County of Snyder
Hazard Mitigation Plan
2019

EXECUTIVE SUMMARY

After suffering the effects of floods, windstorms, winter storms, and other natural and human-made hazards, the citizens, business leaders, and officials of Snyder County recognized the need to develop a long-term approach to reducing their vulnerability to hazards. In 2019, the Snyder County Office of Emergency Management and the Snyder County Office of Planning, the agencies responsible for hazard mitigation in the County, began a hazard mitigation planning process to update the previous Hazard Mitigation Plan (HMP) and identify the hazards that can affect the County and create a strategy to reduce damage from these hazards.

The County Emergency Management Agency and Office of Planning completed the update process of the 2014 HMP. This document represents the culmination of the multi-jurisdictional planning process that involved numerous stakeholders across the County. The planning process consisted of the following steps:

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

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

The following hazards were identified by the Snyder County Hazard Mitigation Planning Team (Planning Team) as presenting the highest risk to the County and its municipalities:

- Flood, Flash Flood, Ice Jam
- Winter Storm
- Dam Failure
- Wildfire
- Tornado, Windstorm
- Utility Interruption
- Transportation Accidents
- Environmental Hazards
- Drought
- Earthquake
- Landslide
- Subsidence

To mitigate against the effects of these hazards, the Planning Team identified the following goals for hazard mitigation over the next five years:

- Strengthen County and local capabilities to reduce the potential impacts of flooding on existing and future public/private assets, including structures, critical facilities, and infrastructure.
- Increase intergovernmental cooperation and build public-private partnerships to implement activities that will reduce the impacts of natural, human-made, and technological hazards.
- Enhance planning and emergency response efforts among state, county, and local emergency management personnel to protect public health and safety.
- Continue to build Snyder County's spatial information resources to strengthen public and private hazard mitigation planning and decision-support capabilities.

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

CERTIFICATION OF ANNUAL REVIEW MEETINGS

The Snyder County Hazard Mitigation Planning Team has reviewed this Hazard Mitigation Plan. The Director of the Snyder County Office of Emergency Management hereby certifies the review.

YEAR	DATE OF MEETING	PUBLIC OUTREACH ADDRESSED?*	SIGNATURE
2020			
2021			
2022			
2023			
2024			
2025			

**Confirm yes here annually and describe on the Record of Changes page.*

RECORD OF CHANGES

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

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1. INTRODUCTION

1.1 BACKGROUND

Across the United States, natural and human-caused disasters have led to increasing levels of deaths, injuries, property damage, and interruption of business and government services. The time, money, and efforts to recover from these disasters exhaust resources, diverting attention from important public programs and private agendas. With over 100 statewide or county-specific gubernatorial and presidential disaster declarations since 1954, the emergency management community, citizens, elected officials, and other stakeholders in Snyder County, Pennsylvania, recognized the impact of disasters on their community and concluded that proactive efforts were needed to reduce the impact of natural and human-caused hazards.

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

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

Accordingly, the Snyder County Planning Team, composed of County officials, municipal representatives, emergency responders, and business leaders, has created this updated HMP.

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

1.2 PURPOSE

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

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

1.3 SCOPE

The implementation actions within this HMP apply to Snyder County and any municipalities that adopt this HMP as their own. However, only those municipalities that have participated in the Plan's creation process will remain eligible for state and federal funding for implementing the HMP. For the purpose of this planning process, municipal participation was defined as submission of municipality-specific information (e.g., completing a Risk Assessment Update Worksheet or Capability Assessment Survey), and attendance by a municipal official at a planning or public meeting conducted as part of the planning process.

1.4 AUTHORITY AND REFERENCES

This section lists references used to prepare the Snyder County HMP. Existing plans and studies were reviewed and integrated into the HMP. The County Comprehensive Plan, located on the Pennsylvania e-Library website (http://www.elibrary.state.pa.us), was incorporated into multiple aspects of this HMP. Information from the Comprehensive Plan and other documents was used to formulate the County profile, to identify the history of individual hazards, and to detail the population projections in Snyder County.

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2. COMMUNITY PROFILE

2.1 GEOGRAPHY AND ENVIRONMENT

Snyder County is located in the Middle Susquehanna River Valley in north-central Pennsylvania and encompasses approximately 332 square miles. The County is bordered to the north by Union County, to the east by the Susquehanna River and Northumberland County, to the south by Juniata County, and to the west by Mifflin County. The County is approximately 30 miles north of Harrisburg and is located along the western shore of the Susquehanna River and is part of the Central Pennsylvania Appalachian Region.

Snyder County features a scenic landscape characterized by steep slopes, deep river valleys, and abundant forestland. The County also lies within the Susquehanna River Basin, one of four major drainage basins in Pennsylvania. Many of the fertile valleys along the river and its local tributary streams were settled long before land use controls and floodplain regulations were in place. This settlement pattern led to infrastructure in major flood zones.

The County's topographic features have greatly influenced past and current land use practices. Forested hillsides and fertile valleys provided adequate opportunities for profitable lumbering and agricultural activities. Today, Snyder County's land area is still predominately used for these activities. Despite the decreasing number of farms, land in agricultural uses has continued to play a dominant role in Snyder County, occupying approximately 50 percent of the total land area. Most woodland is situated on steep mountain slopes and is part of state forest holdings.

2.2 COMMUNITY FACTS

The settlement of Snyder County is related to the development of the transportation system throughout the County. Many of the traffic routes in Snyder County were established by the original Native American inhabitants and validated as a system of trade routes that transformed into well-traveled and interconnected roadways over centuries of use and technical advancements. By 1885, canals and railroads had been constructed, thereby removing much of the heavy, bulky freight from these primary roadways. As the rural areas of Snyder County grew and prospered, settlements and small towns sprang up.

Today the County includes 15 townships and 6 boroughs, with the County seat located in Middleburg. Transportation routes in the northern portion of the County are concentrated on State Route 204 and State Route 4081, for east and westbound travels as well as Routes 522 and 104 for north-south destinations. Southern extents of the County heavily utilize U.S. Route 11/15.

Heavy and light manufacturing and industrial entities comprise 192 acres in Snyder County. Furniture and fixtures comprise 51 percent of all industries, followed by modular homes making up 16 percent of industry, then lumber, wood, stone, clay, glass, and concrete comprise 10 percent of manufacturing in the County. Middleburg Borough, Selinsgrove Borough, and the Village of Kreamer are the locations with the highest concentration of industry in the County. Industrial development is focused in the central and eastern portions of the County along U.S. Route 11/15 and U.S. Route 522, as well as the Norfolk Southern rail line in the eastern edge of the County. Industry in the County relies heavily on truck and rail services, thus manufacturing and industrial development are typically found along major transportation networks.

The predominant land use development in the County is residential. The County's boroughs, towns, and villages (Selinsgrove, Shamokin Dam, Middleburg, Freeburg, Beavertown, Beaver Springs, McClure, Kreamer, Troxelville, Benfer, Paxtonville, and Penns Creek) have the highest concentrations of population and residential units. The highest of these populated areas are concentrated predominately on the eastern side of the County along the Susquehanna River and Route 11/15.

Commercial areas are zoned to accommodate businesses that sell a product or a service. Snyder County has 735 acres of commercial land, which includes urban central business districts, shopping centers, and commercial strip development. Typically, the highest concentrations of commercial development are present along the Susquehanna River and along U.S. Route 11/15. Examples of dense commercial development in the County include populated areas in the Boroughs of Selinsgrove and Shamokin Dam. Service industries include manufacturing and educational institutions, which comprise the largest employers in Snyder County. Susquehanna University, Midd-West and Selinsgrove Area School Districts, along with State and County Government are some of the top employers in the County. Wholesale trade and retail trade are also strong forces in the County.

2.3 POPULATION AND DEMOGRAPHICS

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

TABLE 2.3-1: BASELINE DEMOGRAPHIC INFORMATION

DEMOGRAPHICS	2018 (PROJECTED)
Total population	40,540
Male	20,108 (49.6%)
Female	20,432 (50.4%)
Median age (years)	39.9
Under 5 years	2,189 (5.4%)
18 years and over	30,648 (75.6%)
65 years and over	7,703 (19.0%)

SOURCE: U.S. CENSUS BUREAU, 2018; AMERICAN COMMUNITY SURVEY, SNYDER COUNTY

Based on figures from 2010 Census data, Snyder County has a population of 39,702. The County has a population density of 120 persons per square mile, which is considerably lower than the Pennsylvania statewide average of 284 persons per square mile. The population number from the 2010 Census is available at the municipal level and illustrates that the most highly populated municipality in Snyder County was Selinsgrove (5,654), with Monroe Township (3,895), Penn Township (4,324), Franklin Township (2,259), and Center Township (2,458) being the most highly populated of the remaining municipalities in the County.

A low population density means that people are spread throughout the County rather than clustered in groups. Dispersing information, instructions, and resources in a low-density area is more difficult than in a more densely populated area because individuals are not centralized.

However, a low population density also helps prevent hazards from affecting as many people. For example, diseases may not spread as quickly because there is less contact among people. Similarly, fires are less likely to spread to other structures because of the large distances between them. The magnitude of an event is typically smaller in a less populated area because each event affects fewer people and properties. Finally, if a tornado occurs in the County, a lack of dense population means that the tornado may not affect structures in the County.

Per the Pa State Data Center 2018 Estimates, approximately 16.3 percent of Snyder County's population is 65 years of age or older. These residents may have access and functional needs and may require special assistance during a disaster. For example, many may be unable to drive; therefore, special evacuation plans may need to be created for them. They may also have hearing or vision impairments that could make receiving emergency instructions difficult. Both older and younger populations have higher risks for contracting certain diseases. The County's combined populations who are under 5 years of age and over 65 years represent approximately 20 percent of the County's total population.

The table below provides population estimates for each municipality in Snyder County and for the County as a whole. Snyder County is losing its population. Between 2000 and 2010, the County's population increased by approximately 3 percent. However, the population is expected to plateau in the future, and by the year 2030, it is estimated that the entire County will have a population of 41,200, which is approximately 0.1 percent more than the 2000 Census population totals for the County. This means that Snyder County will only gain approximately 188 people annually from 2000 to 2030. Some structures may become vacant and infrastructure will age, since there will be little new development that would require infrastructure updates. It is important that the County properly maintains its existing infrastructure and has plans to manage or redevelop vacant properties.

