small lot subdivisions, especially relative to slope, soil and drainage conditions.	Lackawanna River Corridor Association Master Plan	Borough Council	FLUAP, LUPTAP, DEP	1-2 years
	3	All hazards	Include language in the Township's zoning, subdivision and land development ordinances and comprehensive plans to protect: open space, natural areas, wetlands, woodlands, and stream corridors.	Lackawanna River Corridor Association Master Plan	Borough Council	FLUAP, LUPTAP, DEP	1-2 years
	4	Flood	Include language in the Borough's zoning, subdivision and land use ordinances and comprehensive plan to protect Landsdowne Creek.	Lackawanna River Corridor Association Master Plan	Borough Council	FLUAP, LUPTAP, DEP	1-2 years

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Clarks Summit Borough							
	1	Flood	Since Ackerly Creek has overtopped its banks on several occasions conduct a watershed study to determine the sources of the flooding problems.	Comprehensive Plan for Scranton Abingtons Planning Association	Borough Council, Lackawanna County Planning Department and the Scranton Abingtons Planning Association	Pennsylvania DEP, FMA, PDM	3-5 years
	2	Flood	Conduct a Corridor Stormwater Management Study to analyze the hydrology of the tributary to Summit Lake Creek.	Joint County HMP	Borough Council	EMPG, PDM, DEP	3-5 years
	3	Flood	Provide information on the importance of purchasing flood insurance to all property owners in the floodplain.	Joint County HMP	Borough Council	CDBG, FLUAP, FMA	1-2 years
	4	Flood	Conduct a study to identify areas within the Borough that require the replacement of storm drains and culverts along roadways to handle stormwater effectively.	Joint County HMP	Borough Council	EMPG, PDM	3-5 years
	5	Flood	Conduct a study to determine the replacement and/or upgrade of the major sewer main running along the railroad.	Joint County HMP	Borough Council	EMPG, PDM	3-5 years
	6	Mine related hazards	Conduct a workshop to educate residents on the impacts of stormwater infiltration in the sewer system.	Joint County HMP	Borough Council	CDBG, FLUAP	1-2 years
	7	Flood	Develop mitigation measures including an implementation strategy for the Sewer Authority that is located in the floodplain. Use FEMA publication 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures</i> , which provides guidance on determining appropriate mitigation measures.	Joint County HMP	Township Board of Supervisors	EMPG, FMA, FLUAP	1-2 years
Clifton Township*							
	1						
Covington Township*							
	1						
Dalton Borough							
	1	Flood	Since Ackerly Creek has overtopped its banks on several occasions conduct a watershed study to determine the sources of the flooding problems.	Comprehensive Plan for Scranton Abingtons Planning Association	Borough Council, Lackawanna County Planning Department and the Scranton Abingtons Planning Association	Pennsylvania DEP, FMA, PDM	3-5 years
	2	All hazards	Upgrade fire company communications system that serves the Borough fire company, emergency management agency, and other Borough departments.	Joint County HMP	Borough Council	EMPG, CDBG	3-5 years
	3	Flood	Identify ways to protect the sewage treatment plant on the creek through creek bank restoration and other means such as levees or floodwalls.	Joint County HMP	Borough Council	DEP, HMPG	3-5 years
	4	Flood	Conduct a study to identify the work needed on Ackerly Creek north and south of Route 632 (Main Street) to protect the businesses and residences on Main Street from flooding.	Joint County HMP	Borough Council	EMPG, PDM	3-5 years

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Dickson City Borough							
	1	Flood	Include language in the Borough's ordinances for stream corridor buffer and set back requirements and emphasize the protection of stream and river corridors, flood plains and habitat values and functions.	Lackawanna River Corridor Association Master Plan	Borough Council	FLUAP, LUPTAP, DEP	1-2 years
	2	Flood	Clean and repair stormwater drainage collection systems.	2014 Municipal Mitigation Workshop	Borough Council	FLUAP, LUPTAP, DEP	1-2 years
Dunmore Borough							
	1	Flood	Restore the stream channels of Roaring Brook to restore the capacity of the stream.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	Marywood University, Cemetary Associations, PADEP	6-10 years
Elmhurst Township							
	1	Flood	Conduct an engineering study to identify the most appropriate mitigation measure for the Township Government Building on South Main Street and the sanitary station on G.C. Smith Street.	Joint County HMP	Township Board of Supervisors	PDM, FMA	3-5 years
	2	Dam	Ensure that the Elmhurst Reservoir meets all DEP Division of Dam Safety requirements for high hazard dams.	2014 Municipal Mitigation Workshop			
	3	Hazardous Material	Investigate ways to prevent / mitigate a potential train derailment carrying hazardous material through the Township.	2014 Municipal Mitigation Workshop	Lackawanna County RR Authority		
	4	Hazardous Material	Ensure adequate emergency response services are available to respond to potential truck accidents carrying hazardous material on I-84 and I-380.	2014 Municipal Mitigation Workshop			
	5	All hazards	Work with PennDOT and applicable local agencies to determine the structural condition of SR 435, Gardner Rd, and Front St bridges over the Railroad that in case of failure would affect traffic and the Railroad.	2014 Municipal Mitigation Workshop			
Fell Township							
	1	Flood and Mine Subsidence	Consider a channel restoration project on Wilson Creek to reduce flooding and eliminate infiltration into the mine pool from Richmondale to Simpson.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	DEP, PDM	6-10 years
Glenburn Township							
	1	Flood	Since Ackerly Creek has overtopped its banks on several occasions conduct a watershed study to determine the sources of the flooding problems.	Comprehensive Plan for Scranton Abingtons Planning Association	Township Board of Supervisors, Lackawanna County Planning Department and the Scranton Abingtons Planning Association	Pennsylvania DEP, FMA, PDM	3-5 years
	2	All hazards	Identify the most appropriate mitigation measures for Edgewood Trailer Park since there is a sewage treatment plant nearby.	Joint County HMP	Township Board of Supervisors	EMPG, HMPG, PDM	1-2 years

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Greenfield Township							
	1	Flood	Include language in the Township's zoning, subdivision and land development ordinances for the protection of upper headwater reaches of Rush Brook and Fall Brook.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	FLUAP, LUPTAP, DEP	1-2 years
	2	Flood	Consider enhancements to the Township's zoning, land development and subdivision plans to improve the management of small lot subdivisions, especially relative to slope, soil and drainage conditions and participate with other municipalities, county agencies in programs to better manage minor subdivision development.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	FLUAP, LUPTAP, DEP	1-2 years
	3	Flood	Include language in the Township's zoning, subdivision and land development ordinances and comprehensive plans to further define and protect: open space, natural areas, wetlands, woodlands, and stream corridors.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	FLUAP, LUPTAP, DEP	1-2 years
	4	Flood	Develop mitigation measures including an implementation strategy for the Greenfield Sewer Station that is located in the floodplain. Use FEMA publication 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures</i> , which provides guidance on determining appropriate mitigation measures.	Joint County HMP	Township Board of Supervisors	HMGP, FMA, PDM	1-2 years
Jefferson Township							
	1	Flood	Incorporate language in the Township's plans and ordinances to protect appropriate resources in the Wallenpaupack headwaters along Moosic Mountain. Support the acquisition, protection and conservation of these resources	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	FLUAP, LUPTAP, DEP	1-2 years
Jermyn Borough							
	1	Flood	Consider additional streambank stabilization along Aylesworth Creek upstream of the confluence with the Lackawanna River.	Lackawanna River Corridor Association Master Plan	Borough Council	PADEP, FMA	3-5 years
	2	Flood	Identify flood control measures on Rushbrook Creek including the construction of concrete channels.	Joint County HMP	Borough Council	PDM, HMPG	1-2 years
	3	Flood	Conduct a study to address stormwater issues on the 700 blocks of Lincoln, Jefferson, and Madison Aveues.	Joint County HMP	Borough Council	PDM, HMPG	3-5 years
	4	All hazards	Determine the feasibility of setting up a command center in the Borough to provide support during emergencies.	Joint County HMP	Borough Council	CDBG, UDP, PDM	3-5 years
	5	Flood	Determine the feasibility of constructing a levee in the Borough along the Lackawanna River.	Joint County HMP	Borough Council	PDM, HMPG	6-10 years
	6	Flood	Remove sand bars and gravel bars in the Lackawanna River on Evergreen Drive and Delaware Street to restore the flood carrying capacity of the River.	Joint County HMP	Borough Council	DEP, HMPG	1-2 years

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Jessup Borough							
	1	Flood	Include language in the Borough's subdivision and land development ordinance to require a 75-foot building setback from each side of the creek's channel center and from the bank full line along the Lackawanna River for all new development.	Lackawanna River Corridor Association Master Plan	Borough Council	FLUAP, LUPTAP	1-2 years
LaPlume Township							
	1		Work with DEP to remove fallen trees and large branches that have fallen into the stream during past storms to prevent future flooding of the stream.	Joint County HMP	Township Board of Supervisors	PDM, DEP	1-2 years
Madison Township							
	1	Flood	Consider the acquisition of a majority of the Theta Company properties within the Elmhurst and Curtis Reservoir sheds Reservoirs in Madison Township, or the development of a conservation easement program to ensure that these lands are maintained as open space in the future.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	Bi County Open Space program, HMGP, FMA	6-10 years
Mayfield Borough							
	1	Flood	Construct flood control berms along the Lackawanna River North of Hosey Creek.	Lackawanna River Corridor Association Master Plan	Borough Council, DEP, US Army Corps of Engineers	DEP, PDM, HMGP	1-2 years
	2	Hazardous Material	Develop a regular inspection program, and upgrade the containment system for the 1 million+ gallon gasonline storage tanks near BR0006.	2014 Municipal Mitigation Workshop	Borough Council; DEP	DEP, PDM, HMGP	1-2 years
	3	Flood	Develop mitigation measures including an implementation strategy for Mayfield Elementary School, fire station, and municipal building which houses police, that are located in the floodplain and on an underground mine. Use FEMA publication 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures</i> , which provides guidance on determining appropriate mitigation measures.	Joint County HMP	Borough Council	HMGP, FMA, PDM	1-2 years
	4	Flood	Replace undersized pipe culvert at Hill Street which affects homes in the 400, 500, and 600 block of Hill Street during heavy rain.	2014 Municipal Mitigation Workshop			
	5	Flood	Conduct and engineering study for the design of a new/improved flood protection system along the Lackawanna River from Meredith Street bridge (Carbondale Township) to the Powderly Creek at Oak Street.	2014 Municipal Mitigation Workshop			
	6	Flood	Conduct and engineering study to investigate solutions to flood potential from Powderly Creek overtopping the floodwall/levee system and flowing through an old Railroad tunnel underpass which would flood the Borough.	2014 Municipal Mitigation Workshop			
	7	Flood	Remove debris and sedimentation from Powderly Creek on the east side of the D&H Railroad tracks.	2014 Municipal Mitigation Workshop			

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Moosic Borough							
	1	Flood	Consider using the lower reaches of Spring Brook in Moosic, Spike Island and Belin Village for educational interpretation of the various types of structural and nonstructural responses to issues related to bank stabilization, flood control and mine water infiltration.	Lackawanna River Corridor Association Master Plan	Borough Council	CDBG, UDP	1-2 years
	2	Flood	Provide upgrades to the pump station.	Joint County HMP	Borough Council	HMGP, FMA, PDM	3-5 years
Moscow Borough							
	1	Flood	Conduct an engineering study to investigate solutions to mitigate flooding potential at Vaubrun St, SR 690, and Brook St from Van Brunt Creek and Bear Brook which would impact three schools and the Moscow Sewer Authority Facility.	2014 Municipal Mitigation Workshop			
	2	All hazards	Investigate ways to prevent / mitigate a potential train derailment at the underpass at Market St (SR 690) which would cause potential for hazardous materials release putting at risk nearby homes and business, and which would cut off emergency services to a large portion of the Borough.	2014 Municipal Mitigation Workshop			
	3	All hazards	Ensure adequate emergency response services are available to respond to potential accidents on I-380 involving hazardous material spills.	2014 Municipal Mitigation Workshop			
	4	All hazards	Develop a plan to address the evacuation needs of a large population of senior citizens in a proposed senior housing development.	2014 Municipal Mitigation Workshop			
	5	Winter Storm	Acquire an emergency generator at the Borough/Police Building, which is needed in the event of power outages which would leave the Borough without emergency response capabilities.	2014 Municipal Mitigation Workshop			
	6	All hazards	Develop an additional crossing over the Railroad to mitigate potential incidents at the underpass of SR 690 and SR 435 which would cut off half of the Borough and much of the surrounding municipalities from critical emergency services.	2014 Municipal Mitigation Workshop			
	7	All hazards	Develop a plan to address the evacuation needs of a large population of school students from the 3 schools.	2014 Municipal Mitigation Workshop			

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Newton Township							
	1	Flood	Conduct a regional watershed study for Gardner, Keyser, Buttermilk, and Falls Creek.	Comprehensive Plan for Scranton Abingtons Planning Association	Township Board of Supervisors, Lackawanna County Planning Department and the Scranton Abingtons Planning Association	Pennsylvania DEP, FMA	3-5 years
	2	Flood	Include language for the protection of Keyser Creek, in Newton Township's zoning, subdivision and land development ordinances and comprehensive plans.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	FLUAP, LUPTAP	1-2 years
	3	Flood	Consider enhancements to the Township's zoning, land development and subdivision plans to improve the management of small lot subdivisions, especially relative to slope, soil and drainage conditions. Participate with local municipalities and county agencies in programs to better manage minor subdivision development.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	FLUAP, LUPTAP	1-2 years
	4	Flood	Include language in the Township's zoning, subdivision and land development ordinances and comprehensive plans to further define and protect: open space, natural areas, wetlands, woodlands, and stream corridors.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	FLUAP, LUPTAP, DEP	1-2 years
	5	Flood	Consider conservation easements, acquisition or other protection measures for headwaters of Keyser Creek.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	DEP, PDM, HMGP	3-5 years
North Abington Township							
	1	Flood	Conduct a watershed study for Kennedy Creek and South Branch Tunkhannock Creek.	Comprehensive Plan for Scranton Abingtons Planning Association	Township Board of Supervisors, Lackawanna County Planning Department and the Scranton Abingtons Planning Association	Pennsylvania DEP, FMA	3-5 years
Old Forge Borough							
	1	Flood and Mine related hazards	Replace the borehole culvert at the Old Forge, Duryea and Butler Mine outfalls.	Lackawanna River Corridor Association Master Plan	Borough Council, Army Corps of Engineers, Bureau of Abandoned Mine Reclamation	DEP BAMR	3-5 years
	2	Flood	Consider easements through acquisition to reduce flooding to structures along St. John's Creek in the Borough.	Lackawanna River Corridor Association Master Plan	Borough Council	PDM, HMGP	6-10 years
	3	Mine related hazards	Conduct annual inspections of the structures that discharge stormwater and groundwater from the flooded minepool and identify any structural repairs needed.	Joint County HMP	Borough Council, Borough Department of Public Works	FMA, DEP	1-2 years
Olyphant Borough							
	1	Mine related hazards	Work with the Office of Surface Mining (OSM) to continue to contain the mine fire in Olyphant Borough near S.R. 6 with trenches and barriers and ensure the fire does not spread to adjacent mines or properties.	Lackawanna River Corridor Association Master Plan	Borough Council, Office of Surface Mining - US Department of the Interior	EMPG, PDM	1-2 years