TABLE 2.3-2: SNYDER COUNTY POPULATION BY MUNICIPALITY

MUNICIPALITY NAME	2000 CENSUS	2010 CENSUS	POPULATION CHANGE 2000-2010 (%)	PROJECTED POPULATION 2020	PROJECTED POPULATION 2030	PROJECTED POPULATION CHANGE 2000-2030 (%)
Adams Township	852	907	6.46	923	925	0.002167
Beaver Township	527	525	-0.38	578	579	0.00173
Beavertown Borough	870	965	10.92	881	883	0.00227
Center Township	2,162	2,458	13.69	2,644	2,651	0.002648
Chapman Township	1,426	1,554	8.98	1,552	1,561	0.005799
Franklin Township	2,094	2,259	7.88	2,062	2,067	0.002425
Freeburg Borough	584	575	-1.54	515	518	0.005825
Jackson Township	1,276	1,382	8.31	1,439	1,461	0.015288
McClure Borough	975	941	-3.49	900	907	0.007778
Middleburg Borough	1,382	1,309	-5.28	1,388	1,393	0.003602
Middlecreek Township	1,971	2,114	7.26	2,367	2,369	0.000845
Monroe Township	4,012	3,895	-2.92	4,476	4,488	0.002681
Penn Township	3,781	4,324	14.36	4,595	4,576	-0.00413
Perry Township	1,973	2,183	10.64	2,215	2,218	0.001354
Selinsgrove Borough	5,383	5,654	5.03	5,510	5,517	0.00127
Shamokin Dam Borough	1,502	1,686	12.25	1,335	1,347	0.008989
Spring Township	1,563	1,616	3.39	1,663	1,670	0.004209
Union Township	1,519	1,520	0.07	1,725	1,730	0.002899
Washington Township	1,532	1,654	7.96	1,829	1,834	0.002734
West Beaver Township	1,124	1,110	-1.25	1,283	1,289	0.004677
West Perry Township	1,038	1,071	3.18	1,218	1,220	0.001642
SNYDER COUNTY	38,406	39,702	3.37	41,098	41,202	0.002531

SOURCE: U.S. CENSUS BUREAU, 2000 CENSUS/2010 CENSUS

TABLE 2.3-3: RACE AND ETHNICITY IN SNYDER COUNTY

RACE AND ETHNICITY	2010
One race	39,375 (99.2%)
White	38,476 (96.9%)
Black or African American	428 (1.1%)
American Indian and Alaska Native	68 (.17%)
Asian or Pacific Islander	204 (.51%)
Some other race	187 (.47%)
Two or more races	348 (.87%)
Foreign born	571 (1.4%)
Speak a language other than English	2,978 (7.5%)
Hispanic or Latino	657 (1.7%)

SOURCE: U.S. CENSUS BUREAU, 2010

Approximately 7.5 percent of Snyder County's population speaks a language other than English. Hazard mitigation strategies will need to address language barriers to ensure that all residents can receive emergency instructions.

TABLE 2.3-4: HOUSING CHARACTERISTICS IN SNYDER COUNTY

HOUSING CHARACTERISTICS	2018 ESTIMATES
Total housing units	16,506
Owner-occupied housing units	12,000
Renter-occupied housing units	4,258
Vacant housing units	248
Median value (dollars)	154,800

SOURCE: U.S. CENSUS BUREAU, 2018

Snyder County has over 16,000 residential housing units. These properties may be vulnerable to various natural hazards, particularly flooding and windstorms. Damage to residential properties is not only expensive to repair or rebuild, but also devastating to the displaced family.

Approximately 8 percent of the County's residential properties are vacant. Vacant buildings are particularly vulnerable to arson and criminal activity. Since vacant properties have not been maintained, many are structurally deficient and at risk of collapsing. Vacant properties may, however, serve a role in transitioning disaster survivors from shelters to temporary housing units.

About 25.8 percent of the County's population rents. Renters are more transient than homeowners; therefore, communicating with renters may be more difficult than communicating with homeowners. Similarly, tourists are a harder population to communicate with during an emergency incident. Communication strategies should be developed to ensure that these populations can be given proper notification.

TABLE 2.3-5: ECONOMIC CHARACTERISTICS IN SNYDER COUNTY

ECONOMIC CHARACTERISTICS	2017 ESTIMATES
Median household income	$54,182
Median family income	$62,263
Per capita income	$24,961

SOURCE: U.S. CENSUS BUREAU, 2017

The median household income in the County is $49,917, which is lower than the Commonwealth of Pennsylvania's median household income of $53,599. The County's per capita income of $23,836 is also lower than the Commonwealth's per capita income of $29,291.

2.4 LAND USE AND DEVELOPMENT

Snyder County is a predominantly rural, agricultural community that is increasingly influenced by its transportation systems. These transportation systems provide the County with a high level of accessibility to major urban centers, such as Harrisburg, Williamsport, and points beyond. As a result, the County's eastern tier municipalities have experienced a tremendous amount of growth and development stemming outward from U.S. Routes 11/15 and 522. These growth pressures are impacting the outlying rural municipalities through conventional development practices, which pose a series of impacts to local communities.

Snyder County is located in the Valley and Ridge physiographic province and predominantly occupies the valley area between Jacks and Shade Mountains. The County's topographic features have greatly influenced past and current land uses. For example, forested hillsides and fertile valleys provided adequate opportunities for profitable lumbering and agricultural activities. Today, Snyder County's land area is still primarily used for these activities. Despite the decreasing number of farms, land in agricultural uses has continued to play a predominant role in Snyder County, occupying approximately 50 percent of the total land area. Most woodland is situated on steep mountain slopes and is part of the large state forest holdings.

The Rural Areas land use category comprises the majority of Snyder County's land area and primarily consists of traditional family farm operations, open spaces, forest lands, low-density residential uses, commercial agricultural operations, natural resource production operations, and small-scale industrial uses.

TABLE 2.4-1: EXISTING LAND USE, 2017

LAND USE CATEGORY	ACRES	% OF TOTAL
Agriculture	105,783.3	49.87%
Forest	101,435.2	47.82%
Residential	2,052.0	.97%
Water Features	1,205.1	.57%
Commercial	733.0	.35%
Public/Semi-public Areas	547.0	.26%
Industrial	191.6	.26%
Transportation, Communication, and Utilities	119.3	.06%
Open Space	46.9	0.02%
Total	212,113.5	100.00%

SOURCE: U.S. EPA, 1986 MRLC SATELLITE IMAGERY

2.5 DATA SOURCES

Information for the Community Profile was developed by using information from the following sources:

1. THE CENTER FOR RURAL PENNSYLVANIA. "COUNTY PROFILE." HTTP://WWW.RURALPA2.ORG/COUNTY_PROFILES.CFM.
2. CENTER FOR WORKFORCE INFORMATION AND ANALYSIS. PENNSYLVANIA DEPARTMENT OF LABOR. JUNE 2018. HTTP://WWW.PAWORKSTATS.STATE.PA.US/ADMIN/GSIPUB/HTMLAREA/UPLOADS/SNYDER_CP.PDF.
3. COUNTY PROFILE. CENTER FOR RURAL PENNSYLVANIA. 2010. HTTP://WWW.RURALPA2.ORG/COUNTY_PROFILES.CFM.
4. PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION. ACT 220 POPULATION PROJECTIONS, SEDA-COG REGIONAL WATER PLAN. 2006.
5. SNYDER COUNTY STRATEGIC COMPREHENSIVE PLAN. MAY 21, 2001. HTTP://WWW.SNYDERCOUNTY.ORG/DEPTS/PLANNING/PAGES/PLANNINGCOMMISSION.ASPX.
6. U.S. CENSUS BUREAU. 2010 CENSUS.
7. U.S. CENSUS BUREAU. 2005-2009 AMERICAN COMMUNITY SURVEY, SNYDER COUNTY.

Data sources used to develop the HMP in general are listed in Section 1.4. Data sources used to perform GIS analysis for the risk assessment are listed in Section 4.1. These sources are key in understanding the current demographic makeup of the community as well as in framing the foundation of the Plan. The sources provided the underlying context of the Plan and allowed the Planning Team to understand critical vulnerabilities in the County. Throughout the course of the planning process, the Planning Team continually sought additional data sources to augment the information included in the Plan. The Planning Team made multiple requests for existing jurisdictional documents (e.g., jurisdictional hazard mitigation plans and other relevant information). Despite multiple requests for municipal documents, the response was somewhat limited.

3. PLANNING PROCESS

A successful planning process builds partnerships and brings together members representing government agencies, the public, and other stakeholders to reach consensus on how the community will prepare for and respond to the hazards that are most likely to occur. Applying a comprehensive and transparent process adds validity to the Plan. Those involved gain a better understanding of the problem or issue and how solutions and actions were devised. The result is a revised set of common community values and widespread support for directing financial, technical, and human resources to an agreed-upon action. The planning process was an integral part of updating the Snyder County HMP. This section describes the planning process used to create the updated HMP, gaining participation from 17 of the County's 21 municipalities.

3.1 PROCESS AND PARTICIPATION SUMMARY

To update the Snyder County HMP, Snyder County Emergency Management and Snyder County Department of Planning facilitated the updating of the HMP.

In accordance with the DMA 2000 requirements, this Plan documents the following topics:

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

The standard planning process used in Pennsylvania to create and update HMPs is described in the Standard Operating Guide listed in Section 1.4.4 and was followed during the update of the Snyder County HMP. The review and analysis of each of the sections on hazard identification, risk assessment, and mitigation strategy are described in Sections 4 and 6.

Public participation and planning meetings served as the main forums for gathering information to create the HMP. The Planning Team was afforded access to the information in relevant and approved plans, policies, and procedures for Snyder County. Opportunities for public participation included attending public meetings, completing written surveys, and reviewing and commenting on the existing plan and other documents. Meetings, surveys, and teleconferences were used to gather input from County, municipal, and other stakeholders to develop all sections of the Plan. Through this process, the County was able to establish a comprehensive approach to reducing the effects of hazards on the County and its municipalities.

3.2 THE PLANNING TEAM

The County's Planning Team consists of the following members:

- Derick Shambach, Snyder County Office of Emergency Management
- Lincoln Kaufman, Snyder County Department of Planning
- Patricia Treaster, Administrative Assistant
- Sue Reese, Snyder County GIS Department
- Wendy Cook, Snyder County Assessment

Mr. Shambach served as the County's primary point of contact for the mitigation planning process.

The Planning Team acknowledged that identifying hazards that specifically affect Snyder County and assessing their likelihood of occurrence and the potential damage to the people, property, and environment of the County were among the most important steps in developing a comprehensive HMP. The Planning Team chose to focus on an all-hazards approach as opposed to narrowing the focus to human-caused or natural disasters only.

3.3 MEETINGS AND DOCUMENTATION

The Planning Team held the following meetings during the development process of the County HMP:

TABLE 3.3-1: PUBLIC AND PLANNING MEETINGS

DATE	DESCRIPTION OF MEETING
June 16, 2017	Kick-off meeting between County Emergency Management Agency (EMA), and Planning Commission
July 24, 2017	Meeting with Planning team and PEMA
September 8, 2017	Kick-off meeting with Planning Team members, municipalities, school districts, and other stakeholders
October 25, 2017	Meet with PEMA and FEMA
December 14, 2017	Public meeting to review risk assessment and to set mitigation goals, objectives, and actions
March 12, 2019	Public meeting to review the HMP draft and for the Planning Team to approve its submission to PEMA and FEMA for formal review
Various Dates	Teleconference with municipal representatives to review the HMP draft and provide additional input

Each meeting was followed by discussion, decisions, and unmet needs identified during the meetings. These minutes were shared among the Planning Team members and attendees of the meeting. Documentation from all meetings can be found in Appendix B. County residents were informed of public meetings through advertisement in the newspaper.