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Ransom Township							
	1	Flood	Consider easements or acquisitions to conserve upper headwater areas of St. Johns Creek and its tributary streams, Race Brook and Sawmill Creek.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	PDM, HMGP	6-10 years
	2	Flood	Consider conservation easements or acquisition for the headwaters of Keyser Creek and its tributary streams Lucky Run and Lindy Creek.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	PDM, HMGP	6-10 years
	3	Flood	Remove debris from tributary streams to Gardners Creek.	2014 Municipal Mitigation Workshop			
	4	Hazardous Material	Investigate ways to prevent / mitigate a potential train derailment carrying hazardous material through the Township.	2014 Municipal Mitigation Workshop			
	5	All hazards	Develop an early warning system for the Village of Ransom to notify residents of potential hazard events.	2014 Municipal Mitigation Workshop			
Roaring Brook Township							
	1	All hazards	Acquire emergency backup generators for Roaring Brook Township Operations Center (430 Blue Shutters Road) and the maintenance facility (210 Elmhurst Blvd) to be used for power outages, and provide charging stations for cell phones and computers.	2014 Municipal Mitigation Workshop			
	2	Hazardous Material	Develop education procedures and mass notification for large and small incidents at major interstates I-380 and I-84.	2014 Municipal Mitigation Workshop			
	3	Wildfire	Create program for educating home owners through newsletters and the Township web site on wildfire prevention, particularly for two new subdivisions containing 98 lots and 198 lots of which multiple acre lots are carved from, and are adjacent to, woodlands. Ensure adequate emergency response services are available to respond to wildfires.	2014 Municipal Mitigation Workshop			
Scott Township							
	1	Flood	Consider the acquisition of a majority of Theta Company lands in the Leggetts Creek watershed, including property around Griffin Reservoir, by public or private conservation agencies for long-term preservation.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	HMPG, DEP	6-10 years
	2	Flood	Consider acquisition of conservation easements along upper reaches of Hull Creek to protect the properties from flooding.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors	PDM, HMGP	6-10 years

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Scranton City							
	1	Flood	Replace the culvert through south Scranton.	Lackawanna River Corridor Association Master Plan	City Council	PDM, HMP, Penn DOT	3-5 years
	2	Flood	Conduct a regional watershed study of the Pine Brook Watershed and engineering studies for the local drainage and nuisance flooding problems in the residential areas of the watershed.		City Council	DEP, PDM, HMGP	3-5 years
	3	Flood	Identify appropriate measures for the undersized bridges on Greenbush Run.	Lackawanna River Corridor Association Master Plan	City Council	DEP, PennDOT	1-2 years
	4	Flood	Increase height of Lackawanna River levee to comply with FEMA regulations.	2014 Municipal Mitigation Workshop			
	5	All hazards	Create disaster recovery site for City Activities.	2014 Municipal Mitigation Workshop			
	6	Flood	Acquire 15 Rep Loss/Severe Rep Loss properties for FEMA mitigation	Steering Committee	Planning Commission	FEMA	Completed
	7	Flood	Acquire remaining 3 properties for FEMA mitigation - 2 on Parker Street, 1 on Raines Street	Steering Committee	Planning Commission	FEMA	1-2 years
South Abington Township							
	1	Flood	Conduct a watershed study for Leggetts and Summit Lake Creek.	Comprehensive Plan for Scranton Abingtons Planning Association	Township Board of Supervisors, Lackawanna County Planning Department and the Scranton Abingtons Planning Association	Pennsylvania DEP, FMA	3-5 years
	2	Flood	Consider the acquisition of majority of Theta Company lands in the Leggetts Creek watershed, including property around Griffin Reservoir and downstream along the creek and Maple Lake, by public or private conservation agencies for long-term preservation.	Lackawanna River Corridor Association Master Plan	Lackawanna County, Township Board of Supervisors	PADCNR	6-10 years
	3	Flood	Develop mitigation measures including an implementation strategy for the municipal building that is located in the floodplain. Use FEMA publication 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures</i> , which provides guidance on determining appropriate mitigation measures.	Joint County HMP	Township Board of Supervisors	HMGP, FMA, PDM	1-2 years
	4	Flood	Conduct an engineering study to investigate potential solutions to flooding of SR 611 between I-81 and the off ramp to the Abington Shopping Center, and provide adequate warning signs and alternate routes to drivers to detour to other areas.	2014 Municipal Mitigation Workshop			
	5	Flood	Remove debris from the creek under Shady Lane Rd, and at multiple bridges to the south.	2014 Municipal Mitigation Workshop			
	6	All hazards	Work with PennDOT and applicable local agencies to continue to pursue the design and construction of a bypass around SR 611 at Clarks Summit to I-81 to relieve congestion on SR 611 which prevents efficient evacuation in the event of potential hazards.	2014 Municipal Mitigation Workshop			

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Spring Brook Township							
	1	Flood	Consider the acquisition of a majority of the Theta Company properties within the Spring Brook Intake, and Nesbitt and Watres Reservoir sheds, or the development of a conservation easement program to ensure that these lands are maintained as open space in the future.	Lackawanna River Corridor Association Master Plan	Township Board of Supervisors, EPA	Bi County Open Space program, HMGP, FMA	6-10 years
	2		Clear fallen debris (trees) from Rattle Snake Creek and Trout Run to allow maximum flow during high volume times.	Joint County HMP	Township Board of Supervisors	DEP, PDM	3-5 years
	3		Replace undersized culvert on Swartz Valley Road.	Spring Brook Township	Township Board of Supervisors	DCED	1-2 years
Taylor Borough							
	1	Flood	Consider acquisition of conservation easements along Taylor Borough along the Lackawanna River.	Lackawanna River Corridor Association Master Plan	Borough Council	PDM, HMGP	6-10 years
	2	Flood	Acquire protective easements along restored stream reaches on St. Johns Creek	Lackawanna River Corridor Association Master Plan	Borough Council	HMPG, DEP	6-10 years
	3	Flood	Develop easements or acquisitions to conserve upper headwater areas of St. Johns Creek and two of its tributaries, Race Brook and Sawmill Creek.	Lackawanna River Corridor Association Master Plan	Borough Council	HMGP, FMA, PDM, DEP	6-10 years
	3	Flood	Develop mitigation measures including an implementation strategy for the sewer pump station on the border of Scranton and Taylor Borough and is located in the floodplain. Use FEMA publication 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures, which provides guidance on determining appropriate mitigation measures.</i>	Joint County HMP	Township Board of Supervisors	HMGP, FMA, PDM	3-5 years
Thornhurst Township							
	1	Flood	Replace undersized culverts at the intersection of Bear Lake and River Road.	Joint County HMP	Township Board of Supervisors	UDP, CDBG, PMA	3-5 years
	2	Flood	Replace or repair the two dams (Kahulltus Dam) at Thornhurst Country Club Estates.	Joint County HMP	Township Board of Supervisors	NDSP, UDP	3-5 years
	3	All hazards	Since the firehouse is also used as a shelter during emergencies, determine the feasibility of constructing a building next to fire house to store fire trucks during disasters.	Joint County HMP	Township Board of Supervisors	LMRDP, UDP	3-5 years
	4	Flood	Identify means to alleviate the erosion problem along the banks of the Lehigh River through river bank stabilization.	Joint County HMP	Township Board of Supervisors	HMPG, DEP	3-5 years
	5	Flood	Develop mitigation measures including an implementation strategy for the Township building and firehouse that are both located in the floodplain. Use FEMA publication 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures, which provides guidance on determining appropriate mitigation measures.</i>	Joint County HMP	Township Board of Supervisors	HMGP, FMA, PDM	3-5 years

Table 6.3. Lackawanna County Municipal Mitigation Actions.

Municipality	Action No.	Hazard Mitigated	Mitigation Action	Source	Responsible Entity	Possible Funding	Project Timeline
Throop Borough							
	1	Flood	Consider a flood control project in Throop Borough to mitigate flooding along the Lackawanna River and Eddy Creek, while maintaining and restoring a forested riparian buffer through this reach of Eddy Creek.	Lackawanna River Corridor Association Master Plan	Borough Council	PADEP, FMA	6-10 years
	2	Flood	Replace the existing stormwater conveyance system from Cypress St to Sulphur Creek with an upgraded system to improve drainage and mitigate flooding in the Borough.	2014 Municipal Mitigation Workshop			
	3	All hazards	Acquire emergency backup generators at the police department and civic center facilities.	2014 Municipal Mitigation Workshop			
	4	Mine Area	Conduct a mine restoration activity to cap the open mine areas in the Borough.	2014 Municipal Mitigation Workshop			
Vandling Borough							
	1	Flood	Consider a flood control project in Throop Borough to mitigate flooding along the Lackawanna River and Eddy Creek, while maintaining and restoring a forested riparian buffer through this reach of Eddy Creek.	Lackawanna River Corridor Association Master Plan	Borough Council	PADEP, FMA	6-10 years
Waverly Township							
	1	Flood	Improve, repair, and maintain multiple stormwater management facilities (detention basins) in the Township.	Joint County HMP	Township Board of Supervisors	UDP, CDBG, PMA	Ongoing
	2	Flood	Since Ackerly Creek has overtopped its banks on several occasions conduct a watershed study to determine the sources of the flooding problems.	SAPA Comprehensive Plan	Lackawanna County Planning Department and the Scranton Abingtons Planning Association	Pennsylvania DEP	3-5 years
	3	Flood	The pump station is inadequate to handle larger storm events. Conduct a study to determine appropriate upgrades to the sewer pump station.	Joint County HMP	Township Board of Supervisors	UDP, CDBG, PMA	3-5 years
West Abington Township							
	1	Flood	Identify areas throughout the Township that need to be replaced with drainpipes of a larger diameter to handle increase water flow due to flooding.	Joint County HMP	Township Board of Supervisors	HMPG, PDM	Completed
	2	All hazards	Identify areas in the Township where the road widths are not wide enough to allow passage of emergency/utilities vehicles during an emergency.	Joint County HMP	Township Board of Supervisors	HMPG, PDM, CDBG	3-5 years
	3	Flood	Replace/repair drainage ditches and pipes on Lower Staton Town Road, Beech Hill Road, and Orchard Road.	Joint County HMP	Township Board of Supervisors	HMPG, PDM, EMPG	Lower Station Town Road - Completed; Beech Hill Road Completed; Orchard Road 1-2 years
	4	Flood	Conduct a transportation study to include a traffic analysis, road improvements, and address evacuation routes so they are better prepared to face flood events.	Joint County HMP	Township Board of Supervisors	HMPG, PDM, CDBG	3-5 years

*Indicates municipality did not participate at the 2014 Municipal Mitigation Workshop and/or submit mitigation action for this Plan Update.

6.4.5 Mitigation Action Plan and Prioritization

Once the mitigation actions and implementation plan were finalized, the Steering Committee developed specific criteria to prioritize the actions. Mitigation actions from the 2009 Plan that fell into the latter two categories: "In Progress" and "On-Going" were reprioritized. A new set of criteria was used and the Plan was revised to reflect the following three criteria to reflect changes in priorities. The criteria included: Social Considerations, Administrative Considerations, and Economic Considerations. The following questions were asked to evaluate criteria for project prioritization.

Social Considerations – Life/Safety Impact

- Will the project have minimal, direct or significant impact on the safety of businesses, residents, and properties?
- Will the proposed action adversely affect one segment of the population?
- Will the project be a proactive measure to reduce a particular risk or risks?

Administrative Considerations – Administrative/Technical Assistance

- Is there sufficient staff currently available to implement the project?
- Is training required for the staff to implement this project?

Economic Considerations – Project Cost

- What is the approximate cost of the project?

For each criterion, the level of importance (high, medium, or low) was determined and corresponding points were assigned, as indicated in Table 6.4.

Table 6.4. Evaluation Criteria for Project Prioritization

Criteria	Points	High	Points	Medium	Points	Low
Life/Safety Impact	10	Significant impact on public safety for businesses, residents, and/or properties	6	Direct impact on businesses, residents, and/or properties	2	Minimal/negligible impact on businesses, residents, and/or properties
Administrative/ Tech Assistance	5	No additional staff or technical support needed to implement action	3	Some administrative and technical support needed to implement action	1	Significant administrative and technical support needed to implement action
Project Cost	5	Low cost (<\$25,000)	3	Moderate cost (\$25,000-\$100,000)	1	High cost to implement (>\$100,000)

Points were then assigned to each action and totaled, in order to determine the ranking of projects of actions as shown in Table 6.5. It should be noted that this Plan does not include a prioritization of projects within a category; i.e., there is no ranking of projects listed within the High Priority category.

Table 6.4. Lackawanna County Mitigation Actions Prioritization

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Life/Safety Considerations	Technical Capacity/Staffing Considerations	Cost Considerations	Total
Other Mitigation Actions (Emergency Management)							
1	Update the evacuation strategy for Lackawanna County and municipalities in conjunction with the Long Range Transportation Plan. The Plan should include issues such as staging areas, feeding plan for displaced persons, signs, temporary housing, decontamination, and destination points such as shelters. Involve experts in emergency planning, transportation planning, and traffic engineering in developing the plan.	All hazards	County Emergency Management Agency	10	\$1	3	14
2	Continue to work with the Red Cross to conduct an annual assessment of existing shelters in the county to determine their condition and adequacy with respect to beds, etc. and determine which ones would need to be retrofitted. Identify additional locations that could be equipped and identified as shelters based on the needs and the population centers in the county.	All hazards	County Emergency Management Agency	10	5	5	20
3	Conduct a Commodity Flow Study for the County and its municipalities.	Hazardous Materials	County Emergency Management Agency	10	1	1	12
Preventative Measures							
4	Identify a point-of-contact to property owners and municipalities who have flooding problems and provide advise to municipalities on the flood hazard, availability of flood insurance, flood protection, and stormwater management methods. Also provide inquirers with technical advice and information from the community's FIRM and FEMA's website on a property's location in a Special Flood Hazard Area, zone, and its base flood elevation.	Flood	County Regional Planning Commission, County Emergency Management Agency	2	3	5	10
5	Encourage the individual municipalities to be firmly committed to continue compliance with the NFIP: a) Work with municipalities to encourage them to include language in their zoning ordinances to concur with the Model Floodplain Ordinance and the Subdivision/Land development Ordinance with respect to what is allowed in the floodplain. b) Conduct a training program for floodplain officials in the county and those who administer the floodplain ordinance in the municipalities to educate them on sound flood management principles. c) Regulate development and redevelopment through the adoption of provisions that exceed the minimum NFIP requirements. d) Work with communities to ensure that there are no deficiencies when the Community Assistance Visits are conducted to ensure continued compliance.	Flood	County Regional Planning Commission	2	3	3	8
6	Develop stormwater management programs for the Borough of Dunmore and City of Scranton and transfer permitting, management, and maintenance to a single agency.	Flood	County Regional Planning Commission, Borough of Dunmore, City of Scranton	6	1	1	8

Table 6.4. Lackawanna County Mitigation Actions Prioritization

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Life/Safety Considerations	Technical Capacity/Staffing Considerations	Cost Considerations	Total
7	Conduct an annual workshop to encourage regional cooperation between municipalities for multi-municipal planning to reduce the impact of hazard events on adjacent municipalities.	All hazards	County Regional Planning Commission and individual municipalities	2	3	5	10
8	Work with the municipalities to integrate the County's Hazard Mitigation Plan into the municipalities' comprehensive plan and zoning ordinance by: a) encouraging them to include principles and strategies for safe development; b) Including language in the zoning ordinance to discourage development in the 100-year floodplain; and c) encouraging municipalities to include measures in their zoning ordinance to enhance the concept of defensible space practice; d) discourage development on permeable soils to reduce the impacts of drought; and e) best management practices in stormwater management.	All hazards	County Regional Planning Commission, County Engineer	2	5	5	12
9	Promote denser development (small lot single family development) or cluster development to preserve environmentally sensitive areas (i.e., woodlands, wetlands, floodplains, or severely steep slopes).	All hazards	County Regional Planning Commission	2	5	5	12
10	Coordinate the preparation of the countywide Act 167 Stormwater Management Plan with the Joint-County Comprehensive Plan and work with municipalities to adopt and enforce the ordinance requirements.	Flood, Drought	County Regional Planning Commission, County Engineer, County Conservation District				
11	Develop a Source Water Protection Plan to properly utilize and protect ground water resources in Lackawanna County.	Drought	County Regional Planning Commission, County Engineer	2	\$1	1	4
12	Work with the City of Scranton and any municipality along large rivers and streams, to join the CRS by educating them on the benefits of CRS and also providing them with technical assistance.	Flood	County Regional Planning Commission, Municipality	2	\$3	3	8
13	Work with the municipalities to identify a point of contact to perform an annual review of the mitigation actions for their municipality from this Hazard Mitigation Plan.	All hazards	County Regional Planning Commission	2	5	5	12
14	Develop digitized mine maps in GIS format.	Earthquake, Mine related hazards	Department of Environmental Protection, County Emergency Management Agency, State Mining Office				