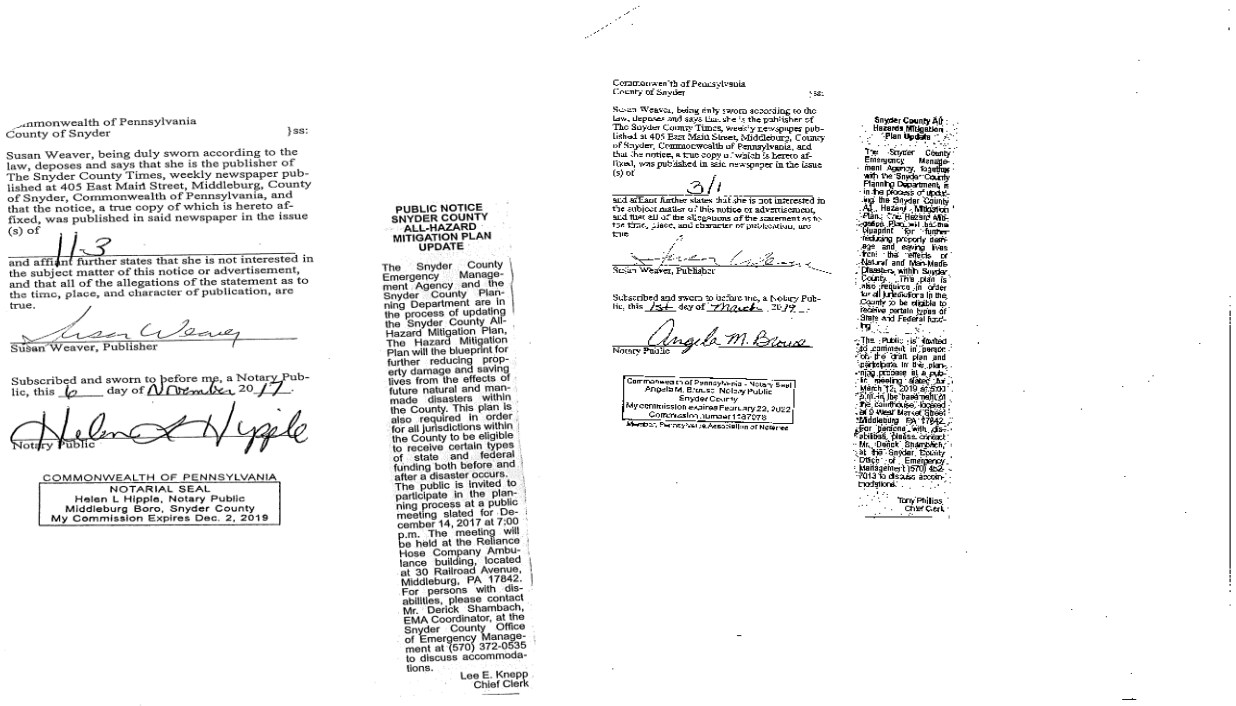
3.4 PUBLIC AND STAKEHOLDER PARTICIPATION

To maximize the effectiveness of the HMP, the Planning Team sought continual public and stakeholder engagement. Public input was encouraged and collected through a variety of methods. An Evaluation of Identified Hazardous and Risk Survey and a Capabilities Assessment Survey, as well as a National Flood Insurance Program Survey, were sent to each municipality in Snyder County. Of all the municipalities in the County, 17 municipalities returned a survey so that their input could be reviewed and incorporated into the County HMP.

Local, state, and federal agencies, neighboring jurisdictions, local businesses, community leaders, educators, and other relevant private and nonprofit groups that had a vested interest in the development of the HMP were given the opportunity to participate in the planning process by attending a planning or public meeting, or by offering comments on the website that posted the existing HMP. The County soil conservation district was briefed monthly on the status of the update of the plan and given the opportunity to suggest any edits. Invitations or phone calls to participate in meetings were sent to all municipalities, adjacent counties, universities, and other stakeholders identified by the County. Appendix B includes copies of invitation letters and lists of individuals to whom they were sent. Phone call invites were completed with the Selinsgrove School district, Midd-West School district, Union, Northumberland, Juniata, and Mifflin Counties and Penn DOT to participate in a planning meeting. Surveys were sent to all municipalities, and invitations to the final teleconference were sent to those municipalities that had not been represented at a meeting. Seventeen municipalities' representatives attended at least one of these meetings.

Through public notices published in the local newspaper, the above-mentioned groups and the general public were invited to review the Plan on the project website (http://www.snydercounty911.org/) and send comments to the Snyder County Office of Emergency Management or to the Snyder County Planning Department. In addition, public meetings were held during the planning process as listed in Section 3.3. Each of these meetings was preceded by a public notice inviting the general public to review and comment on the Plan, as well as to attend the meeting itself. Copies of the actual public notices are found in Appendix B, immediately following the copy of materials used at the respective meetings. Copies of the public notices for the December 14, 2017 and March 12, 2019 public meetings, as well as for the opening of the public comment period, are shown below, and were published on 11/6/2017 and 3/1/2019, respectively.

FIGURE 3.4-1: PUBLIC NOTICES



Commonwealth of Pennsylvania
County of Snyder }ss:

Susan Weaver, being duly sworn according to the law, deposes and says that she is the publisher of The Snyder County Times, weekly newspaper published at 405 East Main Street, Middleburg, County of Snyder, Commonwealth of Pennsylvania, and that the notice, a true copy of which is hereto affixed, was published in said newspaper in the issue (s) of

11-3

and affiant further states that she is not interested in the subject matter of this notice or advertisement, and that all of the allegations of the statement as to the time, place, and character of publication, are true.

Susan Weaver, Publisher

Subscribed and sworn to before me, a Notary Public, this 6 day of November 2017.

Notary Public

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Helen L Hipple, Notary Public
Middleburg Boro, Snyder County
My Commission Expires Dec. 2, 2019

PUBLIC NOTICE
SNYDER COUNTY
ALL-HAZARD
MITIGATION PLAN
UPDATE

The Snyder County Emergency Management Agency and the Snyder County Planning Department are in the process of updating the Snyder County All-Hazard Mitigation Plan. The Hazard Mitigation Plan will the blueprint for further reducing property damage and saving lives from the effects of future natural and man-made disasters within the County. This plan is also required in order for all jurisdictions within the County to be eligible to receive certain types of state and federal funding both before and after a disaster occurs. The public is invited to participate in the planning process at a public meeting slated for December 14, 2017 at 7:00 p.m. The meeting will be held at the Reliance Hose Company Ambulance building, located at 30 Railroad Avenue, Middleburg, PA 17842. For persons with disabilities, please contact Mr. Derick Shambach, EMA Coordinator, at the Snyder County Office of Emergency Management at (570) 372-0535 to discuss accommodations.

Lee E. Knepp
Chief Clerk

Commonwealth of Pennsylvania
County of Snyder }ss:

Susan Weaver, being duly sworn according to the law, deposes and says that she is the publisher of The Snyder County Times, weekly newspaper published at 405 East Main Street, Middleburg, County of Snyder, Commonwealth of Pennsylvania, and that the notice, a true copy of which is hereto affixed, was published in said newspaper in the issue (s) of

3/1

and affiant further states that she is not interested in the subject matter of this notice or advertisement, and that all of the allegations of the statement as to the time, place, and character of publication, are true

Susan Weaver, Publisher

Subscribed and sworn to before me, a Notary Public, this 1st day of March 2019

Notary Public

Commonwealth of Pennsylvania - Notary Seal
Angela M. Blouse, Notary Public
Snyder County
My commission expires February 22, 2022
Commission number 1327078
Member, Pennsylvania Association of Notaries

Snyder County All-Hazards Mitigation Plan Update

The Snyder County Emergency Management Agency, together with the Snyder County Planning Department, is in the process of updating the Snyder County All - Hazard Mitigation Plan. The Hazard Mitigation Plan will the blueprint for further reducing property damage and saving lives from the effects of Natural and Man-Made Disasters, within Snyder County. This plan is also required in order for all jurisdictions in the County to be eligible to receive certain types of State and Federal funding.

The Public is invited to comment in person on the draft plan and participate in the planning process at a public meeting slated for March 12, 2019 at 6:00 p.m. in the basement of the Courthouse, located at 9 West Main Street, Middleburg PA 17842. For questions, with disabilities, please contact Mr. Derick Shambach, at the Snyder County Office of Emergency Management (570) 422-7013 to discuss accommodations.

Tony Phillips
Chief Clerk

Section 3.5 includes a table showing overall municipal participation in the planning process.

As illustrated, the Planning Team felt that jurisdictional and stakeholder participation was critical to the process. The Planning Team met regularly to review the status of the Plan, the Plan itself, and strategies to involve the public. The Planning Team felt it was critical to allow adequate time for stakeholders to review each section individually. The Planning Team also contacted various municipalities to elicit feedback on the sections of the Plan.

3.5 MULTI-JURISDICTIONAL PLANNING

Snyder County took a multi-jurisdictional approach to preparing its HMP, in that the HMP will apply to the County and to all participating municipalities. The County was able to provide resources (funding, data, GIS, etc.) to which the municipalities may not have had access. However, the County was dependent on the municipal buy-in, since the municipalities have the legal authority to enforce compliance of land use planning and development issues. The County undertook an intensive effort to

involve all 21 municipalities in the HMP process. Each municipality was given the opportunity to participate in this process. Municipal officials and representatives were invited to attend public and other meetings, asked for comment on the HMP drafts that were posted to the eLibrary, and asked to create and prioritize mitigation actions. Since several municipalities were not able to attend a meeting as part of the planning process, County representatives contacted them via telephone to provide another opportunity for participation.

Participation culminates in formal adoption of the HMP; copies of municipal adoption resolutions are found in Appendix A. The tables on the following pages reflect the municipalities that met the planning participation requirements that applied to this HMP development.

The Planning Team also made numerous attempts to involve municipalities and stakeholders in the process by actively contacting the municipalities. The Planning Team distributed 18 e-mail letters, and contacted via telephone those municipalities that had either completed a survey or attended a meeting. The mailings explained the purpose of the planning process, encouraged municipalities to participate, and contained copies of the various surveys that municipalities were encouraged to complete. The Planning Team also distributed a special survey that measured participation in the National Flood Insurance Program (NFIP) and tracked flood management activities. Additionally, the Planning Team publicly advertised both the risk assessment review meeting and the public draft review meeting through various local media outlets. Active efforts were made to involve as many municipalities and stakeholders as possible throughout the process.

Tables 3.5-1 and 3.5-2 illustrate municipalities' participation in the three different meetings and the number of responses to the surveys.