Table 6.4. Lackawanna County Mitigation Actions Prioritization

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Life/Safety Considerations	Technical Capacity/Staffing Considerations	Cost Considerations	Total
Projects							
15	Coordinate efforts between the Joint-County Comprehensive Plan and the countywide Act 167 Stormwater Management Plan to identify groundwater recharge areas and sensitive groundwater areas such as mine lands. Work closely with the municipalities to enforce infiltration and groundwater recharge requirements in these areas to reduce the impacts of drought.	Drought	County Conservation District, County Engineer				
16	For those parties not interested in acquisition or where acquisition is not feasible, continue to work with municipalities to advise homeowners with a preferred mitigation alternative such as elevation or flood proofing.	Flood	County Office of Emergency Management	2	3	3	8
17	Conduct a structural assessment and engineering inspection of all County-owned critical facilities that have been identified in high hazard areas. The assessment should include the ability of each facility to sustain damage from any hazard event and recommendation of specific retrofitting measures in a technical report.	All hazards	Department of Buildings and Grounds, County Engineer	2	1	1	4
18	Encourage municipalities to reduce the vulnerability of critical facilities to wildfires by: increasing buffers and introducing defensible spaces; identifying farm roads, service roads, and other private access corridors in high hazard areas that could be used as fire breaks; and providing assistance to the County Emergency Management Agency to identify vulnerable structures (firewise communities).	Wildfire	Pennsylvania Department of Environmental Protection - Bureau of Forestry	2	3	3	8
19	Work with FEMA to conduct detailed studies for Ackerly Creek, Lackawanna River, Leggetts Creek Tributary1, Mill Creek No. 2, Saint John's Creek, and Tinklepaugh Creek as identified in the FEMA Region III Post-Flood Community Flood Risk Evaluation for Lackawanna County.	Flood	County Engineer				
20	Develop methods to secure funding to initiate a structural survey for 4 older communities in the County. The survey should involve an inventory of all pre-1970 buildings - age of structure, construction material, and structural flaws.	All hazards	County Engineer, Office of Economic and Community Development	2	1	1	4

Table 6.4. Lackawanna County Mitigation Actions Prioritization

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Life/Safety Considerations	Technical Capacity/Staffing Considerations	Cost Considerations	Total
Outreach and Coordination							
21	Designate specific locations throughout the County such as the County Emergency Management Agency, County Planning Department, municipal libraries, and events such as fairs to provide information to the public on flooding and other hazards. Encourage these locations to stock a variety of FEMA publications on various natural hazards and also the most recent FIRMs; also include information on the County's website and develop brochures on specific topics.	All hazards	County Regional Planning Commission, Public Information Office, County EMA	2	5	5	12
22	Conduct an educational campaign and develop brochures on topics such as: the impacts of drought, proper sediment and erosion control, and dangers of developing on old mines and dumps.	Drought, Flood, Mine related hazards	County Engineer, County Flood Protection Department, Communications Office, Department of Environmental Protection				
23	Continue to conduct the Municipal Engineers workshop (that is part of the ACT 167 stormwater management requirement) to educate municipal officials, engineers, and developers.	Flood	County Engineer, County Regional Planning Commission				
24	Encourage the Flood POC to stay closely involved with the activities of the Susquehanna River Basin Commission, Delaware River Basin Commission by encouraging a staff member from the County Regional Planning Commission to be present at their meetings.	Flood	County Regional Planning Commission	2	1	1	4
25	Work with State agencies, professional organizations, real-estate agents, and non-government organizations to conduct an annual workshop at a key location in each county for private developers to involve them in hazard mitigation activities and educate them on 'safe' development principles that can be incorporated into their development proposals.	All hazards	Department of Community and Economic Development, Pennsylvania Association of Township Supervisors, County Emergency Management Agency	2	3	5	10
26	Continue to provide inquirers with technical advice and information from the community's FIRM and FEMA's website on a property's location in a Special Flood Hazard Area, zone, and its base flood elevation.	Flood	County Regional Planning Commission, County Flood Protection Department				
27	Work with real estate agents throughout the county and encourage them to advise prospective property purchasers in flood prone and mine subsidence.	Flood, Mine Related Hazards	County Flood Protection Department, County Regional Planning Commission, County Emergency Management Agency, State agencies				

Table 6.4. Lackawanna County Mitigation Actions Prioritization

Action No.	Mitigation Action	Hazard Mitigated	Lead Agency	Life/Safety Considerations	Technical Capacity/Staffing Considerations	Cost Considerations	Total
Plan Implementation							
28	Monitor and evaluate mitigation actions annually and update the hazard mitigation plan every five years to reflect changes in development after a major hazard event.	All hazards	County Planning Commission	2	3	3	8
29	Provide technical assistance to municipalities in implementing individual hazard mitigation actions.	All hazards	County Planning Commission, EMA				

Gray Text = Action has either been completed or no longer applicable per discussion with the Steering Committee

Project Prioritization for Municipal Projects

The projects are simply listed in alphabetical order by municipality. The projects would be prioritized as individual municipalities prepare applications for specific funding agencies for particular projects. The overall timeline for the completion of projects is dependent on available funding and involvement and commitment by the municipality. For the purposes of funding, a benefit-cost analysis should be conducted. Given that flooding is of highest priority in the County and the large number of actions developed to address flooding, this Plan suggests a system to prioritize and organize the flood projects within each community.

- High priority – public infrastructure (sewage treatment plants, water supply plants, electric and gas facilities) and critical facilities (hospitals, schools, day care, nursing homes, emergency shelters, emergency services, government buildings, public utilities, communications, and transportation). These facilities have been categorized as high priority as their continued operation is vital to the functioning of the municipality.
- Medium Priority - acquisitions and floodproofing/elevation of buildings in the 100-year floodplain.
- Low Priority - Storm drainage improvements including culverts and inlets. Non-floodplain projects.

Chapter 7 - Plan Maintenance

7.1 Update Process Summary

Requirement §201.6(c)(4)(i): *[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

Once this Plan has received approval from the Pennsylvania Emergency Management Agency (PEMA) and the Federal Emergency Management Agency (FEMA), the Plan will be adopted by the Lackawanna County Commission and its 40 participating jurisdictions. This County Hazard Mitigation Plan Update is intended to be a 'living document'. Plan adoption is not considered the final step in the planning process, but rather as a first step to 'realization'. The plan monitoring and maintenance schedule is a cycle of events that involve periodic review, adjustments, and improvement. This Chapter establishes a method to monitor how the Plan will be evaluated and maintained in the future.

7.2 Monitoring, Evaluating, and Updating the Plan

In order to ensure that the Plan continues to provide a framework of reducing risk in the County, the Emergency Management Agency will take responsibility to convene an annual meeting of the Hazard Mitigation Plan Steering Committee. The Committee will comprise of the members who were involved in the preparation of the Plan Update as well as municipal representatives.

The two annual report forms that were developed during the 2009 planning process are included at the end of this chapter:

1. County Annual Report Form that will be completed for each high priority County project, and
2. Municipality Annual Report Form that will be completed by each municipality to provide an update to the County on the status of their mitigation projects.

This form will be distributed to all municipalities, requesting them to document the status of each hazard mitigation action for their jurisdiction. Each action proposed in the Mitigation Plan will be categorized as one of the following: completed, in progress, not started/delayed, modified, or cancelled. The Steering Committee will assist the Emergency Management Director to prepare a status report of the mitigation actions based on the annual report forms from the municipalities as well as the County.

In addition to conducting an annual review of the Plan, the Steering Committee will review the Plan within 30 days after a disaster. Each goal and objective will be examined for its relevance and validity to the changing situation in each municipality and the mitigation actions will be reviewed to ensure that they address any recent issues that may have stemmed from disaster events. During quiet times, the Plan will be updated every five years to reflect the current risk, vulnerabilities, development trends, and as mitigation actions are implemented. While an annual report will be completed each year, any state and Federal mandates from PEMA and FEMA respectively, will be addressed in the five-year update. The municipalities will not be responsible for making any changes to the Hazard Mitigation Plan based on PEMA or FEMA requirements in between the five-year update.

7.3 Benefit-Cost Analysis

A benefit-cost analysis determines the cost effectiveness of a project to minimize damage or prevent damage from future hazard events. By determining the benefit-cost of the proposed mitigation project, it will provide the communities, as well as project developers, with additional knowledge about the feasibility of the proposed mitigation alternative. If the costs outweigh the benefits, then other alternatives that are more effective can be identified to accomplish the Plan's goals.

7.4 Continued Public Involvement

Requirement §201.6(c)(4)(iii): *[The plan shall include a] discussion of how the community(ies) will continue public participation in the plan maintenance process.*

The preparation of this Plan has involved the public throughout the process through municipal workshops, public meetings, public hearings, and via the Internet. Lackawanna County is dedicated to continuing to solicit public participation during the five-year update as required by FEMA. Copies of the Hazard Mitigation Plan Update will be provided to the public libraries and be placed on the County's website, along with a mechanism for submission for comments.

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

The County Comprehensive Plan; Capital Improvements Program; Building Code; Municipal Floodplain Management Regulations; Emergency Operations Plan, and Zoning Ordinance are identified for incorporation of hazard mitigation actions once the Plan is adopted. Each of these mechanisms will continue to be used to meet the intent of this Plan, as appropriate. Once the County adopts this Hazard Mitigation Plan Update, mitigation strategies discussed in this plan will be implemented via the aforementioned mechanisms as well as through the incorporation into the new planning mechanisms.

Specific options for incorporating hazard mitigation principles into each of these plans and ordinances have been made in Chapter 4. For these documents that are already in existence, mitigation actions should be incorporated as an amendment to the document.

Incorporation of Mitigation Actions into Existing Planning Mechanisms – Municipalities

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

Once the County Commission adopts the 2014 Lackawanna County Hazard Mitigation Plan Update, the Document Review section of Chapter 3 of this Plan Update should be reviewed and disseminated to various Lackawanna County agencies and municipalities that develop and implement specific plans and ordinances.

Each participating municipality will be responsible for implementing the specific recommendations in the document review section of the Plan and incorporating these recommendations into their local planning documents such as comprehensive plans, zoning ordinances, land development, and subdivision regulations.

Chapter 8 - Plan Adoption

8.1 Adoption by the Local Governing Body

*Requirement §201.6(c)(5): [The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., County Commission).*

Include adoption resolution from Lackawanna County here

8.2 Multi-Jurisdictional Plan Adoption

Requirement §201.6(c)(5): For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

Include adoption resolutions from all municipalities in Lackawanna County here.

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APPENDIX A
BIBLIOGRAPHY

Bibliography

- 1) Comprehensive Planning – Commonwealth of Pennsylvania Governor's Executive Order 1999-1
- 2) The Pennsylvania Code – Chapter 102 Title 25 – Sediment and Erosion Control
- 3) Pennsylvania State All-Hazard Mitigation Plan 2013
- 4) 2004 Open Space, Greenways, and Outdoors Master Plan for Lackawanna and Luzerne Counties
- 5) Article VI – Zoning Ordinance Lackawanna County
- 6) Article V – Subdivision and Land Development Ordinance Lackawanna County
- 7) Floodplain Ordinance
- 8) Lackawanna River Watershed Act 167 Stormwater Management Ordinance
- 9) Lackawanna County Continuity of Operations Plan
- 10) 2011 Lackawanna-Luzerne Regional Plan – Comprehensive Plan and Long-Range Transportation for Lackawanna-Luzerne Counties, PA
- 11) Subdivision and Land Development Ordinance, 2010 – Moscow Borough
- 12) Carbondale Regional Comprehensive Plan 2003-2013 – Carbondale City, Carbondale Township, and Fell Township
- 13) Spring Brook Township Floodplain Management Ordinance 2007 Update
- 14) 2013-2018 Comprehensive Economic Development Strategy Five-Year Plan for Northeastern Pennsylvania
- 15) United States Census Bureau—American Community Survey

APPENDIX B

LOCAL PLAN REVIEW TOOL

INTRODUCTION

The Local Mitigation Plan Review Tool demonstrates how the 44 CFR§201.6 regulations are met and consists of the following components:

- 1) Regulation Checklist (required review for compliance with 44 CFR §201.6);
- 2) Plan Assessment (qualitative review); and
- 3) Multi-jurisdiction Summary Sheet.

The Local Mitigation Plan Review Tool offers the Plan Reviewer an opportunity to provide the community with feedback on various plan sections.

- The Regulation Checklist provides a summary of the FEMA Mitigation Planner’s evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan’s strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each part of the Plan, i.e., Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption.

The FEMA Mitigation Planner must reference the Local Mitigation Plan Review Guide when completing the Local Mitigation Plan Review Tool.

LOCAL MITIGATION PLAN REVIEW TOOL

Jurisdiction: Lackawanna County, PA	Title of Plan: Lackawanna County Hazard Mitigation Plan 2014 Update	Date of Plan: October 2014
Local Point of Contact: Mary Liz Donato	Address: Lackawanna County Planning Commission 135 Jefferson Avenue, 2 nd Floor Scranton, PA 18503	
Title: Regional Planning Manager		
Agency: Lackawanna County Planning Commission		
Phone Number: 570 963-6400 ext. 1354		
		E-Mail: donatomi@lackawannacounty.org

State Reviewer:	Title:	Date:

FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region (insert #)		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

1. REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by the FEMA Mitigation Planner. The Checklist is used to identify the location of relevant or applicable content in the Plan by section/subsection and determine if each regulation has been ‘met’ or ‘not met’. The “Required Revisions” summary at the bottom of each element must be completed by the FEMA Mitigation Planner to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan element that is classified as ‘Not Met’. Sections should be referenced and summarized at the top of each subsection by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each element and subsection are described in detail in the Local Mitigation Plan Review Guide.

1. REGULATION CHECKLIST	Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)			
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))			
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))			
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))			
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))			
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))			
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))			
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))			
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))			
B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))			
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))			

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
<u>ELEMENT B: REQUIRED REVISIONS</u>				
ELEMENT C. MITIGATION STRATEGY				
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))				
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))				
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))				
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))				
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))				
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))				
<u>ELEMENT C: REQUIRED REVISIONS</u>				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))				
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))				
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))				
<u>ELEMENT D: REQUIRED REVISIONS</u>				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))				
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))				

1. REGULATION CHECKLISTLocation in Plan
(section and/or
page number)**Met** **Not
Met**

Regulation (44 CFR 201.6 Local Mitigation Plans)

ELEMENT E: REQUIRED REVISIONS**ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)**

F1.			
F2.			

ELEMENT F: REQUIRED REVISIONS

2. PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback on the quality and utility of the Plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/ local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Plan. The Plan Assessment MUST be completed by the FEMA Mitigation Planner and is not required from the State. The Assessment is an opportunity for the FEMA Mitigation Planner to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA entities, specifically the Risk Analysis and HMA branches.