3.5-1: Worksheets/Surveys Completed

MUNICIPALITY	EVALUATION OF IDENTIFIED HAZARD/RISK	CAPABILITIES ASSESSMENT	MITIGATION GOALS/ OBJECTIVES/ACTIONS EVALUATION	RISK ASSESSMENT EVALUATION	DRAFT REVIEW COMMENTS FORM
Adams Township	X		X	X	X
Beaver Township	X		X	X	X
Beavertown Borough	X		X	X	X
Center Township	X		X	X	
Chapman Township	X		X	X	
Franklin Township	X		X	X	X
Freeburg Borough	X		X	X	
Jackson Township	X		X	X	X
McClure Borough	X		X	X	X
Middleburg Borough	X		X	X	
Middlecreek Township	X		X	X	
Monroe Township	X		X	X	
Penn Township	X	X	X	X	X
Perry Township	X		X	X	X
Selinsgrove Borough	X	X	X	X	X
Shamokin Dam Borough	X		X	X	X
Spring Township	X		X	X	X
Union Township	X		X	X	
Washington Township	X	X	X	X	
West Beaver Township	X		X	X	X
West Perry Township	X		X	X	

TABLE 3.5-2: MUNICIPALITY RESPONSE

MUNICIPALITY	MEETINGS			TELEPHONE MEETING	ADOPTED PLAN
	STAKEHOLDER KICK-OFF MEETING	RISK ASSESSMENT / MITIGATION STRATEGY MEETING	DRAFT REVIEW PUBLIC MEETING		
Adams Township					
Beaver Township					
Beavertown Borough	X	X			
Center Township	X	X	X		
Chapman Township	X	X			
Franklin Township	X	X			
Freeburg Borough	X				
Jackson Township				X	
McClure Borough	X	X			
Middleburg Borough	X	X			
Middlecreek Township	X	X			
Monroe Township	X	X	X		
Penn Township	X	X			
Perry Township				X	
Selinsgrove Borough	X	X	X		
Shamokin Dam Borough				X	
Spring Township	X				
Union Township					
Washington Township					
West Beaver Township				X	
West Perry Township	X	X			

4. RISK ASSESSMENT

4.1 PROCESS SUMMARY

This risk assessment provides a factual basis for activities proposed by Snyder County in its mitigation strategy. Hazards that may affect the County are identified and defined in terms of location and geographic extent, magnitude of impact, previous events, and likelihood of future occurrence.

The Planning Team identified natural and human-made hazards that have the potential to impact Snyder County. The occurrence of a past hazard incident in the County provided an indication of future possible incidence, but the fact that a hazard incident has not previously occurred did not exclude the hazard from further investigation. Similarly, limited past occurrences of hazard incidents did not by themselves warrant a hazard's inclusion in the Plan.

All 34 hazards listed in PEMA's Standard List of Hazards from the Commonwealth of Pennsylvania's All-Hazard Mitigation Planning Standard Operating Guide (SOG) that might affect Snyder County were listed on the Evaluation of Identified Hazards and Risk form that was provided to stakeholders. The purpose of the form is to collect information from municipal officials and other stakeholders on what hazards affect their community and the frequency of incidents. Based on the results of this exercise, feedback from the Planning Team, information from the 2010 Pennsylvania State HMP update, and past disaster declarations, the hazards most prevalent to Snyder County that were selected for inclusion in the 2019 County HMP update include Drought; Earthquake; Flood, Flash Flood, Ice Jam; Landslide; Tornado/Windstorm; Wildfire; Winter Storms; Dam Failure; Environmental Hazards; Levee Failure; Transportation Accidents; Utility Interruption; and Subsidence. Table 4.1-1 illustrates the hazards profiled in the 2013 HMP and the 2019 HMP update.

The Planning Team removed certain hazards from the 2006 HMP for a number of reasons. Civil disorder and terrorism were removed from the list of hazards due to lack of occurrence and probability within Snyder County. Urban and rural fire was changed to wildfires because the Planning Team considered urban fires to be an everyday emergency and not a disaster. Although urban fires can cause a lot of damage, very rarely would they be considered a disaster and cause widespread damage. There are no nuclear facilities in range of the County to cause any ill effects, which led to its removal from the list. Severe weather and geological hazards were clarified and changed to specific hazards that threatened the County. Transportation accidents were added to the 2013 hazard list due to the increase in traffic volume in Snyder County. Municipality participants felt that transportation accidents have the ability to disrupt the County's normal functions and its effective critical services for extended periods of time.

TABLE 4.1-1: HAZARDS ADDRESSED IN 2014 AND 2019

2014 HAZARD MITIGATION PLAN	2019 HAZARD MITIGATION PLAN UPDATE
• Drought • Earthquake • Flood/Flash Flood/Ice Jam • Landslide • Tornado/Windstorm • Wildfire • Winter Storms • Dam Failure • Environmental Hazards • Transportation Accidents • Utility Interruption • Subsidence	• Drought • Earthquake • Flood/Flash Flood/Ice Jam • Landslide • Tornado/Windstorm • Wildfire • Winter Storms • Dam Failure • Environmental Hazards • Transportation Accidents • Utility Interruption • Subsidence

4.2 PRESIDENTIAL DISASTER AND EMERGENCY DECLARATIONS

Presidential Disaster and Emergency Declarations are issued when it has been determined that state and local governments need assistance in responding to a disaster event. Table 4.2-1 identifies 15 Presidential Disaster and Emergency Declarations issued between 1972 and October 2012 that have affected Snyder County. Additional declarations after October 2012 can be found on the FEMA website at http://www.fema.gov/news/disasters_state.fema?id=42.

TABLE 4.2-1: PRESIDENTIAL DISASTER AND EMERGENCY DECLARATIONS AFFECTING SNYDER COUNTY

DECLARATION NUMBER	DATE	EVENT
3356	October 2012	Hurricane Sandy
4030	September 2011	Remnants of Tropical Storm Lee
3180	February 2007	Severe Winter Storm
1649	June 2006	Severe Storms, Flooding, and Mudslides
3235	September 2005	Hurricane Katrina
1557	September 2004	Tropical Depression Ivan
1298	September 1999	Tropical Depression Dennis, Flash Flooding
1093	January 1996	Flooding
1085	January 1996	Blizzard
1015	March 1994	Winter Storm, Severe Storm
3105	March 1993	Blizzard
737	May 1985	Tornado
523	October 1976	Severe Storms, Flooding
485	September 1975	Severe Storms, Heavy Rains, Flooding
340	June 1972	Flood, Tropical Storm Agnes

SOURCE: FEMA, 2018

In addition to these federally declared events, 31 events warranted Gubernatorial Proclamations of Emergency.

TABLE 4.2-2: SNYDER COUNTY GUBERNATORIAL PROCLAMATIONS OF EMERGENCY

DATE	EVENT
March 2017	Severe Winter Weather
October 2012	Hurricane Sandy
August 2011	Hurricane Irene
January 2011	Winter Storm
February 2010	Winter Storms
April 2007	Proclamation of Emergency - Severe Winter Storm
February 2007	Proclamation of Emergency - Severe Winter Storm
September 2006	Proclamation of Emergency - Tropical Depression Ernesto
June 2006	Proclamation of Emergency - Flooding
September 2005	Proclamation of Emergency - Hurricane Katrina
September 2004	Tropical Depression Ivan
September 2003	Hurricane Isabel/Henri
February 2003	Severe Winter Storm
September 1999	Hurricane Floyd
September 1999	Flash Flooding (Tropical Depression Dennis)
July 1999	Drought
December 1998	Drought
January 1996	Severe Winter Storms
January 1996	Flooding
September 1995	Drought
January 1994	Severe Winter Storms
March 1993	Blizzard
July 1991	Drought
February 1978	Blizzard
January 1978	Heavy Snow
October 1976	Flood
September 1975	Flood (Hurricane Eloise)
April 1975	High Winds

February 1974	Truckers' Strike
June 1972	Flood (Tropical Storm Agnes)
January 1966	Heavy Snow

SOURCE: PEMA, 2012

4.3 SUMMARY OF HAZARDS

The Planning Team was provided the Pennsylvania Standard List of Hazards to be considered for evaluation in the 2019 HMP. The Planning Team decided that the 2019 Plan should identify, profile, and analyze 13 hazards. Table 4.3-1 contains a complete list of the 13 hazards that have the potential to impact Snyder County, as identified through input from those who participated in the 2019 HMP planning process and from information available in the 2013 Snyder County Hazard Mitigation Plan. Hazard profiles are included in Section 4.4 for each of these hazards.

TABLE 4.3-1: HAZARDS IDENTIFIED IN THE 2013 SNYDER COUNTY HAZARD MITIGATION PLAN AND THEIR RESPECTIVE DEFINITIONS

HAZARD NAME	HAZARD DESCRIPTION
NATURAL HAZARDS	
Drought	Drought is a natural climatic condition which occurs in virtually all climates, the consequence of a natural reduction in the amount of precipitation experienced over a long period of time, usually a season or more in length. High temperatures, prolonged winds, and low relative humidity can exacerbate the severity of drought. This hazard is of particular concern in Pennsylvania due to the presence of farms as well as water-dependent industries and recreation areas across the Commonwealth. A prolonged drought could severely impact these sectors of the local economy, as well as residents who depend on wells for drinking water and other personal uses. (National Drought Mitigation Center, 2006)
Earthquake	An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking which is dependent upon amplitude and duration of the earthquake. (FEMA, 1997)

HAZARD NAME	HAZARD DESCRIPTION
Flood, Flash Flood, Ice Jam	Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period of time. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiographic, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas. (NOAA, 2009) Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. All forms of flooding can damage infrastructure. (USACE, 2007)
Landslide	A landslide is the downward and outward movement of slope-forming soil, rock and vegetation reacting to the force of gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes and changes in groundwater levels. Mudflows, mudslides, rockfalls, rockslides and rock topples are all forms of a landslide. Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, developed hillsides and areas recently burned by forest and brush fires. (Delano, 2001)
Subsidence	Subsidence is a natural geologic process that commonly occurs in areas with underlying limestone bedrock and other rock types that are soluble in water. Water passing through naturally occurring fractures dissolves these materials leaving underground voids. Eventually, overburden on top of the voids causes a collapse which can damage structures with low strain tolerances. This collapse can take place slowly over time or quickly in a single event, but in either case. Karst topography describes a landscape that contains characteristic structures such as sinkholes, linear depressions, and caves. In addition to natural processes, human activity such as water, natural gas, and oil extraction can cause subsidence and sinkhole formations. (FEMA, 1997)

HAZARD NAME	HAZARD DESCRIPTION
Tornado, Windstorm	A windstorm can occur during severe thunderstorms, winter storms, coastal storms, or tornadoes. Straight-line winds such as a downburst have the potential to cause wind gusts that exceed 100 miles per hour. Based on 40 years of tornado history and over 100 years of hurricane history, FEMA identifies western and central Pennsylvania as being more susceptible to higher winds than eastern Pennsylvania. (FEMA, 1997) A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes or tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and wind-blown debris. According to the National Weather Service (NWS), tornado wind speeds can range between 30 to more than 300 miles per hour. They are more likely to occur during the spring and early summer months of March through June and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small, short-lived tornadoes can inflict tremendous damage. Destruction ranges from minor to catastrophic depending on the intensity, size, and duration of the storm. Structures made of light materials such as mobile homes are most susceptible to damage. Waterspouts are weak tornadoes that form over warm water and are relatively uncommon in Pennsylvania. Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries. (NOAA, 2002) Based on NOAA Storm Prediction Center Statistics, the number of recorded F3, F4, and F5 tornadoes between 1950-1998 ranges from <1 to 15 per 3,700 square mile area across Pennsylvania. (FEMA, 2009) A water spout is a tornado over a body of water. (American Meteorological Society, 2009)
Wildfire	A wildfire is a raging, uncontrolled fire that spreads rapidly through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that can be seen for miles. Wildfires can occur at any time of the year, but mostly occur during long, dry hot spells. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in fields, grass, brush, and forests. 98% of wildfires in Pennsylvania are a direct result of people, often caused by debris burns. (PA DCNR, 1999)

HAZARD NAME	HAZARD DESCRIPTION
Winter Storm	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. A winter storm can range from a moderate snowfall or ice event over a period of a few hours to blizzard conditions with wind-driven snow that lasts for several days. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow, which can severely impair visibility and disrupt transportation. The Commonwealth of Pennsylvania has a long history of severe winter weather. (NOAA, 2009)
HUMAN-MADE HAZARDS	
Dam Failure	A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Dams provide benefits such as flood protection, power generation, drinking water, irrigation, and recreation. Failure of these structures results in an uncontrolled release of impounded water. Failures are relatively rare, but immense damage and loss of life is possible in downstream communities when such events occur. Aging infrastructure, hydrologic, hydraulic and geologic characteristics, population growth, and design and maintenance practices should be considered when assessing dam failure hazards. The failure of the South Fork Dam, located in Johnstown, PA, was the deadliest dam failure ever experienced in the United States. It took place in 1889 and resulted in the Johnstown Flood which claimed 2,209 lives. (FEMA, 1997) Today there are approximately 3,200 dams and reservoirs throughout Pennsylvania. (PA DEP, 2009)
Environmental Hazards	Environmental hazards are hazards that pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. Environmental hazards include the following: Hazardous Material Releases – at fixed facilities or as such materials are in transit and including toxic chemicals, infectious substances, biohazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive (PL 1990-165, § 207(e)). Air or Water Pollution – the release of harmful chemical and waste materials into water bodies or the atmosphere, for example. (National Institute of Health Sciences, July 2009; EPA, Natural Disaster PSAs, 2009)

HAZARD NAME	HAZARD DESCRIPTION
Transportation Accidents	Transportation accidents can result from any form of air, rail, water, or road travel. It is unlikely that small accidents would significantly impact the larger community. However, certain accidents could have secondary regional impacts such as a hazardous materials release or disruption in critical supply/access routes, especially if vital transportation corridors or junctions are present. (US DOT, 2009) Traffic congestion in certain circumstances can also be hazardous. Traffic congestion is a condition that occurs when traffic demand approaches or exceeds the available capacity of the road network. This hazard should be carefully evaluated during emergency planning since it is a key factor in timely disaster or hazard response, especially in areas with high population density. (Federal Highway Administration, 2009)
Utility Interruption	Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works, and information network sectors. Utility interruption hazards include the following: Geomagnetic Storms: including temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation, and satellite systems (National Research Council et al., 1986) Fuel or Resource Shortage: resulting from supply chain breaks or secondary to other hazard events (2005 All-Hazard Mitigation Plan, Mercer County, PA) Electromagnetic Pulse: originating from an explosion or fluctuating magnetic field and causing damaging current surges in electrical and electronic systems (Institute for Telecommunications Sciences, 1996) Information Technology Failure: due to software bugs, viruses, or improper use (Rainer Jr. et al., 1991) Ancillary Support Equipment: electrical generating, transmission, system-control, and distribution-system equipment for the energy industry (Hirst and Kirby, 1996) Public Works Failure: damage to or failure of highways, flood control systems, deepwater ports and harbors, public buildings, bridges, dams, for example (U.S. Senate Committee on Environment and Public Works, 2009) Telecommunications System Failure: damage to data transfer, communications, and processing equipment, for example (FEMA, 1997) Transmission Facility or Linear Utility Accident: liquefied natural gas leakages, explosions, facility problems, for example (U.S. Department of Energy, 2005) Major Energy, Power, Utility Failure: interruptions of generation and distribution, power outages, for example (U.S. Department of Energy, 2000)

4.4 HAZARD PROFILES AND VULNERABILITY ANALYSIS

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

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

- **Location and Extent**: The location and extent of the County's vulnerability to a certain hazard can vary throughout the County. The maximum threat or worst-case disaster should be considered for each hazard. However, secondary effects of many hazards can be just as devastating. These secondary effects cause many hazards to become regional hazards affecting many areas with differing impacts.
- **Range of Magnitude**: Each individual hazard poses certain threats to the County and its municipalities. It is important to identify what hazards pose the greatest threat and focus mitigation actions toward those hazards.
- **Past Occurrences:** A record of past events is particularly helpful to evaluate hazards. Past records of the County's hazards also offer valuable information when tempered with the knowledge of preventative efforts, changes in preventative efforts, and advancements in technology that may reduce the frequency or severity of such an event.
- **Future Occurrences:** The probability of an occurrence in the future is another important factor to consider when preparing for an all-hazards response. An event that occurs annually with relatively minor impact may deserve more emphasis than a major event that occurs once every 50 to 100 years.
- **Vulnerability Assessment:** The susceptibility of a community to destruction, injury, or death resulting from a hazard event defines the degree of vulnerability. The degree of vulnerability may be related to geographic location, as with floodplains, the type of facilities or structure, or the socioeconomics of a given area. Additionally, certain population groups may be more vulnerable to some hazards because of immobility or their inability to take protective action. The vulnerability assessment section of each hazard profile lists the critical infrastructure within the respective hazard areas. Maps showing the locations of this infrastructure in the 1 percent chance floodplain are shown in Appendix D.

4.5 NATURAL HAZARDS

4.5.1 DROUGHT

Drought is a normal part of virtually all climates. It is the consequence of a natural reduction in the amount of precipitation experienced over a long period of time, usually a season or more in length. Droughts are sometimes characterized by a water shortage, a dry spell, and/or general dryness in a location. High temperatures, prolonged winds, and low relative humidity can exacerbate the severity of drought.

LOCATION AND EXTENT

Droughts are defined as the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. Droughts are regional climatic events, so they typically impact all communities in a relatively uniform fashion with only minor localized variations in rainfall events. Droughts often occur across county boundaries, affecting large areas of Pennsylvania at the same time. The spatial extent for areas of impact can range from localized areas in Pennsylvania to the entire Mid-Atlantic region. Areas with extensive agriculture uses are particularly vulnerable to drought; roughly 100,179 acres (156 square miles) of Snyder County – 47 percent of the total land acreage – is held in farms (USDA, 2007). This agricultural land is spread throughout Snyder County.

RANGE OF MAGNITUDE

Hydrologic drought events result in a reduction of stream flows, reduction of lake/reservoir storage, and a lowering of groundwater levels. These events have adverse impacts on public water supplies for human consumption, rural water supplies for livestock consumption and agricultural operations, water quality, natural soil water or irrigation water for agriculture, soil moisture, conditions conducive to wildfire events, and water for navigation and recreation.

The Commonwealth uses five parameters to assess drought conditions:

1. STREAM FLOWS (COMPARED TO BENCHMARK RECORDS)
2. PRECIPITATION (MEASURED AS THE DEPARTURE FROM NORMAL, 30-YEAR AVERAGE PRECIPITATION)
3. RESERVOIR STORAGE LEVELS IN A VARIETY OF LOCATIONS (ESPECIALLY THREE NEW YORK CITY RESERVOIRS IN THE UPPER DELAWARE RIVER BASIN)
4. GROUNDWATER ELEVATIONS IN A NUMBER OF COUNTIES (COMPARING TO PAST MONTH, PAST YEAR, AND HISTORIC RECORD)
5. THE PALMER DROUGHT SEVERITY INDEX (PDSI) – A SOIL MOISTURE ALGORITHM CALIBRATED FOR RELATIVELY HOMOGENEOUS REGIONS THAT MEASURES DRYNESS BASED ON RECENT PRECIPITATION AND TEMPERATURE

TABLE 4.5.1-1: PDSI CLASSIFICATIONS

SEVERITY CATEGORY	PDSI VALUE
Extremely wet	4.0 or more
Very wet	3.0 to 3.99
Moderately wet	2.0 to 2.99
Slightly wet	1.0 to 1.99
Incipient wet spell	0.5 to 0.99
Near normal	0.49 to -0.49
Incipient dry spell	-0.5 to -0.99
Mild drought	-1.0 to -1.99
Moderate drought	-2.0 to -2.99
Severe drought	-3.0 to -3.99
Extreme drought	-4.0 or less

SOURCE: NDMC, 2006

The following phases of drought preparedness in Pennsylvania are listed in order of increasing severity:

- Drought Watch: A period to alert government agencies, public water suppliers, water users, and the public regarding the potential for future drought-related problems. The focus is on increased monitoring, awareness, and preparation for response if conditions worsen. A request for voluntary water conservation is made. The objective of voluntary water conservation measures during a drought watch is to reduce water uses by 5 percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may be asking for more stringent conservation actions.
- Drought Warning: This phase involves a coordinated response to imminent drought conditions and potential water supply shortages through concerted voluntary conservation measures to avoid or reduce shortages, relieve stressed sources, develop new sources, and if possible forestall the need to impose mandatory water use restrictions. The objective of voluntary water conservation measures during a drought warning is to reduce overall water uses by 10 to 15 percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may be asking for more stringent conservation actions.
- Drought Emergency: This stage is a phase of concerted management operations to marshal all available resources to respond to actual emergency conditions, to avoid depletion of water sources, to ensure at least minimum water supplies to protect public health and safety, to support essential and high-priority water uses, and to avoid unnecessary economic dislocations. It is possible during this phase to impose mandatory restrictions on non-essential water uses that are provided in the Pennsylvania Code (Chapter 119), if deemed necessary and if ordered by the governor of Pennsylvania. The objective of water use restrictions (mandatory or voluntary) and other conservation measures during this phase is to reduce consumptive water use in the affected area by 15 percent, and to reduce total use to the extent necessary to preserve public water system supplies, to avoid or mitigate local or area shortages, and to ensure equitable sharing of limited supplies.