The Plan Assessment is divided into two sections:

- 1. Plan Strengths and Opportunities for Improvement*
- 2. Resources for Implementing Your Approved Plan*

1. Plan Strengths and Opportunities for Improvement - The sections in the Plan Assessment are organized according to the plan elements as listed in the Regulation Checklist. Each section includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans and are not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, but should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, but should be open-ended and provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once the FEMA Mitigation Planner has examined the section and is ready to paraphrase their comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section. The Local Mitigation Plan Review Guide provides an example of a completed Plan Assessment.

2. Resources for Implementing your Approved Plan - The Resources section provides a place for the FEMA Mitigation Planner to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States are strongly encouraged to add state and local resources, if available.

I. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Suggested topics for consideration:

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 *Local Mitigation Plans* identifies additional elements that *should* be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

- 1) A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;
- 2) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and
- 3) A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.

Suggested topics for consideration:

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, Hazus, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

Suggested topics for consideration:

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- *Key problems identified in, and linkages to, the vulnerability assessment;*

- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (applicable to plan updates only)

Suggested topics for consideration:

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*
- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

2. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders by identifying the following:

- *What FEMA assistance (funding) programs are available (e.g., HMA) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (NFIP, CRS, Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*

- *Are there upcoming trainings/workshops (BCA, HMA grants, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (e.g., USFS grants, NOAA programs, EPA Smart Growth, HUD sustainability grants, etc.) and/or state and local agencies?*

APPENDIX C

MEETINGS AND PARTICIPATION DOCUMENTATION

Lackawanna County
ALL HAZARDS MITIGATION PLAN UPDATE

Steering Committee Meeting #1

20 March 2014

1:30pm-4pm

AGENDA

Introductions – Mary Liz Donato, Planning Manager, Lackawanna County Planning Commission

- County Staff
- Steering Committee Members
- Consultants
 - Deepa Srinivasan, President, Vision Planning and Consulting, LLC
 - Steve Boone, Borton Lawson Engineering

PowerPoint Presentation – Deepa Srinivasan and Steve Boone

- Overview of the Hazard Mitigation Planning Process
- Schedule
- Deliverables

Discussion of Relevant Plans, Ordinances, and Programs - Deepa Srinivasan

Summary of Capabilities Questionnaire – Deepa Srinivasan

Discussion of Hazards and Risks – Steve Boone

Discussion of 2009 Plan Goals and Objectives

Wrap-up

- Next steps
- Municipal Workshop
- Steering Committee Meeting and Public Meeting June/July 2014
- Questions

Adjournment

SIGN-IN SHEET
Municipal Workshop
Lackawanna County, PA
20 March 2014

Name	Agency/ Municipality	Title	Phone No.	Email	Address
Edward Caughan	Moscow	Council Person	570-842-2219	edcaughan101@verizon.net	Parkview Rd, Moscow
William Helm	Moscow	Council Person	570 815 6971	bill@heimfive.com	516 CHURCH ST Moscow
PAT DENNIS	ARCHBALD BOROUGH	ASSISTANT	570-876-1800	ARCHBALD@COMCAST.NET	400 Church St ARCHBALD.
William Brown	PAISO & JUDY	Supervisor	570 586-7256	BROWN WCB@ADL.COM	2517 BOLD MT RD CLARKS SUMMIT PA 15411
Jim Howley	Thornhurst	E.M.C.	570-842-9412	jehowley@verizon.net	413 Old River Rd Thornhurst PA 18424
Robert Talmon	THROOP BOROUGH	STREET COMMISSIONER	(570) 409-2927	THROOPBOROUGH@COMCAST.NET	100 HALL ST. THROOP, PA 18612
Michelle Bannan	City of Carbondale	City Clerk	(570) 282-4633	mbannan@icontech.com	1 W 1/2 Main Street Carbondale, PA 18407
Chuck Maloney	MAOSIC	EMA	570-840-0655	CMALON@COMCAST.NET	119 ILLIANA DR. MAOSIC, PA 18507
PAUL WILLIAMS	MADISON TWP	PLANNING COMMISSION	(570) 842-2935	PWDIVER@YAHOO.COM	4450 DAWN ACRES DR MADISON TWP 18444
Jim Perry	MAYFIELD BOROUGH	EMA	570-876 8253	Jim.Perry2@me.com	739 Penn Ave MAYFIELD, PA 18432
Tony Jordan	ROARING BROOK TWP	SUPERVISOR	570-842 6080	TONYJRB@COMCAST.NET	430 BLUESHUTTERS ROAD ROARING BROOK TWP, 18444
Don King	City of Scranton	City Planner	570-348- 4280	dking@scrantonpa.gov	340 N. Washington Scranton PA 18503
JERRY Aschenbrenner	LAPLUME TWP	HAZARD MITIGATION OFFICER	570 945-5511	Aschenb@ad.com	P.O. Box 2 LAPLUME PA 18440
SEAN Connolly.	South Abington Township.	EMA	570-840-0694	SEAN5551@Yahoo.com	104 Shady Lane, Rd-Chinchilla- PA 18410
DAVID BILZONI	CITY OF SCRANTON	BUSINESS ADMINISTRATOR	570-348-4214	DBILZONI@SCRANTONPA.GOV	340 N. WASHINGTON AVE. SCRANTON, PA 18503
Merle Lyon	Elmhurst Twp	Supervisor EMA	570-842-7415	woothit2@Comcast.Net	207 Route 590 Elmhurst, PA 18444
Margie Douc	Lacka Co. Planning	Reg. Planning Mgr	570-963-6400	clonaton@lackawannacounty.org	135 Jeffman Ave. Scranton PA 18503
STAVS PITOMAK	LACKA CO. PLAN.	"	"	PITOMAK@LACKAWANNA.CO.PA	"

2014 All-Hazards Mitigation Plan Update Lackawanna County, PA

Municipal Workshop
20 March 2014

Presented by:
Deepa Srinivasan, Vision Planning and Consulting, LLC



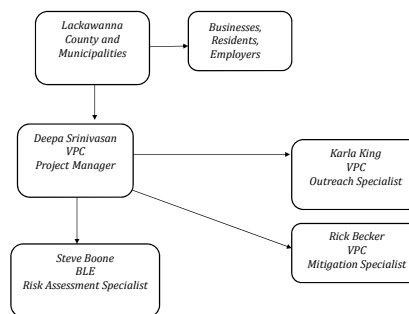
Project Purpose

To update the all-hazards mitigation plan to improve Lackawanna County's resistance to natural hazards by identifying actions to reduce the impact of various hazards to municipal residents and structures.

Key Players

- Lackawanna County Staff – Planning Department, Emergency Management
- Hazard Mitigation Plan Steering Committee
- Municipalities
- Consultants
 - Deepa Srinivasan, President, Vision Planning & Consulting
 - Steve Boone, Borton Lawson Inc.
- Public
- Pennsylvania Emergency Management Agency (PEMA)
- Federal Emergency Management Agency (FEMA)

Project Organization



Steps in the Planning Process

1. Reconvene steering committee and develop planning process (meetings)
2. Assess hazards, risks, vulnerability
3. Assess local capabilities (questionnaire)
 - Existing Plans, Programs, Policies
 - Personnel and Equipment Resources
 - Local Codes and Zoning Ordinances
 - Current and Proposed Construction Projects

Steps in the Planning Process (cont'd)

4. Develop goals and objectives and mitigation actions
 - Preventative Measures
 - Projects
 - Natural Resource Protection
 - Outreach and Communication
 - Other Mitigation Actions
5. Write mitigation plan and prioritize projects (using Evaluation Criteria)
 - Social
 - Technical
 - Administrative
 - Political
 - Legal
 - Economic
 - Environmental

Steps in the Planning Process (cont'd)

- 6. Develop implementation plan
 - Priorities for Mitigation Actions
 - Short-, Medium-, or Long-Range
 - Potential Funding Sources
 - Responsible Entities
 - Target Completion Dates
 - Five-Year Plan Maintenance Cycle

Meetings

- 2 Steering Committee Meetings
 - Meeting 1:
 - Planning process, schedule, deliverables, capability assessment
 - Hazard identification, risk assessment
 - Meeting 2:
 - Goals and objectives, mitigation actions, prioritization
 - Implementation strategy
- Municipal Meeting
 - Planning process, hazard identification, risk assessment, capability assessment
 - Mitigation actions, implementation strategy

Meetings

- Two Public Meetings
 - Planning process
 - Present goals for mitigation of various hazards
 - Present options for mitigation actions and projects
 - Review proposed prioritization criteria for mitigation projects

Risk Assessment - Summary of Hazards

2009 PLAN – HAZARD PRIORITIZATION <ol style="list-style-type: none"> 1. Flooding 2. High Wind 3. Winter Storms 4. Mine Related Hazards 5. Drought 6. Tornadoes 7. Wildfires 8. Landslides 9. Earthquakes 10. Hazardous Materials Incidents 11. Nuclear Release 12. Dam Failures 	2014 PLAN UPDATE – HAZARD PRIORITIZATION <ol style="list-style-type: none"> 1. Flooding (regional events) 2. Winter Weather 3. Wind Events 4. Flooding (annual local events) 5. Drought and Crop Failure 6. Wildfires 7. Nuclear Release 8. Earthquakes 9. Hazardous Materials Incidents 10. Land/Mine Subsidence 11. Landslides 12. Dam Failure 13. Radon
--	--

Risk Assessment Update

- Flooding
 - Tropical Storms Irene and Lee
 - ~\$50 Million in Damages
 - Critical Infrastructure Impacted
 - Updated DFIRM Mapping
- Flooding Remains #1 Priority Hazard
- Winter Weather and Wind Events
 - Typical occurrence frequency, extent, and impacts
- Remain #2 and #3 Priority Hazards

Risk Assessment Update

- Risk Factor Calculation – More Refined Hazard Prioritization Mechanism

Hazard	Risk Factor	Priority Rank
Flooding (regional)	3.3	1
Winter Weather	3.0	2
Wind Events	2.6	3
Flooding (annual local events)	2.5	4
Drought and Crop Failure	2.5	5
Wildfires	2.2	6
Nuclear Release	2.1	7
Earthquakes	2.0	8
Hazardous Materials Incidents	2.0	9
Land Subsidence	1.8	10
Landslides	1.7	11
Dam Failure	1.6	12
Radon	1.5	13

Risk Factor = Scaled Factor Based on Weighting of:

- Probability – 30% Weight
- Impact – 30% Weight
- Spatial Extent – 20% Weight
- Duration – 10% Weight
- Warning Time – 10% Weight

Risk Assessment Update

- Municipal Mitigation Workshop–
 - Update local hazards identified by municipalities
 - Develop mitigation actions for each newly identified or updated local hazard
- Updated Hazard Prioritization
 - Mitigation Strategy
 - Must reflect the revised risk for these hazards

Lackawanna County Departments/Agencies

- County Planning Commission
- County Emergency Management Agency
- Roads and Bridges
- Community Development
- Economic Development

Municipal Participation

Municipality	Questionnaire Response		Attendance at Municipal Workshop	Review Updates of Mitigation Actions	Review of Draft Plan
	Sent	Received			
Richfield Borough	1		1		
Berrien Township	1		1		
Beaky Borough	1		1		
City of Carbondale	1		1		
Carbondale Township	1		1		
Carroll Green Borough	1		1		
Crooks Summit Borough	1		1		
Collin Township	1		1		
Conowing Township	1		1		
Nelson Borough	1		1		
Delaware City Borough	1		1		
Duquesne Borough	1		1		
Duquesne Township	1		1		
Fell Township	1		1		
Glenburn Township	1		1		
Greenfield Township	1		1		
Jefferson Township	1		1		
Lehigh Borough	1		1		
Lehigh Township	1		1		
Luzerne Township	1		1		
Mayfield Borough	1		1		
Moscow Borough	1		1		
Moscow Township	1		1		
North Abington Township	1		1		
Old Forge Borough	1		1		
Oradell Borough	1		1		
Ransom Township	1		1		
Shawangunk Township	1		1		
Scott Township	1		1		
City of Scranton	1		1		
South Abington Township	1		1		
Spring Brook Township	1		1		
Ward Borough	1		1		
Thornhurst Township	1		1		
Throop Borough	1		1		
Wandering Borough	1		1		
Wenatch Township	1		1		
West Abington Township	1		1		
Total	48	24	0		

Capability Assessment – Document Review

State Plans

- Comprehensive Planning - Commonwealth of Pennsylvania Governor’ s Executive Order 1999-1
- The Pennsylvania Code – Chapter 102 Title 25 Sediment and Erosion Control
- Growing Greener
- Commonwealth of Pennsylvania Enhanced All-Hazard Mitigation Plan, August 2007

County Plans

- 2011 Lackawanna-Luzerne Regional Plan – Comprehensive and Long-Range Transportation Plan for Lackawanna and Luzerne Counties, PA
- 2014 Lackawanna County Emergency Operations Plan
- Lackawanna County Continuity of Operations/Continuity of Government Plan

Capability Assessment – Document Review

Municipal Plans

- Carbondale Regional Comprehensive Plan 2003-2013 – Carbondale City, Carbondale Township, and Fell Township
- Subdivision and Land Development Ordinance, 2010 – Moscow Borough
- 2012 Spring Brook Township Zoning Ordinance
- Thornhurst Zoning Ordinance. <http://www.keystatepub.com/> Go to Code of Ordinances online and search for Thornhurst – Chapter 27
- Spring Brook Township Floodplain Management Ordinance 2007 Update

Capability Assessment

County/Municipal Capabilities

- Organizational
- Informational
- Technical/Technological
- Fiscal
- Staffing
- Emergency Management

Capability Assessment - Municipal Questionnaire

- Critical facilities in high hazard areas
- Critical facilities damaged from past hazards
- Buildings in floodplain, flood insurance policies
- Existing plans and ordinances
- Specific policies on: freeboard, cluster development incentives, critical facilities protection, floodplain fill restrictions, development restrictions
- Completed and proposed mitigation projects
- Staffing capabilities
- Emergency services
- Training

Municipal Plans and Policies

- 12 out of 24 municipalities stated they had a freeboard requirement.
- 7 out of 24 municipalities stated they had new/improved development restrictions.
- 7 out of 24 municipalities stated they had restrictions for fill in the floodplain.
- 4 out of 24 municipalities stated they had critical facilities protection requirements.
- 3 out of 24 municipalities stated they had incentives for cluster development.

Mitigation Actions

- 3 municipalities reported property protection measures including buyouts, elevation of structures, floodwalls.
- 5 municipalities reported structural projects.
- 6 municipalities reported post disaster recovery or emergency services projects.
- 5 municipalities reported natural resource projects including erosion and sediment control, wetland protection, etc.
- 1 municipality (Waverly Township) reported a public outreach project.
- 7 municipalities reported future mitigation projects.

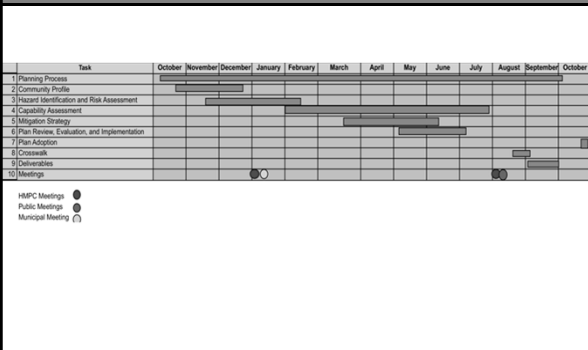
Structures of Concern

- 6 municipalities reported critical areas in the floodplain.
- 17 municipalities reported buildings in the floodplain, with a total of approximately 2,227 reported.
- 2 municipalities reported flood insurance policies, with a total of approximately 614 reported.
- 2 municipalities reported repetitive loss structures, with a total of 16 structures reported.

Staff Capabilities

- 7 out of 24 municipalities stated they have a floodplain administrator.
- 22 out of 24 municipalities stated they have a building inspector.
- 17 out of 24 municipalities stated they have a site plan reviewer.
- 22 out of 24 municipalities stated they have an engineer.

Schedule



Next Steps

- Hazard Identification and Risk Assessment
- Mitigation Capability Assessment
- Steering Committee Meeting #2 (May 2014)
- Public Meetings (May 2014)

Thank You!



SIGN-IN SHEET
 Steering Committee Meeting
 Lehigh County, PA
 21 August 2014

Name	Agency/ Municipality	Title	Phone No.	Email	Address
Mary Litz	Lehigh Co.	Regional	510- 203-1100	Accounting@lehighcounty.org	135 Jefferson Ave Scranton PA 18503
Doretha	Planning Comm	Planning	510- 463-6400	planning@lehighcounty.org	154 Jefferson Ave Scranton PA 18502
Steve	Lehigh County	Administrative	510- 463-6400	steve@lehighcounty.org	
Preppias	Lehigh County	Administrative	510- 463-6400	preppias@lehighcounty.org	
Tony	Lehigh County	Administrative	510- 463-6400	tony@lehighcounty.org	
Jonann	Lehigh County	Administrative	510- 463-6400	jonann@lehighcounty.org	
Ryan	Lehigh County	Administrative	510- 463-6400	ryan@lehighcounty.org	
Berndish	Lehigh County	Administrative	510- 463-6400	berndish@lehighcounty.org	
Don	Lehigh County	Administrative	510- 463-6400	don@lehighcounty.org	
King	Lehigh County	Administrative	510- 463-6400	king@lehighcounty.org	
Debra Swann	V.P.E.	Records	248-873- 8717	debra@lehighcounty.org	7572 Morris St Fulda MD 20759
Steve Baus	Records	Records	484-880-0170	steve@lehighcounty.org	3077 Adelphi Rd Brimley PA 18018

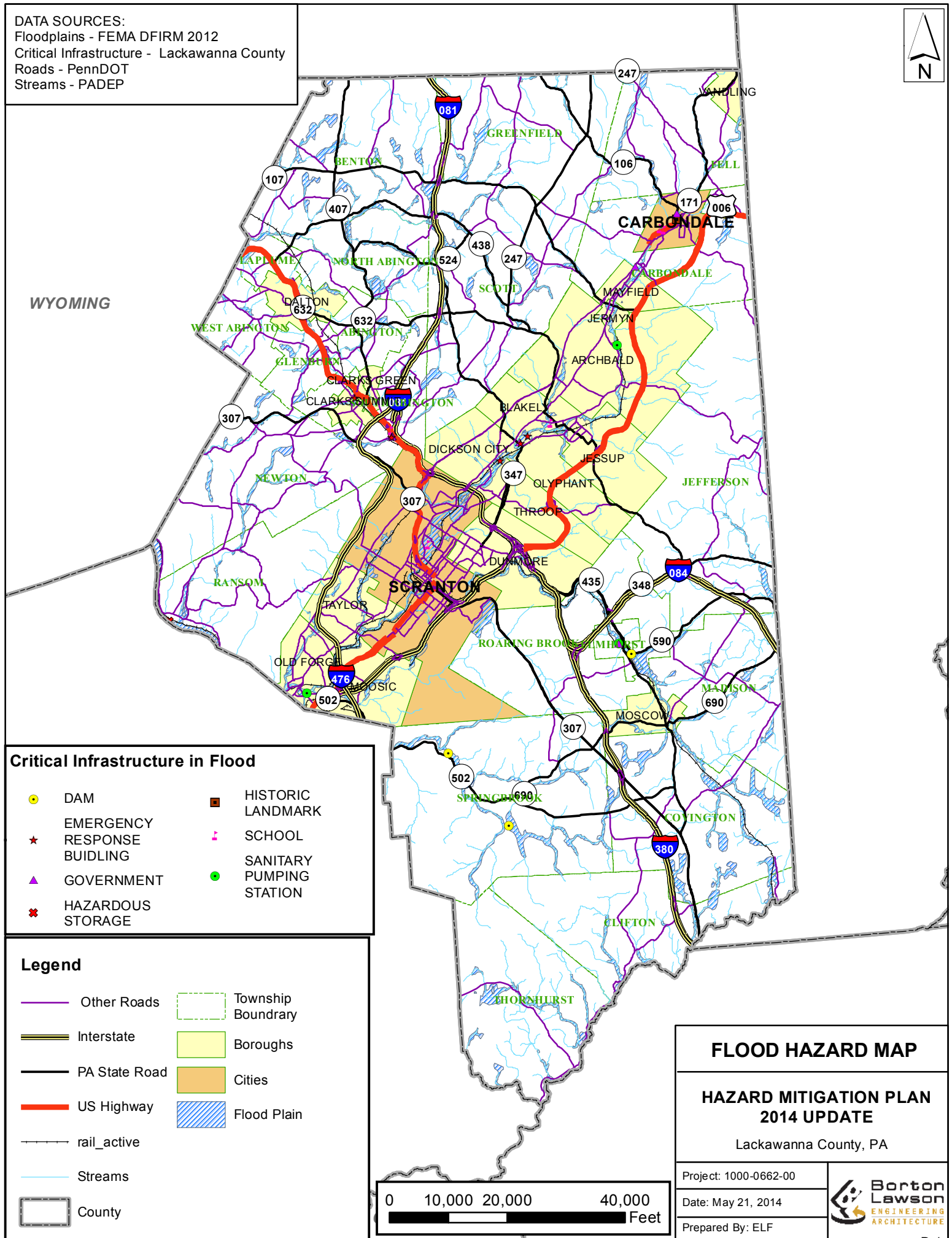
SIGN-IN SHEET
Public Meeting
Lackawanna County, PA
21 August 2014

Name	Agency/ Municipality	Title	Phone No.	Email	Address
JOSEPH J TOMCATAGG	MAYFIELD	DEPT FIRE CHIEF	570-810-0918 CELL	—	647 HESSON ST MAYFIELD, PA
AL KOPA	MAYFIELD	COUNCIL	570-280-5555 CELL	—	605 DELAWARE MAYFIELD, PA
Arnie Palmer	Clarks Green	council	570-337- 6857	arpalmer18@ comcast.net	104 W. Abington Clarks Green, PA
Ed Conroy	Moscow	Council	570-810-2219	edconroy@moscowpa.gov	917 Auburn Rd. Moscow, PA 17058
Maryliz Dorcks	Lake Co. Planning Comm	Pl. Planning Mgt.	570- 933-6408	mdorcks@lakeco.org	135 Johnson Ave. Summit, PA 15085
STONE PITKIN	Lackawanna County Planning Commission	Technical Advisor at Lackawanna County	570- 867-6440	stonepitkin@lacounty.org	185 Jefferson Ave. Lackawanna, PA 17801
William Hain	Moscow Belle	VP Council	570-815-6971	billhain@lakeco.org	514 CHARLTON ST MOSCOU PA 17058

APPENDIX D

**HAZARD IDENTIFICATION & RISK ASSESSMENT
DATA AND MAPS**

DATA SOURCES:
 Floodplains - FEMA DFIRM 2012
 Critical Infrastructure - Lackawanna County
 Roads - PennDOT
 Streams - PADEP

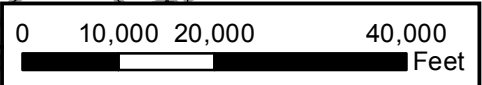


Critical Infrastructure in Flood

	DAM		HISTORIC LANDMARK
	EMERGENCY RESPONSE BUILDING		SCHOOL
	GOVERNMENT		SANITARY PUMPING STATION
	HAZARDOUS STORAGE		

Legend

	Other Roads		Township Boundary
	Interstate		Boroughs
	PA State Road		Cities
	US Highway		Flood Plain
	rail_active		
	Streams		
	County		



FLOOD HAZARD MAP

**HAZARD MITIGATION PLAN
2014 UPDATE**

Lackawanna County, PA

Project: 1000-0662-00	
Date: May 21, 2014	
Prepared By: ELF	

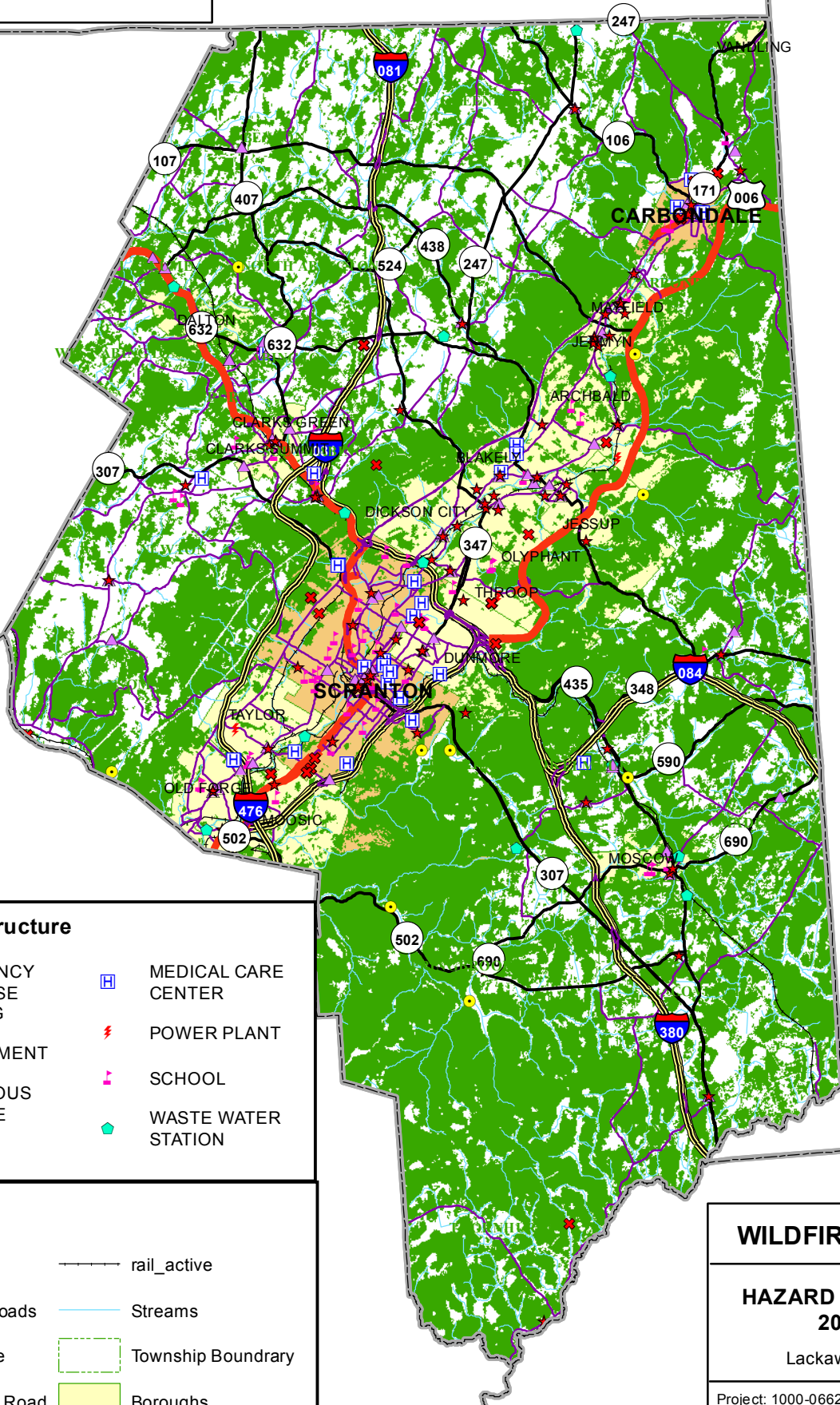
Lackawanna County Critical Facilities Within Floodplains

Municipalities	Dams	Emergency Response	Government	Hazardous Storage	Sanitary Facility	Schools
Archbald Borough					1	
Blakely Borough						1
Carbondale Township	1		1			
Carbondale City			1			2
Clarks Summit Borough		1				
Dalton Borough		2	2			
Dickson City Borough		1				
Elmhurst Township	1		1		1	
Moosic Borough					1	
Olyphant Borough		2	1			
Ransom Township				1		
Scranton City						1
South Abington Township		1	2			1
Springbrook Township	2					
Total: 28	4	7	8	1	3	5

DATA SOURCES:
 Land Cover - National Land Cover Database 2011
 Critical Infrastructure - Lackawanna County



WYOMING

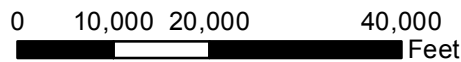


Critical Infrastructure

- | | | | |
|---|-----------------------------|---|---------------------|
| ★ | EMERGENCY RESPONSE BUILDING | ⊠ | MEDICAL CARE CENTER |
| ▲ | GOVERNMENT | ⚡ | POWER PLANT |
| ✖ | HAZARDOUS STORAGE | 🎓 | SCHOOL |
| ● | DAM | ⬢ | WASTE WATER STATION |

Legend

- | | | | |
|----|---------------|-------|-------------------|
| ▭ | County | — | rail_active |
| — | Other Roads | — | Streams |
| == | Interstate | - - - | Township Boundary |
| — | PA State Road | ■ | Boroughs |
| — | US Highway | ■ | Cities |