- Local Water Rationing: Although not a drought phase, local municipalities may, with the approval of the Pennsylvania Emergency Management Council, implement local water rationing to share a rapidly dwindling or severely depleted water supply in designated water supply service areas. These individual water rationing plans, authorized through provisions of the Pennsylvania Code (Chapter 120), will require specific limits on individual water consumption to achieve significant reductions in use. Under both mandatory restrictions imposed by the Commonwealth and local water rationing, procedures are provided for granting of variances to consider individual hardships and economic dislocations.

The effects of a drought can be far-reaching in both the economic and environmental realms. Economic impacts include the reduced productivity of aquatic resources, mandatory water use restrictions, well failures, cutbacks in industrial production, agricultural losses, and limited recreational opportunities. Environmental impacts of drought include the following:

- Hydrologic effects – lower water levels in reservoirs, lakes, and ponds; reduced stream flow; loss of wetlands; estuarine impacts; groundwater depletion and land subsidence; effects on water quality such as increases in salt concentration and water temperature
- Damage to animal species – lack of feed and drinking water; disease; loss of biodiversity; migration or concentration; and reduction and degradation of fish and wildlife habitat
- Damage to plant communities – loss of biodiversity; loss of trees from urban landscapes and wooded conservation areas
- Increased number and severity of fires
- Reduced soil quality
- Air quality effects – dust and pollutants
- Loss of quality in landscape

Snyder County has experienced several significant droughts. Based on the County's disaster history and other drought occurrence data, the worst drought event in Snyder County occurred in the summer of 1999. Extended dry weather spurred Governor Ridge to declare a drought emergency in 55 counties, including Snyder County. Crop damages indicated losses of over $500 million statewide, and crop losses totaled 70 percent to 100 percent. (National Climatic Data Center [NCDC], 2012). Snyder County lost over of $16 million in crop damage (Spatial Hazard Events and Losses Database for the United States [SHEDLUS]).

In September 1995, a drought entered its thirteenth month throughout eastern Pennsylvania. A drought warning was issued by the Pennsylvania Department of Environmental Protection (PA DEP) on September 1. By the end of the month, most of the eastern portion of the Commonwealth was under a drought emergency. Preliminary crop losses totaled $300 million statewide. Specific dollar losses in Snyder County are not known.

Snyder County also experienced a significant drought in 1982. This event was widespread across the Commonwealth and caused over $196 million worth of losses. Droughts affected dairy farmers in the County who experienced significant losses as a result of the drought. The event required subsidies to be issued to farmers to offset losses.

PAST OCCURRENCES

Snyder County has experienced several droughts in the last 22 years. The PA DEP maintains the most comprehensive data on drought occurrences across the Commonwealth. The number of declared droughts from 1980 to 2012 is shown in Table 4.5.1-2. Table 4.5.1-3 shows past drought events in Snyder County. Descriptions of drought status categories (e.g., watch, warning, and emergency) are included in Section 4.3.1.1.B. Snyder's County's record of droughts prior to 1980 is limited.

TABLE 4.5.1-2: DECLARED DROUGHT STATUS IN SNYDER COUNTY 1980-2012 (PADPA, 2012)

TOTAL DROUGHT WATCHES	TOTAL DROUGHT WARNINGS	TOTAL DROUGHT EMERGENCIES
14	9	5

TABLE 4.5.1-3: DROUGHT EVENTS IN SNYDER COUNTY

DATE	DROUGHT STATUS
November 18, 1980- April 20, 1982	Emergency
April 26, 1985- October 29,1985	Watch
July 7, 1988- August 25-1988	Watch
August 24, 1988- December 12, 1988	Warning
March 3, 1989- May 15, 1989	Watch
June 28, 1991- July 24, 1991	Warning
July 24, 1991- April 20, 1992	Emergency
April 20, 1992- June 23, 1992	Warning
September 1, 1995- September 20, 1995	Warning
September 20, 1995- November 8, 1995	Emergency
November 8, 1995- December 18, 1995	Warning
July 17, 1997- October 27, 1997	Watch
November 13, 1997- January 16, 1998	Watch
December 3, 1998- December 16, 1998	Warning
December 16, 1998- March 15, 1999	Emergency
March 15, 1999- June 10, 1999	Watch
June 10, 1999- July 20, 1999	Warning
July 20,1999-September 30, 1999	Emergency
September 30, 1999- December 16, 1999	Watch
December 16, 1999- May 5, 2000	Watch
August 8, 2001- February 12, 2002	Watch

February 12, 2002- June 14, 2002	Warning
June 14, 2002- September 5, 2002	Watch
September 5, 2002-November 7, 2002	Warning
April 11, 2006-June, 30, 2006	Watch
August 6, 2007-September, 5 2007	Watch
October 5, 2007-January 11, 2008	Watch
September 16, 2010- November 10, 2010	Watch
March 24, 2015-July 10, 2015	Watch
August 2, 2016-December 16, 2016	Watch
December 16, 2016-February 14, 2017	Warning
February 14, 2017-May 16, 2017	Watch

FUTURE OCCURRENCES

It is difficult to forecast the exact severity of future drought events. The impact of shortages on municipal water suppliers is expected to remain minor to moderate, but the impact is expected to become more severe for those living in rural areas. Based on national data from 1895 to 1995, Snyder County, like the rest of the Middle Susquehanna Region, was in severe or extreme drought approximately 10 percent to 14.9 percent of the time. This is equivalent to a PDSI value of less than or equal to -2. Therefore, the future occurrence of a drought can be considered moderately possible as defined by the Risk Factor Methodology probability criteria (see Table 4.7.2-1).

VULNERABILITY ASSESSMENT

As indicated in Section 4.3, the sizeable agricultural economy and community in Snyder County is most vulnerable to droughts and other water supply deficiencies. Historical losses are usually crop damage and losses and reduced livestock productivity rather than injuries or deaths of individuals. The total value of all agricultural products is nearly $50 million annually (U.S. Department of Agriculture [USDA], 2007). Nearly 90 percent of this total is the production of livestock, poultry, and their products; the remaining 10 percent is made up of crop production.

Water supplies are also vulnerable to the effects of drought, particularly in locations where citizens rely on wells for their fresh drinking water. Future droughts will affect those systems relying on surface supplies while those relying on wells should be able to handle short-term droughts without any major problem. However, longer-term droughts that inhibit recharging of groundwater aquifers will extend the problems of well owners for an undetermined length of time. As a result, Snyder County residents who use private, domestic wells are more vulnerable to droughts. Table 4.5.1-4 shows the number of domestic wells in each municipality. It is important to note that the well data was obtained from the Pennsylvania Groundwater Information System (PaGWIS). PaGWIS relies on voluntary submissions of well record data by well drillers; as a result, it is not a complete database of all domestic wells in the County. This is the most complete dataset of domestic wells available.

TABLE 4.5.1-4: PAGWIS DATA FOR SNYDER COUNTY

MUNICIPALITY	NUMBER OF REPORTED WELLS	MUNICIPALITY	NUMBER OF REPORTED WELLS
Adams Township	111	Monroe Township	346
Beaver Township	69	Penn Township	394
Beavertown Borough	4	Perry Township	279
Center Township	312	Selinsgrove Borough	89
Chapman Township	140	Shamokin Dam Borough	96
Franklin Township	255	Spring Township	187
Freeburg Borough	3	Union Township	178
Jackson Township	155	Washington Township	252
McClure Borough	10	West Beaver Township	57
Middleburg Borough	17	West Perry Township	106
Middlecreek Township	230	Total:	3290

The most severe secondary effect resulting from a drought is the likelihood of forest fires due to the extreme shortage of moisture in the ground. Large forest fires could devastate Bald Eagle State Forest, Bald Eagle State Park, State Game Lands in Beaver Township and Perry Township, and recreational areas in heavily forested portions of the County. Forest fires can threaten agricultural and natural resource production facilities in western municipalities. Prolonged drought conditions may have a lasting impact on the economy, population settlement, and could cause major ecological changes such as increased scrub growth, increased flash flooding, and increased wind erosion of the soil.

Long-term water shortages during severe drought conditions could have a high impact on agribusiness, public utilities, and other industries reliant upon water for production services. This may require water rationing and distribution, which will place a strain on the availability of consumable water to the community and has the potential to cause a public health emergency.

Loss of water pressure, reduction in hydroelectric power generation, and/or the suspension of services in affected areas would have limited effect on local government operations, the delivery of key services, and to property and infrastructure. The reduction of groundwater supply may exacerbate environmental factors by setting the conditions for the creation of sinkholes and other natural hazards. Reduced groundwater supply for non-domesticated animals and other organisms may add strain to the ecosystem.

4.5.2 EARTHQUAKE

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10 to 20 miles of the earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns (FEMA, 1997).

LOCATION AND EXTENT

Earthquake incidents in Pennsylvania do not typically impact areas greater than 100 kilometers from the epicenter of the event and are usually mild events. The Department of Earth Sciences at Millersville University identified relative earthquake hazard zones for Pennsylvania. Snyder County falls entirely within the "slight" zone. Since the Commonwealth does not reside on an active fault, many of the earthquakes that do occur are from deep within the earth's crust. In most cases, these are non-measurable events. However, earthquake standards are still a valuable consideration when determining building codes.

RANGE OF MAGNITUDE

Earthquake magnitude is often measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake. Table 4.5.2-1 summarizes Richter Scale Magnitudes as they relate to the spatial extent of impacted areas. No earthquakes have occurred in Snyder County, but those located closest to Snyder County in Lebanon and Centre Counties indicate that earthquakes have generally had magnitudes of between 1 and 4. Statewide, Pennsylvania has not experienced any earthquakes with a magnitude greater than 6.0.

TABLE 4.5.2-1: RICHTER SCALE MAGNITUDES AND ASSOCIATED EARTHQUAKE-SIZE EFFECTS

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

The Richter Scale does not give any indication of the impact or damage of an earthquake, although it can be inferred that higher magnitude events cause more damage. Instead, the impact of an earthquake event is measured in terms of earthquake intensity, usually measured using the Modified Mercalli Intensity Scale, shown in Table 4.5.2-2. Because Snyder County is not on an active fault line, little or no damage is expected from these earthquake events. However, since the worst earthquake recorded in Pennsylvania had a magnitude of 5.2, a worst-case scenario for this hazard would be if an earthquake of similar magnitude occurred in Snyder County. As described in Tables 4.5.2-1 and 4.5.2-2, this magnitude of event would be felt and non-stationary objects would shake or fall off shelves, trees would sway, and suspended objects would swing, but damage would overall be mild and would likely be concentrated in populated areas of the County.

TABLE 4.5.2-2: MODIFIED MERCALLI INTENSITY SCALE WITH ASSOCIATED IMPACTS

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

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

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

PAST OCCURRENCES

According to records maintained by the Pennsylvania Department of Conservation and Natural Resources (DCNR), there has never been an earthquake with its epicenter located within Snyder County.