WILDFIRE HAZARD MAP

**HAZARD MITIGATION PLAN
2014 UPDATE**

Lackawanna County, PA

Project: 1000-0662-00

Date: May 21, 2014

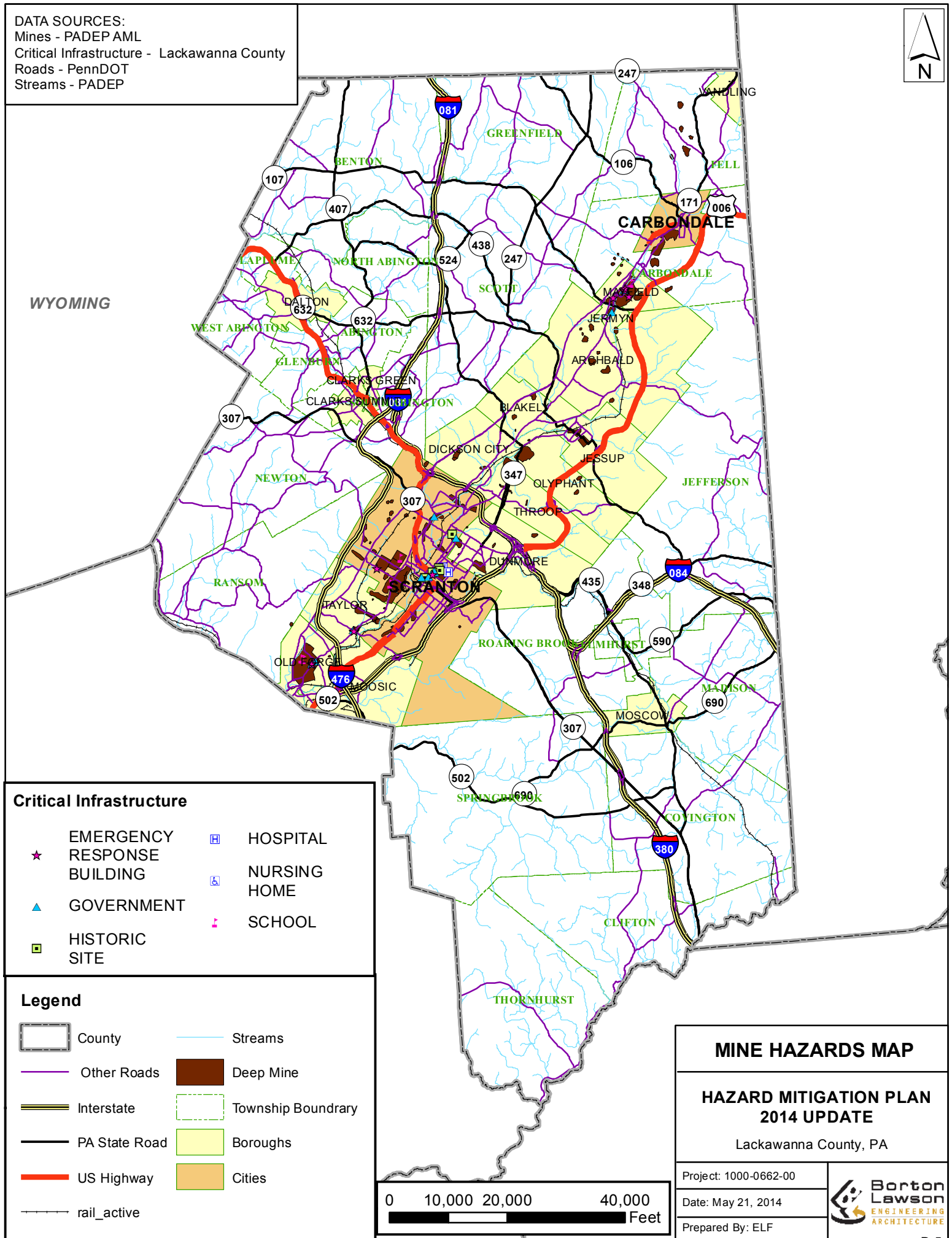
Prepared By: ELF



Lackawanna County Critical Facilities Vulnerable to Wildfires

Municipality	Type of Facility
Archbald Borough	School
Carbondale City	Hazardous Storage
Carbondale City	Hazardous Storage
Clarks Summit Borough	School
Covington Township	Hazardous Storage
Dalton Borough	Government
Dalton Borough	Emergency Response Building
Dunmore Borough	Emergency Response Building
Elmhurst Township	Nursing Home
Elmhurst Township	Government
Jessup Borough	Emergency Response Building
Laplume Township	School
Laplume Township	Government
Moscow Borough	School
Moscow Borough	School
Newton Township	Hospital
Newton Township	School
Olyphant Borough	Emergency Response Building
Ransom Township	Government
Roaring Brook Township	Government
Roaring Brook Township	Emergency Response Building
Scott Township	Hazardous Storage
Scott Township	Hazardous Storage
Scott Township	Hazardous Storage
Scott Township	Hazardous Storage
Scott Township	Hazardous Storage
Scott Township	Hazardous Storage
Scott Township	Hazardous Storage
Scranton City	Nursing Home
Scranton City	Hazardous Storage
Scranton City	Hazardous Storage
Scranton City	Hazardous Storage
Scranton City	Government
South Abington Township	School
Thornhurst Township	Hazardous Storage
Thornhurst Township	Emergency Response Building
Waverly Township	Hospital
Waverly Township	Government
Waverly Township	Government
Total Number of Facilities	39

DATA SOURCES:
 Mines - PADEP AML
 Critical Infrastructure - Lackawanna County
 Roads - PennDOT
 Streams - PADEP



- Critical Infrastructure**
- ★ EMERGENCY RESPONSE BUILDING
 - ▲ GOVERNMENT
 - HISTORIC SITE
 - 🏥 HOSPITAL
 - 🏠 NURSING HOME
 - 🎓 SCHOOL

- Legend**
- ▭ County
 - Other Roads
 - Interstate
 - PA State Road
 - US Highway
 - rail_active
 - Streams
 - Deep Mine
 - ▭ Township Boundary
 - Boroughs
 - Cities

MINE HAZARDS MAP

**HAZARD MITIGATION PLAN
2014 UPDATE**

Lackawanna County, PA

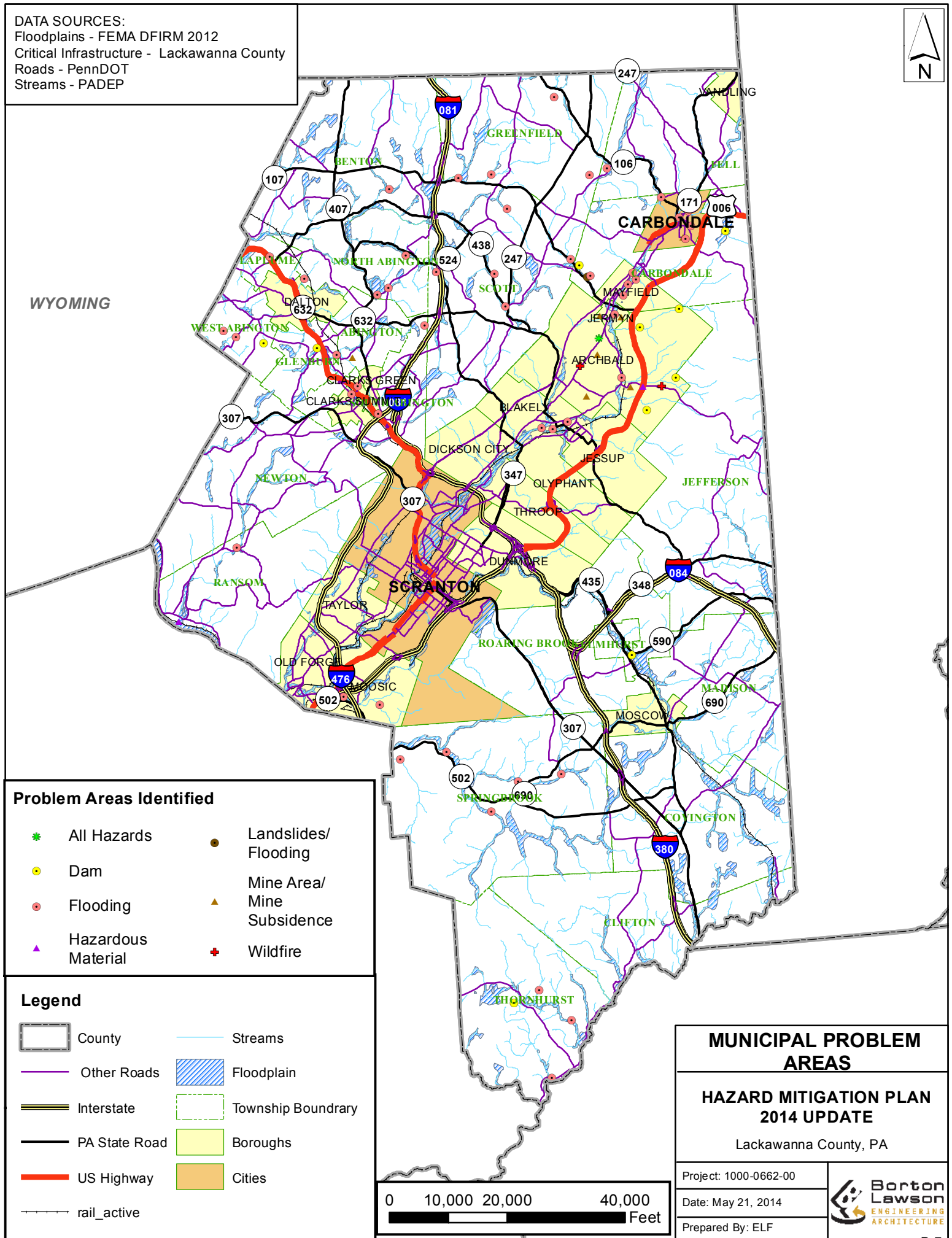
Project: 1000-0662-00
 Date: May 21, 2014
 Prepared By: ELF



Lackawanna County Critical Facilities Over Deep Mines

Municipalities	Emergency Response	Government	Hospital	Nursing Home	Schools
Jermyn Borough		1			
Mayfield Borough	4	1			1
Old Forge Borough	2	2			2
Scranton City	2	9	2	2	4
Taylor Borough	1	1			
Total: 34	9	14	2	2	7

DATA SOURCES:
 Floodplains - FEMA DFIRM 2012
 Critical Infrastructure - Lackawanna County
 Roads - PennDOT
 Streams - PADEP

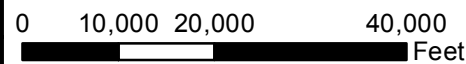


Problem Areas Identified

- * All Hazards
- Landslides/
Flooding
- Dam
- Flooding
- ▲ Mine Area/
Mine
Subsidence
- ▲ Hazardous
Material
- ✚ Wildfire

Legend

- County
- Other Roads
- Interstate
- PA State Road
- US Highway
- rail_active
- Streams
- ▨ Floodplain
- - - Township Boundary
- Boroughs
- Cities



**MUNICIPAL PROBLEM
 AREAS**

**HAZARD MITIGATION PLAN
 2014 UPDATE**

Lackawanna County, PA

Project: 1000-0662-00

Date: May 21, 2014

Prepared By: ELF



Lackawanna County Number of Structures in 100-Year Floodplain and Corresponding Economic Exposure Value

Municipality	Structures in Floodplain	100-Year Flood Economic Loss (Million \$)
Archbald Borough	146	57.0
Benton Township	129	50.4
Blakely Borough	380	148.5
Carbondale City	141	55.1
Carbondale Township	34	13.3
Clarks Green Borough	-	-
Clarks Summit Borough	72	28.1
Clifton Township	92	35.9
Covington Township	184	71.9
Dalton Borough	104	40.6
Dickson City Borough	773	302.0
Dunmore Borough	27	10.6
Elmhurst Township	30	11.7
Fell Township	212	82.8
Glenburn Township	17	6.6
Greenfield Township	7	2.7
Jefferson Township	4	1.6
Jermyn Borough	183	71.5
Jessup Borough	186	72.7
Laplume Township	50	19.5
Madison Township	39	15.2
Mayfield Borough	38	14.8
Moosic Borough	153	59.8
Moscow Borough	76	29.7
Newton Township	82	32.0
North Abington Township	41	16.0
Old Forge Borough	172	67.2
Olyphant Borough	470	183.7
Ransom Township	56	21.9
Roaring Brook Township	-	-
Scott Township	124	48.5
Scranton City	2264	884.7
South Abington Township	118	46.1
Springbrook Township	35	13.7
Taylor Borough	43	16.8
Thornhurst Township	80	31.3
Throop Borough	42	16.4
Vandling Borough	-	-
Waverly Township	13	5.1
West Abington Township	4	1.6
Total Number of Structures	6,621	
Total Economic Loss (\$ Million)		2,587

Lackawanna County Number of Structures Vulnerable to Wildfires and Corresponding Economic Exposure

Municipality	Structures Vulnerable to Wildfires	Economic Exposure (Million \$)
Archbald Borough	883	345
Benton Township	921	360
Blakely Borough	666	260
Carbondale City	1,667	651
Carbondale Township	481	188
Clarks Green Borough	595	232
Clarks Summit Borough	1,563	611
Clifton Township	1,129	441
Covington Township	2,715	1,061
Dalton Borough	586	229
Dickson City Borough	510	199
Dunmore Borough	1,177	460
Elmhurst Township	383	150
Fell Township	955	373
Glenburn Township	576	225
Greenfield Township	1,379	539
Jefferson Township	2,006	784
Jermyn Borough	566	221
Jessup Borough	436	170
Laplume Township	237	93
Madison Township	1,419	554
Mayfield Borough	494	193
Moosic Borough	418	163
Moscow Borough	676	264
Newton Township	1,325	518
North Abington Township	321	125
Old Forge Borough	488	191
Olyphant Borough	391	153
Ransom Township	897	351
Roaring Brook Township	866	338
Scott Township	2,827	1,105
Scranton City	3,848	1,504
South Abington Township	2,335	912
Springbrook Township	1,302	509
Taylor Borough	231	90
Thornhurst Township	840	328
Throop Borough	354	138
Vandling Borough	149	58
Waverly Township	799	312
West Abington Township	217	85
Total Number of Structures	39,628	
Total Economic Loss (Million \$)		15,485

Lackawanna County Number of Structures Over Deep Mines and Corresponding Economic Exposure Value

Municipality	Structures over Deep Mines	Subsidence Economic Loss (Million \$)
Archbald Borough	4	1.6
Benton Township	-	-
Blakely Borough	23	9.0
Carbondale City	557	217.6
Carbondale Township	168	65.6
Clarks Green Borough	-	-
Clarks Summit Borough	-	-
Clifton Township	-	-
Covington Township	-	-
Dalton Borough	-	-
Dickson City Borough	94	36.7
Dunmore Borough	587	229.4
Elmhurst Township	-	-
Fell Township	-	-
Glenburn Township	-	-
Greenfield Township	-	-
Jefferson Township	-	-
Jermyn Borough	299	116.8
Jessup Borough	611	238.7
Laplume Township	-	-
Madison Township	-	-
Mayfield Borough	786	307.1
Moosic Borough	37	14.5
Moscow Borough	-	-
Newton Township	-	-
North Abington Township	-	-
Old Forge Borough	2292	895.6
Olyphant Borough	756	295.4
Ransom Township	-	-
Roaring Brook Township	-	-
Scott Township	-	-
Scranton City	6614	2584.4
South Abington Township	-	-
Springbrook Township	-	-
Taylor Borough	293	114.5
Thornhurst Township	-	-
Throop Borough	163	63.7
Vandling Borough	-	-
Waverly Township	-	-
West Abington Township	-	-
Total Number of Structures	13,284	
Total Economic Loss (\$ Million)		5,191

Flood Summary - National Climatic Data Center (NCDC) and Spatial Hazard Events and Losses Database for the United States (SHELDUS)

Hazard Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Total Damage	Current Dollar Factored Damage
4/2/1970	Flooding, Severe Storm/Thunder Storm	0.12	0	\$1,515	\$152	\$1,667	\$9,862
6/21/1972	Flooding, Severe Storm/Thunder Storm	0	0.75	\$7,462,687	\$746,269	\$8,208,955	\$45,104,150
9/23/1975	Flooding, Severe Storm/Thunder Storm	0	0.12	\$1,515,152	\$1,515	\$1,516,667	\$6,453,901
1/24/1979	Flooding, Severe Storm/Thunder Storm, Wind	0	0	\$15,152	\$0	\$15,152	\$47,797
2/23/1979	Flooding, Severe Storm/Thunder Storm	0	0	\$15,152	\$0	\$15,152	\$47,797
2/10/1981	Flooding, Severe Storm/Thunder Storm, Wind	0	0.05	\$227,273	\$0	\$227,273	\$573,921
2/2/1982	Flooding	0	0	\$1,515	\$0	\$1,515	\$3,599
6/29/1982	Flooding, Lightning, Severe Storm/Thunder Storm, Wind	0	0	\$3,846	\$0	\$3,846	\$9,136
4/15/1983	Flooding, Severe Storm/Thunder Storm	0	0	\$22,727	\$0	\$22,727	\$52,367
12/12/1983	Flooding, Severe Storm/Thunder Storm	0	0	\$20,833	\$0	\$20,833	\$48,003
2/14/1984	Flooding, Severe Storm/Thunder Storm	0	0	\$227,273	\$22,727	\$250,000	\$551,876
4/4/1984	Flooding, Severe Storm/Thunder Storm, Wind	0.05	0	\$2,273	\$0	\$2,273	\$5,017
5/26/1984	Flooding, Severe Storm/Thunder Storm	0	0	\$22,727	\$2,273	\$25,000	\$55,188
7/1/1984	Flooding, Severe Storm/Thunder Storm	0.27	0	\$227,273	\$227	\$227,500	\$502,208
3/14/1986	Flooding	0	0	\$14,706	\$0	\$14,706	\$30,765
7/1/1995	Flooding	0	0	\$4,000	\$0	\$4,000	\$6,015
1/19/1996	Flooding	0	0	\$19,500,000	\$0	\$19,500,000	\$28,508,772
11/8/1996	Flooding	0	0	\$25,000	\$0	\$25,000	\$36,550
5/28/2002	Flooding	0	0	\$100,000	\$0	\$100,000	\$127,389
8/15/2002	Flooding	0	0	\$5,000	\$0	\$5,000	\$6,369
6/1/2003	Flooding	0	0	\$30,000	\$0	\$30,000	\$37,406
9/3/2003	Flooding	0	0	\$5,000,000	\$0	\$5,000,000	\$6,234,414
8/30/2004	Flooding	0	0	\$10,000	\$0	\$10,000	\$12,136
9/18/2004	Flooding	0	0	\$20,000,000	\$0	\$20,000,000	\$24,271,845
9/18/2004	Flooding	0	0	\$1,000,000	\$0	\$1,000,000	\$1,213,592
11/28/2004	Flooding	0	0	\$50,000	\$0	\$50,000	\$60,680
3/29/2005	Flooding	0	0	\$20,000	\$0	\$20,000	\$23,474
4/2/2005	Flooding	0	0	\$200,000	\$0	\$200,000	\$234,742
4/2/2005	Flooding	0	0	\$200,000	\$0	\$200,000	\$234,742
6/11/2005	Flooding	0	0	\$10,000	\$0	\$10,000	\$11,737
6/27/2006	Flash Flood	0	0	\$50,000,000	\$0	\$50,000,000	\$56,882,821
6/27/2006	Flood	0	0	\$5,000,000	\$0	\$5,000,000	\$5,688,282
11/16/2006	Flash Flood	0	0	\$5,000	\$0	\$5,000	\$5,688
11/16/2006	Flash Flood	0	0	\$2,000	\$0	\$2,000	\$2,275
11/16/2006	Flash Flood	0	0	\$10,000	\$0	\$10,000	\$11,377
11/16/2006	Flash Flood	0	0	\$5,000	\$0	\$5,000	\$5,688
3/8/2008	Flash Flood	0	0	\$1,000	\$0	\$1,000	\$1,065
7/31/2009	Flash Flood	0	0	\$10,000	\$0	\$10,000	\$10,684
8/19/2009	Flash Flood	0	0	\$2,000	\$0	\$2,000	\$2,137
6/13/2010	Flash Flood	0	0	\$150,000	\$0	\$150,000	\$157,729
9/30/2010	Flash Flood	0	0	\$10,000	\$0	\$10,000	\$10,515
7/8/2011	Flash Flood	0	0	\$10,000	\$0	\$10,000	\$10,194
9/27/2011	Flash Flood	0	0	\$1,000	\$0	\$1,000	\$1,019
9/27/2011	Flash Flood	0	0	\$1,000	\$0	\$1,000	\$1,019
9/29/2011	Flood	0	0	\$1,000	\$0	\$1,000	\$1,019
6/27/2013	Flash Flood	0	0	\$5,000	\$0	\$5,000	\$5,000
6/30/2013	Flash Flood	0	0	\$10,000	\$0	\$10,000	\$10,000
Totals:				\$111,157,102	\$773,163	\$111,930,265	\$177,321,960

Winter Weather Summary - National Climatic Data Center (NCDC) and Spatial Hazard Events and Losses Database for the United States (SHELDUS)

Hazard Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Total Damage	Current Dollar Factored Damage
2/18/1960	Wind, Winter Weather	0.22	0.06	\$75	\$0	\$75	\$579
3/3/1960	Winter Weather	0.07	0.09	\$75	\$0	\$75	\$579
1/19/1961	Winter Weather	0.14	0.08	\$1,020	\$0	\$1,020	\$7,849
2/3/1961	Winter Weather	0.09	0.22	\$746	\$0	\$746	\$5,741
3/6/1962	Severe Storm/Thunder Storm, Wind, Winter Weather	0	0	\$746	\$0	\$746	\$5,654
12/29/1962	Wind, Winter Weather	0	0	\$74,657	\$0	\$74,657	\$565,582
12/5/1968	Wind, Winter Weather	0.04	0	\$746	\$0	\$746	\$4,910
1/26/1971	Lightning, Wind, Winter Weather	0.46	0	\$1,515	\$1,515	\$3,030	\$17,120
1/26/1971	Lightning, Wind, Winter Weather	0.45	0	\$1,515	\$1,515	\$3,030	\$17,120
1/27/1971	Wind, Winter Weather	0	0	\$746	\$0	\$746	\$4,216
2/13/1971	Wind, Winter Weather	0	0	\$2,500	\$0	\$2,500	\$14,124
2/18/1972	Wind, Winter Weather	0	0	\$746	\$0	\$746	\$4,100
12/20/1973	Severe Storm/Thunder Storm, Winter Weather	0.06	0.03	\$1,515	\$0	\$1,515	\$7,810
1/2/1974	Winter Weather	0.36	0	\$152	\$0	\$152	\$705
1/9/1974	Winter Weather	0.3	0	\$152	\$0	\$152	\$705
1/18/1974	Winter Weather	0	0	\$152	\$0	\$152	\$705
2/8/1974	Winter Weather	1.06	0	\$152	\$0	\$152	\$705
3/29/1974	Winter Weather	0.15	0	\$1,515	\$0	\$1,515	\$7,047
1/19/1975	Winter Weather	0	0	\$1,515	\$0	\$1,515	\$6,447
4/3/1975	Wind, Winter Weather	0	0	\$15,152	\$152	\$15,303	\$65,119
2/2/1976	Wind, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$6,109
3/22/1977	Severe Storm/Thunder Storm, Wind, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$5,739
10/16/1977	Lightning, Severe Storm/Thunder Storm, Wind, Winter Weather	0	0	\$15,152	\$15	\$15,167	\$57,450
12/17/1977	Severe Storm/Thunder Storm, Wind, Winter Weather	0	0	\$15,152	\$0	\$15,152	\$57,392
1/13/1978	Wind, Winter Weather	0	0	\$15,152	\$0	\$15,152	\$53,350
1/16/1978	Severe Storm/Thunder Storm, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$5,335
1/19/1978	Wind, Winter Weather	0.03	0	\$15,152	\$0	\$15,152	\$53,350
2/5/1978	Wind, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$5,335
3/25/1978	Severe Storm/Thunder Storm, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$5,335
2/11/1983	Winter Weather	0	0	\$2,273	\$0	\$2,273	\$5,237
12/24/1983	Winter Weather	0.45	0.18	\$2,273	\$0	\$2,273	\$5,237
4/22/1986	Winter Weather	0	0	\$4,545	\$4,545	\$9,091	\$19,019
12/3/1991	Winter Weather	0	1	\$12,500	\$0	\$12,500	\$21,044
12/10/1992	Winter Weather	0	0.04	\$74,627	\$0	\$74,627	\$121,939
1/1/1994	Winter Weather	0	0.1	\$746,269	\$0	\$746,269	\$1,155,215
1/4/1994	Winter Weather	2.76	0	\$7,463	\$0	\$7,463	\$11,552
1/14/1994	Winter Weather	1.93	0	\$7,463	\$0	\$7,463	\$11,552
1/17/1994	Winter Weather	0	0	\$746	\$0	\$746	\$1,155
3/2/1994	Winter Weather	0	0	\$7,463	\$0	\$7,463	\$11,552
1/14/1995	Winter Weather	0.29	0.14	\$7,143	\$0	\$7,143	\$10,741
1/2/1996	Winter Weather	0	0	\$3,000	\$0	\$3,000	\$4,386
1/7/1996	Winter Weather	0	0	\$20,000	\$0	\$20,000	\$29,240
1/12/1996	Winter Weather	0	0	\$4,571	\$0	\$4,571	\$6,683
1/3/2003	Winter Weather	0	0	\$357,143	\$0	\$357,143	\$445,315
2/17/2003	Winter Weather	0	0	\$50,000	\$0	\$50,000	\$62,344
12/6/2003	Winter Weather	0	0	\$20,000	\$0	\$20,000	\$24,938
1/10/2004	Winter Weather	0	0	\$5,000	\$0	\$5,000	\$6,068
1/15/2004	Winter Weather	0	0	\$10,000	\$0	\$10,000	\$12,136
1/28/2004	Winter Weather	0	0	\$50,000	\$0	\$50,000	\$60,680
3/16/2004	Winter Weather	0	0	\$20,000	\$0	\$20,000	\$24,272
1/6/2005	Winter Weather	0	0	\$41,429	\$0	\$41,429	\$48,625
1/23/2005	Winter Weather	0	0	\$22,857	\$0	\$22,857	\$26,828
3/1/2005	Winter Weather	0	0	\$22,857	\$0	\$22,857	\$26,828
3/24/2005	Winter Weather	0	0	\$11,429	\$0	\$11,429	\$13,414
12/9/2005	Winter Weather	0	0	\$11,667	\$0	\$11,667	\$13,693
12/16/2005	Winter Weather	0	0	\$12,000	\$0	\$12,000	\$14,085
2/13/2007	Winter Storm	0	0	\$50,000	\$0	\$50,000	\$55,310
3/16/2007	Heavy Snow	0	0	\$1,000	\$0	\$1,000	\$1,106
4/15/2007	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,106
11/17/2007	Winter Weather	0	0	\$5,000	\$0	\$5,000	\$5,531
12/13/2007	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,106
10/28/2008	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,065
12/19/2008	Heavy Snow	0	0	\$1,000	\$0	\$1,000	\$1,065
10/15/2009	Winter Weather	0	0	\$1,000	\$0	\$1,000	\$1,068
2/10/2010	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,052
2/25/2010	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,052
2/20/2011	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,019
3/23/2011	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,019
10/29/2011	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,019
1/2/2014	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,000
2/5/2014	Winter Storm	0	0	\$1,000	\$0	\$1,000	\$1,000
2/13/2014	Winter Storm	0	0	\$5,000	\$0	\$5,000	\$5,000
Totals:				\$1,781,289	\$7,742	\$1,789,032	\$3,259,508

Wind Events Summary - National Climatic Data Center (NCDC) and Spatial Hazard Events and Losses Database for the United States (SHELDUS)

Hazard Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Total Damage	Current Dollar Factored Damage
2/18/1960	Wind, Winter Weather	0.22	0.06	\$75	\$0	\$75	\$579
7/1/1961	Severe Storm/Thunder Storm	0	0	\$7,463	\$0	\$7,463	\$57,405
7/19/1961	Severe Storm/Thunder Storm	0	0	\$746	\$7	\$754	\$5,798
7/24/1961	Severe Storm/Thunder Storm	0	1	\$1,515	\$15	\$1,530	\$11,772
3/6/1962	Severe Storm/Thunder Storm, Wind, Winter Weather	0	0	\$746	\$0	\$746	\$5,654
12/29/1962	Wind, Winter Weather	0	0	\$74,657	\$0	\$74,657	\$565,582
4/4/1963	Wind	0	0	\$746	\$0	\$746	\$5,611
8/1/1963	Severe Storm/Thunder Storm	0	0	\$746	\$7	\$754	\$5,667
3/5/1964	Wind	0.1	0	\$746	\$0	\$746	\$5,528
3/26/1964	Wind	0.03	0	\$15,152	\$1,515	\$16,667	\$123,457
7/1/1964	Severe Storm/Thunder Storm	0.01	0.03	\$746	\$0	\$746	\$5,528
7/22/1964	Severe Storm/Thunder Storm	0.15	0.15	\$3,846	\$0	\$3,846	\$28,490
2/25/1965	Wind	0	0	\$746	\$0	\$746	\$5,447
4/12/1965	Wind	0.03	0	\$7,463	\$0	\$7,463	\$54,472
5/25/1965	Severe Storm/Thunder Storm	0	0	\$746	\$0	\$746	\$5,447
8/13/1965	Severe Storm/Thunder Storm	0	0	\$1,515	\$0	\$1,515	\$11,059
8/18/1965	Severe Storm/Thunder Storm	0	0.03	\$1,515	\$0	\$1,515	\$11,059
11/17/1965	Wind	0.03	0.01	\$746	\$0	\$746	\$5,447
3/1/1966	Wind	0.1	0.01	\$746	\$0	\$746	\$5,293
5/28/1966	Severe Storm/Thunder Storm	0.03	0	\$746	\$0	\$746	\$5,293
6/28/1966	Severe Storm/Thunder Storm	0	0	\$746	\$0	\$746	\$5,293
7/27/1966	Severe Storm/Thunder Storm	0	0	\$1,515	\$0	\$1,515	\$10,746
8/16/1966	Severe Storm/Thunder Storm	0	0	\$7,463	\$0	\$7,463	\$52,927
1/27/1967	Severe Storm/Thunder Storm	0.03	0	\$1,515	\$0	\$1,515	\$10,378
2/16/1967	Wind	0.31	0.01	\$74,627	\$0	\$74,627	\$511,143
4/22/1967	Wind	0.03	0	\$746	\$0	\$746	\$5,111
5/19/1967	Severe Storm/Thunder Storm	0	0	\$15,152	\$0	\$15,152	\$103,778
6/13/1967	Severe Storm/Thunder Storm	0	0	\$1,515	\$15	\$1,530	\$10,480
6/15/1967	Severe Storm/Thunder Storm	0	0	\$3,571	\$0	\$3,571	\$24,459
6/17/1967	Severe Storm/Thunder Storm	0	0	\$3,571	\$36	\$3,607	\$24,703
7/10/1967	Severe Storm/Thunder Storm	0.03	0	\$15,152	\$0	\$15,152	\$103,781
7/24/1967	Severe Storm/Thunder Storm	0	0	\$7,463	\$0	\$7,463	\$51,114
7/25/1967	Severe Storm/Thunder Storm	0	0.05	\$2,500	\$0	\$2,500	\$17,123
8/3/1967	Severe Storm/Thunder Storm	0.03	0.01	\$74,627	\$7	\$74,634	\$511,191
8/4/1967	Severe Storm/Thunder Storm	0	0.2	\$3,333	\$0	\$3,333	\$22,829
10/18/1967	Wind	0	0	\$15,152	\$0	\$15,152	\$103,781
11/12/1967	Severe Storm/Thunder Storm, Wind	0	0	\$1,515	\$0	\$1,515	\$10,377
2/16/1968	Wind	0	0	\$1,515	\$0	\$1,515	\$9,968
12/5/1968	Wind, Winter Weather	0.04	0	\$746	\$0	\$746	\$4,910
12/28/1968	Lightning, Wind	0	0	\$7,463	\$0	\$7,463	\$49,097
3/26/1970	Lightning, Severe Storm/Thunder Storm, Wind	0.06	0	\$1,563	\$0	\$1,563	\$9,246
4/2/1970	Wind	0	0	\$7,463	\$75	\$7,537	\$44,600
4/2/1970	Wind	0.3	0.03	\$1,515	\$152	\$1,667	\$9,862
4/2/1970	Severe Storm/Thunder Storm, Wind	0	0	\$746	\$0	\$746	\$4,416
4/2/1970	Wind	0	0	\$746	\$75	\$821	\$4,857
1/26/1971	Lightning, Wind, Winter Weather	0.46	0	\$1,515	\$1,515	\$3,030	\$17,120
1/26/1971	Lightning, Wind, Winter Weather	0.45	0	\$1,515	\$1,515	\$3,030	\$17,120
1/27/1971	Wind, Winter Weather	0	0	\$746	\$0	\$746	\$4,216
2/13/1971	Wind, Winter Weather	0	0	\$2,500	\$0	\$2,500	\$14,124
1/25/1972	Wind	0.11	0	\$794	\$0	\$794	\$4,361
2/18/1972	Wind, Winter Weather	0	0	\$746	\$0	\$746	\$4,100
5/30/1972	Lightning, Severe Storm/Thunder Storm, Wind	1	0	\$16,667	\$1,667	\$18,333	\$100,733
3/17/1973	Severe Storm/Thunder Storm, Wind	0	0	\$746	\$0	\$746	\$3,847
10/29/1973	Lightning, Severe Storm/Thunder Storm, Wind	1.54	0.15	\$3,846	\$0	\$3,846	\$19,826
12/20/1973	Severe Storm/Thunder Storm, Winter Weather	0.06	0.03	\$1,515	\$0	\$1,515	\$7,810
3/10/1974	Wind	0	0	\$1,250	\$0	\$1,250	\$5,814
7/29/1974	Hail, Lightning, Severe Storm/Thunder Storm, Wind	0.18	0	\$29,412	\$2,941	\$32,353	\$150,479
12/1/1974	Wind	0	0	\$15,152	\$0	\$15,152	\$70,472
4/3/1975	Wind, Winter Weather	0	0	\$15,152	\$152	\$15,303	\$65,119
5/13/1975	Hail, Lightning, Severe Storm/Thunder Storm	0	0	\$16,667	\$167	\$16,833	\$71,631
7/24/1975	Lightning, Severe Storm/Thunder Storm, Wind	0	0	\$5,556	\$0	\$5,556	\$23,641
8/26/1975	Lightning, Wind	0	0	\$4,167	\$0	\$4,167	\$17,731
2/2/1976	Wind, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$6,109
3/21/1976	Wind	0.61	0.06	\$15,152	\$0	\$15,152	\$61,095
6/28/1976	Hail, Lightning, Severe Storm/Thunder Storm, Wind	0	0	\$2,381	\$0	\$2,381	\$9,601
7/29/1976	Hail, Lightning, Severe Storm/Thunder Storm, Wind	0	0	\$45,455	\$45	\$45,500	\$183,468
10/8/1976	Severe Storm/Thunder Storm, Wind	0.15	0	\$151,515	\$1,515	\$153,030	\$617,058
3/22/1977	Severe Storm/Thunder Storm, Wind, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$5,739
4/5/1977	Lightning, Wind	0.03	0	\$1,515	\$0	\$1,515	\$5,739