FUTURE OCCURRENCES

One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak horizontal ground acceleration (PHGA) measures the strength of ground movements in this manner. PHGA is the percent of g (acceleration due to gravity) experienced during the earthquake or the rate in change of motion of the earth's surface during an earthquake as a percent of the established rate of acceleration due to gravity. In general, an acceleration of 10 percent to 15 percent of gravity is associated with structural damage to ordinary buildings not designed to withstand earthquakes, although soil conditions at individual sites will impact the amount of damage.

The U.S. Geologic Survey models the contours that represent earthquake ground motions that have a 10 percent probability of being experienced over a 50-year period. The PHGA value for Snyder County is between two and three. These values correspond to events with low intensities and an expectation of little or no structural damage. Overall, the future occurrence of earthquakes in Snyder County can be considered unlikely, as defined by the Risk Factor methodology probability criteria.

VULNERABILITY ASSESSMENT

Earthquakes of the magnitude seen in Central Pennsylvania are small and shallow. Based on the past history of earthquake events near Snyder County, the County's vulnerability to this hazard is expected to be low as defined by the Risk Factor Methodology (see Table 4.7.2-1). In the event of an earthquake, unanchored objects may be upset, but few damages are expected.

4.5.3 FLOOD, FLASH FLOOD, ICE JAM

Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period of time. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiographic, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas (NOAA, 2009). Winter flooding can include ice jams that occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. All forms of flooding can damage infrastructure (USACE, 2007).

LOCATION AND EXTENT

In the past, most of Snyder County's flood problems resulted from seasonal change. With winter thaws and spring rain, the County will experience most of its flooding in the late winter and early spring months (February to April). During winter thaws, pieces of ice can often back up and jam waterways causing flooding as well.

Flooding poses the biggest threat to those who reside or conduct business in the floodplain. The most significant hazard exists for businesses in the floodplain that process, use, and/or store hazardous materials. A flood could potentially allow for hazardous materials to leak out of these areas. As the water recedes it would spread the hazardous materials throughout the area. Also threatened are the

agricultural areas in the floodplain. Snyder County is mostly rural and flooding could result in significant agricultural losses. Most flood damage to property and structures located in the floodplain is caused by water exposure to the interior, high-velocity water, and debris flow.

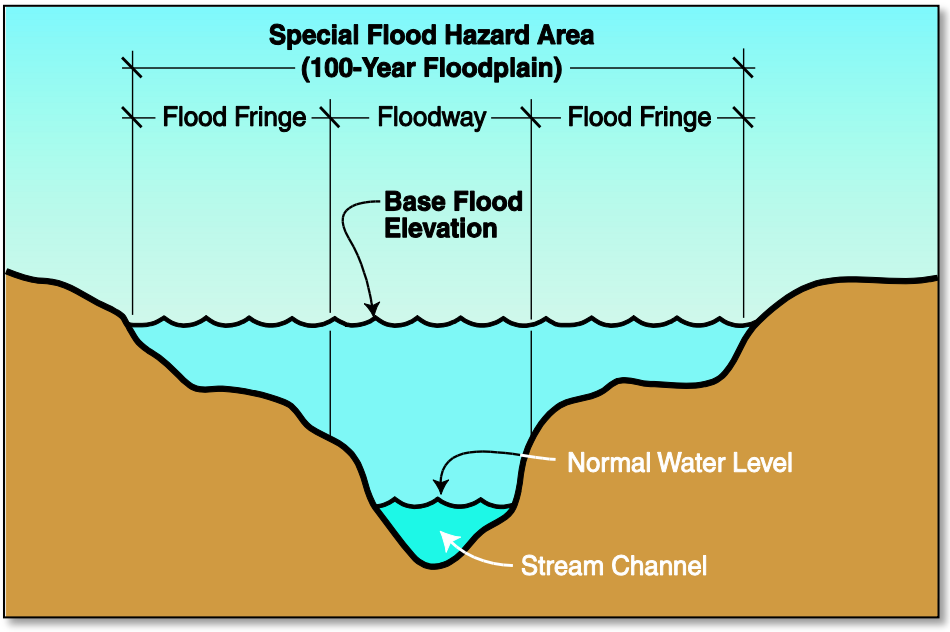
Snyder County is prone to two types of floods:

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

Most communities in Snyder County are located along stream and creek valleys throughout the County. Excess water from snowmelt or rainfall accumulates and overflows onto stream banks and adjacent floodplains. Floodplains are lowlands adjacent to rivers, streams, and creeks that are subject to recurring floods. The size of the floodplain is described by the recurrence interval of a given flood. Flood recurrence intervals are explained in more detail in the Past Occurrence section.

In assessing the potential spatial extent of flooding, it is important to know that a floodplain associated with a flood that has a 10 percent chance of occurring in a given year is smaller than the floodplain associated with a flood that has a 0.2 percent annual chance of occurring. Community development of the floodplain has resulted in frequent flooding in these areas.

FIGURE 4.5.3-1: DIAGRAM IDENTIFYING SPECIAL FLOOD HAZARD AREA, 1 PERCENT ANNUAL CHANGE (100-YEAR) FLOODPLAIN, FLOODWAY, AND FLOOD



RANGE OF MAGNITUDE

Floods are considered hazards when people and property are affected. Most injuries and deaths from flooding happen when people are swept away by flood currents, and most property damage results from inundation by sediment-filled water. A large amount of rainfall over a short time span can result in flash flood conditions. Small amounts of rain can result in floods in locations where the soil is frozen or saturated from a previous wet period or if the rain is concentrated in an area of impermeable surfaces such as large parking lots, paved roadways, or other impervious, developed areas. Flooding can occur in individual municipalities within Snyder County or it can have a countywide effect, involving multiple sites and streams. In this portion of the Susquehanna River Basin, flooding occurs most frequently in spring and early summer.

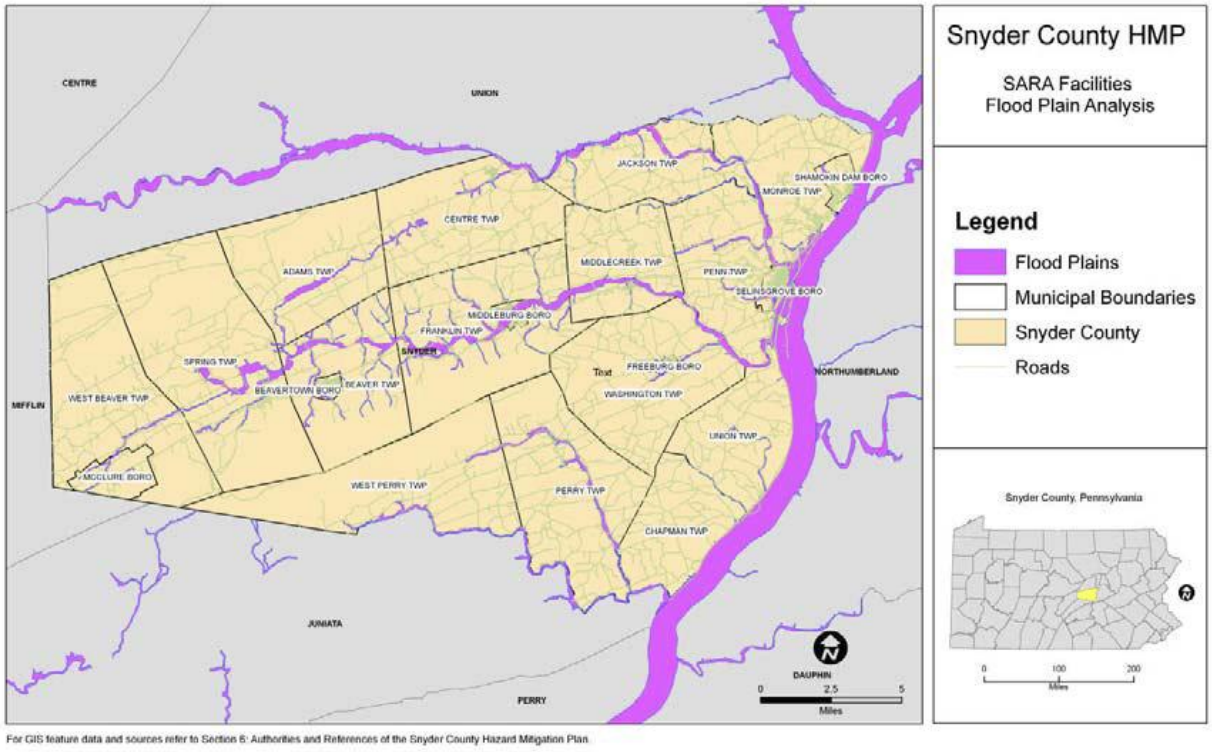
Several factors determine the severity of floods, including rainfall intensity and duration, topography, ground cover, and rate of snowmelt. Water runoff is greater in areas with steep slopes and little to no vegetative ground cover. Also, urbanization typically results in the replacement of vegetative ground cover with asphalt and concrete, increasing the volume of surface runoff and stormwater, particularly in areas with poorly planned stormwater drainage systems.

In the winter and early spring (February to April), major flooding has occurred as a result of heavy rainfall on dense snowpack throughout contributing watersheds. Summer floods have occurred from intense rainfall on previously saturated soils. Summer thunderstorms deposit large quantities of rainfall over a short period of time that can result in flash flood events, when the velocity of floodwaters has the potential to amplify the impacts of a flood event.

Winter floods also have resulted from runoff of intense rainfall on frozen ground, and on rare occasions, local flooding has been exacerbated by ice jams in rivers. Ice jam floods occur on rivers that are totally or partially frozen. A rise in stream stage will break up a totally frozen river and create ice flows that can pile up on channel obstructions such as shallow riffles, log jams, or bridge piers. The jammed ice creates a dam across the channel over which the water and ice mixture continues to flow, allowing for more jamming to occur.

Map 4.5.3-1 shows the areas of Snyder County that are most affected by flooding. As the map shows, Snyder County's eastern border is the Susquehanna River, which is prone to flooding. Also, Penns Creek in the northern portion of the County and Middle Creek through the center of the County have had incidents of major flooding.

MAP 4.5.3-1 – SARA FACILITIES IN FLOOD PRONE AREAS



For GIS feature data and sources refer to Section 6: Authorities and References of the Snyder County Hazard Mitigation Plan.

The worst-case scenario for flooding in Snyder County was Hurricane Agnes in June 1972. This early season hurricane came up from the Gulf of Mexico and brought heavy rain that exceeded the carrying capacity of streams and rivers from southern New York to Virginia from June 22 to June 25 (Gelber, 2002). The Susquehanna River and its major tributaries flooded across the region. The flood had a recurrence interval between the 100 and 500 year. For example, Middle Creek was estimated to be a 500-year flood in Franklin Township and the Susquehanna River was a 200-year flood. The flooding resulted in evacuations, economic losses, and casualties in many communities and major cities, including Harrisburg, Wilkes-Barre, and York. The flooding from Hurricane Agnes caused $2.8 billion in economic losses and 48 deaths in Pennsylvania.