Wind Events Summary - National Climatic Data Center (NCDC) and Spatial Hazard Events and Losses Database for the United States (SHELDUS)

Hazard Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Total Damage	Current Dollar Factored Damage
5/8/1977	Wind	0	0	\$1,515	\$15	\$1,530	\$5,797
7/6/1977	Hail, Lightning, Severe Storm/Thunder Storm, Wind	0.1	0	\$16,667	\$17	\$16,683	\$63,194
7/12/1977	Hail, Lightning, Severe Storm/Thunder Storm, Wind	0.25	0	\$12,500	\$0	\$12,500	\$47,348
10/16/1977	Lightning, Severe Storm/Thunder Storm, Wind, Winter Weather	0	0	\$15,152	\$15	\$15,167	\$57,450
12/17/1977	Severe Storm/Thunder Storm, Wind, Winter Weather	0	0	\$15,152	\$0	\$15,152	\$57,392
1/13/1978	Wind, Winter Weather	0	0	\$15,152	\$0	\$15,152	\$53,350
1/16/1978	Severe Storm/Thunder Storm, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$5,335
1/19/1978	Wind, Winter Weather	0.03	0	\$15,152	\$0	\$15,152	\$53,350
1/24/1978	Severe Storm/Thunder Storm, Wind	0.33	0	\$15,152	\$0	\$15,152	\$53,350
2/5/1978	Wind, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$5,335
3/25/1978	Severe Storm/Thunder Storm, Winter Weather	0	0	\$1,515	\$0	\$1,515	\$5,335
6/21/1978	Lightning, Severe Storm/Thunder Storm, Wind	0.06	0	\$1,515	\$0	\$1,515	\$5,335
7/27/1978	Lightning, Severe Storm/Thunder Storm, Wind	0	0	\$1,515	\$0	\$1,515	\$5,335
4/6/1979	Wind	0.24	0	\$15,152	\$0	\$15,152	\$47,797
5/25/1979	Hail, Severe Storm/Thunder Storm, Wind	1	0	\$1,515	\$152	\$1,667	\$5,258
7/16/1979	Lightning, Severe Storm/Thunder Storm, Wind	0	0	\$943	\$9	\$953	\$3,006
7/23/1979	Lightning, Severe Storm/Thunder Storm, Wind	0	0	\$1,515	\$0	\$1,515	\$4,780
8/10/1979	Lightning, Wind	0	0	\$151,515	\$0	\$151,515	\$477,966
11/26/1979	Severe Storm/Thunder Storm, Wind	0	0	\$1,515	\$0	\$1,515	\$4,780
6/3/1980	Hail, Lightning, Wind	1.14	0.05	\$22,727	\$23	\$22,750	\$63,370
7/11/1980	Hail, Lightning, Severe Storm/Thunder Storm, Wind	0	0	\$2,273	\$23	\$2,295	\$6,394
7/16/1980	Hail, Lightning, Severe Storm/Thunder Storm, Wind	1.09	0	\$22,727	\$23	\$22,750	\$63,370
8/2/1980	Lightning, Severe Storm/Thunder Storm, Wind	0.36	0	\$4,545	\$0	\$4,545	\$12,661
6/25/1981	Lightning, Severe Storm/Thunder Storm, Wind	0.05	0	\$22,727	\$0	\$22,727	\$57,392
7/13/1981	Lightning, Severe Storm/Thunder Storm, Wind	0.5	0	\$250,000	\$0	\$250,000	\$631,313
7/20/1981	Lightning, Severe Storm/Thunder Storm, Wind	0	0	\$2,273	\$227	\$2,500	\$6,313
8/11/1983	Hail, Lightning, Severe Storm/Thunder Storm, Wind	1.09	0	\$22,727	\$0	\$22,727	\$52,367
12/6/1983	Lightning, Wind	0	0	\$2,273	\$0	\$2,273	\$5,237
6/13/1984	Lightning, Severe Storm/Thunder Storm, Wind	0.32	0	\$2,273	\$0	\$2,273	\$5,017
7/11/1984	Hail, Lightning, Severe Storm/Thunder Storm, Wind	0.09	0	\$2,273	\$0	\$2,273	\$5,017
4/6/1985	Wind	0	0	\$22,727	\$0	\$22,727	\$48,459
6/24/1985	Hail, Wind	0.25	0	\$125,000	\$125	\$125,125	\$266,791
12/2/1985	Wind	0.05	0	\$2,273	\$0	\$2,273	\$4,846
12/14/1991	Wind	0	0	\$2,273	\$0	\$2,273	\$3,826
1/14/1992	Severe Storm/Thunder Storm, Wind	6	0	\$100,000	\$0	\$100,000	\$163,399
12/10/1992	Wind	0	0	\$208,333	\$0	\$208,333	\$340,414
7/6/1995	Lightning	0	0	\$10,000	\$0	\$10,000	\$15,038
8/31/1995	Severe Storm/Thunder Storm, Wind	0	0	\$7,000	\$0	\$7,000	\$10,526
10/14/1995	Severe Storm/Thunder Storm, Wind	0	0	\$20,000	\$0	\$20,000	\$30,075
11/11/1995	Wind	0	0	\$7,143	\$0	\$7,143	\$10,741
3/19/1996	Wind	0	0	\$14,200	\$0	\$14,200	\$20,760
4/23/1996	Severe Storm/Thunder Storm, Wind	0	0	\$12,000	\$0	\$12,000	\$17,544
5/21/1996	Severe Storm/Thunder Storm, Wind	0	0	\$10,000	\$0	\$10,000	\$14,620
7/8/1996	Lightning	3	0	\$0	\$0	\$0	\$0
10/19/1996	Wind	0	0	\$1,250	\$0	\$1,250	\$1,827
5/19/1997	Severe Storm/Thunder Storm, Wind	0	0	\$80,000	\$0	\$80,000	\$114,286
8/16/1997	Severe Storm/Thunder Storm, Wind	0	0	\$20,000	\$0	\$20,000	\$28,571
2/17/1998	Wind	0	0	\$7,500	\$0	\$7,500	\$10,549
4/1/1998	Severe Storm/Thunder Storm, Wind	0	0	\$40,000	\$0	\$40,000	\$56,259
5/29/1998	Severe Storm/Thunder Storm, Wind	0	0	\$10,000	\$0	\$10,000	\$14,065
5/31/1998	Hail, Wind, Severe Storm/Thunder Storm	0	0	\$75,000	\$0	\$75,000	\$105,485
5/31/1998	Severe Storm/Thunder Storm, Wind	0	0	\$40,000	\$0	\$40,000	\$56,259
6/2/1998	Severe Storm/Thunder Storm, Wind	0	0	\$10,000	\$0	\$10,000	\$14,065
7/21/1998	Severe Storm/Thunder Storm, Wind	0	0	\$10,000	\$0	\$10,000	\$14,065
10/1/1998	Wind	0	0	\$26,250	\$0	\$26,250	\$36,920
11/10/1998	Wind	0	0	\$6,429	\$0	\$6,429	\$9,042
7/9/1999	Severe Storm/Thunder Storm, Wind	0	0	\$10,000	\$0	\$10,000	\$13,755
7/18/1999	Severe Storm/Thunder Storm, Wind	0	0	\$15,000	\$0	\$15,000	\$20,633
9/16/1999	Wind	0	0	\$625,000	\$0	\$625,000	\$859,697
11/2/1999	Wind	0	0	\$214,286	\$0	\$214,286	\$294,753
12/12/2000	Wind	0	0	\$64,286	\$0	\$64,286	\$85,600
9/13/2001	Lightning	0	1	\$0	\$0	\$0	\$0
5/28/2002	Lightning	2	0	\$0	\$0	\$0	\$0
8/15/2002	Severe Storm/Thunder Storm, Wind	0	0	\$10,000	\$0	\$10,000	\$12,739
7/21/2003	Severe Storm/Thunder Storm, Wind	0	0	\$15,000	\$0	\$15,000	\$18,703
9/19/2003	Wind	0	0	\$50,000	\$0	\$50,000	\$62,344
10/15/2003	Wind	0	0	\$100,000	\$0	\$100,000	\$124,688
11/13/2003	Wind	0	0	\$27,143	\$0	\$27,143	\$33,844
6/9/2004	Severe Storm/Thunder Storm, Wind	0	0	\$10,000	\$0	\$10,000	\$12,136

Wind Events Summary - National Climatic Data Center (NCDC) and Spatial Hazard Events and Losses Database for the United States (SHELDUS)

Hazard Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Total Damage	Current Dollar Factored Damage
6/9/2004	Severe Storm/Thunder Storm, Wind	0	0	\$5,000	\$0	\$5,000	\$6,068
8/20/2004	Severe Storm/Thunder Storm, Wind	0	0	\$5,000	\$0	\$5,000	\$6,068
11/25/2004	Severe Storm/Thunder Storm, Wind	0	0	\$200,000	\$0	\$200,000	\$242,718
12/1/2004	Wind	0	0	\$7,500	\$0	\$7,500	\$9,102
12/23/2004	Wind	0	0	\$8,571	\$0	\$8,571	\$10,402
6/6/2005	Severe Storm/Thunder Storm, Wind	0	0	\$10,000	\$0	\$10,000	\$11,737
6/6/2005	Severe Storm/Thunder Storm, Wind	0	0	\$5,000	\$0	\$5,000	\$5,869
6/6/2005	Lightning	0	0	\$100,000	\$0	\$100,000	\$117,371
9/29/2005	Severe Storm/Thunder Storm, Wind	0	0	\$2,000	\$0	\$2,000	\$2,347
11/6/2005	Severe Storm/Thunder Storm, Wind	0	0	\$5,000	\$0	\$5,000	\$5,869
11/29/2005	Wind	0	0	\$5,714	\$0	\$5,714	\$6,707
6/1/2006	Thunderstorm Wind	0	0	\$5,000	\$0	\$5,000	\$5,688
12/1/2006	Thunderstorm Wind	0	0	\$2,000	\$0	\$2,000	\$2,275
12/1/2006	High Wind	0	0	\$5,000	\$0	\$5,000	\$5,688
6/8/2007	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,106
6/16/2007	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,106
6/19/2007	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,106
6/19/2007	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,106
6/27/2007	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,106
6/27/2007	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,106
6/27/2007	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,106
6/28/2007	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,106
7/10/2007	Thunderstorm Wind	0	0	\$3,000	\$0	\$3,000	\$3,319
8/7/2007	Thunderstorm Wind	0	0	\$35,000	\$0	\$35,000	\$38,717
8/17/2007	Thunderstorm Wind	0	0	\$15,000	\$0	\$15,000	\$16,593
10/9/2007	Thunderstorm Wind	0	0	\$2,000	\$0	\$2,000	\$2,212
5/31/2008	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,065
6/8/2008	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,065
6/10/2008	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,065
6/10/2008	Thunderstorm Wind	0	0	\$2,000	\$0	\$2,000	\$2,130
6/10/2008	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,065
6/29/2008	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,065
7/23/2008	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,065
6/26/2009	Thunderstorm Wind	0	0	\$3,000	\$0	\$3,000	\$3,205
6/26/2009	Thunderstorm Wind	0	0	\$4,000	\$0	\$4,000	\$4,274
8/21/2009	Funnel Cloud	0	0	\$1,000	\$0	\$1,000	\$1,068
7/21/2010	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,052
11/17/2010	Tornado	0	0	\$125,000	\$0	\$125,000	\$131,441
2/18/2011	High Wind	0	1	\$50,000	\$0	\$50,000	\$50,968
4/16/2011	High Wind	0	0	\$50,000	\$0	\$50,000	\$50,968
4/28/2011	Thunderstorm Wind	0	0	\$30,000	\$0	\$30,000	\$30,581
4/28/2011	Thunderstorm Wind	0	0	\$20,000	\$0	\$20,000	\$20,387
4/28/2011	Thunderstorm Wind	0	0	\$10,000	\$0	\$10,000	\$10,194
4/28/2011	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,019
5/30/2011	Thunderstorm Wind	0	0	\$2,000	\$0	\$2,000	\$2,039
7/26/2011	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,019
7/29/2011	Thunderstorm Wind	0	1	\$10,000	\$0	\$10,000	\$10,194
8/28/2011	High Wind	0	0	\$100,000	\$0	\$100,000	\$101,937
5/29/2012	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,000
5/29/2012	Thunderstorm Wind	0	0	\$1,000	\$0	\$1,000	\$1,000
10/29/2012	High Wind	0	0	\$100,000	\$0	\$100,000	\$100,000
4/10/2013	Thunderstorm Wind	0	0	\$20,000	\$0	\$20,000	\$20,000
4/10/2013	Thunderstorm Wind	0	0	\$30,000	\$0	\$30,000	\$30,000
4/10/2013	Thunderstorm Wind	0	0	\$20,000	\$0	\$20,000	\$20,000
9/11/2013	Thunderstorm Wind	0	0	\$5,000	\$0	\$5,000	\$5,000
Totals:				\$4,383,187	\$12,049	\$4,395,236	\$10,058,444

Drought Summary - National Climatic Data Center (NCDC) and Spatial Hazard Events and Losses Database for the United States (SHELDUS)

Hazard Date	Hazard Type	Injuries	Fatalities	Property Damage	Crop Damage	Total Damage	Current Dollar Factored Damage
7/1/1988	Drought	0	0	\$0	\$2,272,727	\$2,272,727	\$4,404,510
7/1/1991	Drought	0	0	\$0	\$2,380,952	\$2,380,952	\$4,008,337
8/1/1991	Drought	0	0	\$0	\$22,727,273	\$22,727,273	\$38,261,402
7/1/1995	Heat	0	0.33	\$0	\$0	\$0	\$0
8/1/1995	Heat	0	0.85	\$0	\$0	\$0	\$0
8/1/1995	Drought, Heat	0	0.73	\$0	\$0	\$0	\$0
8/4/1995	Heat	0	0.86	\$0	\$0	\$0	\$0
8/1/1997	Drought	0	0	\$0	\$200,000	\$200,000	\$285,714
9/1/1999	Drought	0	0	\$0	\$2,857,143	\$2,857,143	\$3,930,045
Totals:				\$0	\$30,438,095	\$30,438,095	\$50,890,009