While Hurricane Agnes can be considered the flood of record for Snyder County, Tropical Storm Lee in September 2011 was an important flood event. This storm developed as a tropical disturbance in the Gulf of Mexico and was a particularly large and slow-moving storm. By the time it reached Pennsylvania, the storm had lost its tropical characteristics and merged with an upper level trough positioned over the eastern third of the United States, resulting in a storm of renewed strength. The storm dumped a record amount of rainfall on the Susquehanna River Valley – 10 to 15 inches in the County.

The flooding was exacerbated by the fact that in many areas, the ground was still saturated from Hurricane Irene's rains during the previous week. During Lee, the Susquehanna River crested at a record high of 32.75 feet. Pennsylvania Governor Tom Corbett declared a Level 1 emergency in the Commonwealth for this event. It was the first time that level of emergency had been declared since September 11, 2001.

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

The following municipal summaries detail flood threats within Snyder County. Not all municipalities within the County are included because not all municipalities are as vulnerable. This analysis was taken from FEMA's Flood Insurance Study.

Center Township

Moderate flooding is experienced along Penns Creek in Center Township.

Chapman Township

Historical data indicates that flooding can occur during any time of year in Chapman Township. Each year this Township can anticipate, on average, 41 thunderstorms (60 percent in the summer, 25 percent in the spring, 14 percent in the fall, and 1 percent in the winter). Larger storms such as Tropical Storm Agnes of 1972, Tropical Storm Ivan of 2004, and Tropical Storm Dennis of 2005 have become more frequent. With the large drainage area of the Susquehanna River before it enters the Township, heavy rain can inundate a large portion of the floodplain within Chapman Township. West Mahantango and North Branch Mahantango Creek can also be affected by storms of all magnitudes.

Using stream gauges along the Susquehanna River in Sunbury, Pennsylvania, Chapman Township has been involved in four major flood events in the past 100 years. These events, in order of decreasing magnitude, occurred on June 24, 1972, March 19, 1936, May 29, 1946, and March 11, 1964. The June 1972 flood had a recurrence interval between the 100 and 500 years. Other large events include Tropical Storm Ivan of 2004 and Tropical Storm Dennis of 2005.

No stream gauges exist along the West Mahantango and North Branch Mahantango Creek. However, personal interviews conducted by FEMA and the Pennsylvania Department of Transportation (PennDOT) District 3 indicate that the June 1972 flood was approximately a 50-year flood.

Franklin Township

Currently, Township Route 439 travels through the floodplain of Middle Creek.

Flooding can occur at any time of year in Franklin Township. On average, 41 thunderstorms (60 percent in the summer, 25 percent in the spring, 14 percent in the fall, and 1 percent in the

winter) can be expected. Larger storms such as Tropical Storm Agnes of 1972, Tropical Storm Ivan of 2004, and Tropical Storm Dennis of 2005 can severely impact Middle Creek. A large amount of floodplain land is affected by this creek as it travels through the Township.

Middle Creek currently has no flood gauges on it. However, it is known that flooding occurred in 1889, 1933, 1936, 1942, 1952, 1956, 1972, 2004, and 2005. The June 1972 flood was estimated to be a 500-year flood on Middle Creek. The tributaries of Middle Creek experienced a 10-year flood during June 1972. This was calculated based on personal interviews with residents, and high-water marks from structures along Stumps Run.

Jackson Township

On average Jackson Township will see 40 to 42 inches of rain per a year that primarily drains into Penns Creek. Penns Creek's drainage area serves 310 square miles. Flooding can occur during any time of year in Jackson Township. Large storms, such as Tropical Storm Agnes of 1972, Tropical Storm Ivan of 2004, and Tropical Storm Dennis of 2005, have the possibility of affecting large amounts of flood plain land in the Township. The U.S. Geological Survey (USGS) gauge number 5550 located upstream on Penns Creek has been in operation since 1930. In June 1972, 34,600 cubic feet per second (cfs) were discharged from Penns Creek, with a recurrence interval of 240 years. This was followed by 19,800 cfs in September 1934 (40-year recurrence), and 15,700 cfs in March 1936 (20-year recurrence). All of these occurrences were a result of either spring rainfall and snowmelts, or tropical storms that moved north along the Atlantic coastline.

Middleburg Borough

Middleburg can expect about 41 inches of rain evenly distributed throughout the year. Middleburg Borough has experienced extensive flooding in the past, particularly in one area referred to as the "French Flats." Located between the U.S. Route 522 bridge over an area referred to as "The Gut," and the U.S. Route 522 bridge over Middle Creek, the French Flats have recorded at least 46 occasions of flooding between 1846 and 1976. Backwaters can cause flooding at the confluence of Middle Creek and Stumps Run in Middleburg Borough.

Middleburg, like most municipalities in Snyder County, will experience flooding during all seasons. On average, 41 thunderstorms occur annually (60 percent in the summer, 25 percent in the spring, 14 percent in the fall, and 1 percent in the winter). Larger storms, such as Tropical Storm Agnes of 1972, Tropical Storm Ivan of 2004, and Tropical Storm Dennis of 2005, have the ability to cause severe flooding in Middleburg Borough.

No stream gauges currently exist along Middle Creek. However, it is known that major flooding occurred in 1889, 1927, 1933, 1936, 1942, 1952, 1956, 1972, 2004, and 2005. During the Flood of 1972, Middle Creek experienced water levels at the 500-year mark. During the same event, Stumps Run experienced water levels at the 10-year flood mark.

Middlecreek Township

Approximately 40 to 42 inches of rain fall in Middlecreek Township annually. Seventy percent of this rainfall will drain into the Middle Creek watershed. The remaining 30 percent will flow into Penns Creek. The June 1972 flood caused extensive damage in the Township, particularly to the Wood-Mode Cabinet Company's showroom. A 1977 flood caused a high degree of ground

erosion in certain areas of the Township. Other large events include Tropical Storm Ivan of 2004 and Tropical Storm Dennis of 2005.

Flooding can and will occur in Middlecreek at any given time during the year. Thunderstorms are usually the culprit of stream flooding. Forty-one thunderstorms, on average, occur in this Township (60 percent in the summer, 25 percent in the spring, 14 percent in the fall, and 1 percent in the winter). No stream gauges are located on Middlecreek. However, recorded events note that major flood events occurred in 1889, 1927, 1933, 1936, 1942, 1952, 1956, 1972, 2004, and 2005. Middle Creek experienced a 500-year flood during June 1972, while Tributary 1 was considered to have registered between the 10- to 100-year level.

Monroe Township

The Susquehanna River forms the southeast boundary of the Township while Penns Creek forms the southwest boundary. The floodplain areas along the Susquehanna River include undeveloped land, small cottages, commercial development separated by a highway, residential development, and a portion of a steam power generating plant.

Susquehanna River flood data in Monroe Township dates back to 1771. Other large floods have occurred in 1784, 1810, 1833, 1846, 1847, 1865, 1889, 1904, 1913, and 1920. Several hundreds of thousands of dollars in flood damage was caused by the Great Flood of 1936. This flood caused water levels on the Susquehanna River to rise to 34.8 feet in Snyder County. Tropical Storm Agnes caused the Susquehanna to rise to 35.65 feet. Residents then experienced the river cresting at 29.83 feet in September 1975. Road closures and evacuations are typical in flood-prone areas of Monroe Township during flood watches and warnings. Other large events include Tropical Storm Ivan of 2004 and Tropical Storm Dennis of 2005.

Penn Township

Located in eastern Snyder County, Penn Township shares a border with Middlecreek Township to the west, Jackson Township to the north, Monroe Township to the northeast, Selinsgrove Borough and Lower Augusta Township Northumberland County to the east, Washington Township to the southwest, and Union Township to the south. Several of these borders are formed by the Susquehanna River, and Penns and Middle Creeks. Between the Susquehanna River and Penns Creek one can find a flood-prone area known as the Isle of Que. Penn Township covers an area of 18.1 square miles and currently has 3,894 residents. Penn Township was incorporated in 1758 and was originally a part of Northumberland County. Annually, Penn Township will see 40 to 42 inches of rainfall during the year.

Most flooding hazards in Penn Township are caused by the Susquehanna River and Penns Creek. Tropical Storm Agnes of 1972 brought with it 620,000 cfs and a 200-year flood along the Susquehanna. Local streams and tributaries also experienced high flows. Penns Creek saw its cfs record nearly double at 34,600 cfs. The Isle of Que experienced the worst damage in June 1972. Homes, farm buildings, machinery, and crops were all damaged in this area. State Route 204 also saw many homes destroyed by the high waters of Penns Creek. In March 2011, the Penns Creek gauge crested at 10.06 feet due to heavy rainfall. This is classified as a moderate flood. Table 4.3.3-3 lists historically high levels of the Penns Creek gauge cresting from 2011-1936. A few residential and agricultural reports were noted from Middle Creek. However, these reports were minor when compared with those along Penns Creek and the Susquehanna River.

Many roads and utilities were disrupted throughout the region. Other large events include Tropical Storm Ivan of 2004 and Tropical Storm Dennis of 2005.

In 2011, the interaction of a stalled frontal boundary over the Mid-Atlantic region, a strong northern stream short-wave (with a persistent jet entrance region), and deep tropical moisture associated with the remnants of Tropical Storm Lee resulted in a multi-day, significantly heavy rainfall event over Pennsylvania. The Susquehanna River and Penns Creek also saw major flooding.

Perry Township

Limited flood data is available for Perry Township. Known flooding has caused water damage to structures along the West Branch and North Branch of the Mahantango Creek.

Selinsgrove Borough

Annually, 40 to 42 inches of rainfall are expected and flooding can occur during any season. Also, 41 thunderstorms occur on average (60 percent in the summer, 25 percent in the spring, 14 percent in the fall, and 1 percent in the winter). Large storms typically inundate areas within the floodplain because of Selinsgrove's proximity to the Susquehanna River and Penns Creek.

The USGS gauge at Sunbury, Pennsylvania, recorded four major floods on the Susquehanna River in the last 100 years. In order of decreasing magnitude, these floods occurred in June 1972, March 1936, May 1946, and March 1964. Substantial upstream reservoir and protective levee construction in the Susquehanna River basin has occurred within the past 100 years. It has been estimated that the June 1972 flood had a recurrence of 170 years. Other large events include Tropical Storm Ivan of 2004 and Tropical Storm Dennis of 2005.

The highest discharge levels on the Susquehanna River were gauged at 34,600 cfs in June 1972, 19,800 in September 1934, and 15,700 cfs in March 1936. The recurrence intervals of these floods were 240-years, 40-years, and 20-years. Typical flooding in Selinsgrove occurs from spring rainfall and snowmelt, or tropical storms that travel along the Atlantic coastline such as Tropical Storm Agnes of 1972, Tropical Storm Ivan of 2004, and Tropical Storm Dennis of 2005.

The June 1972 flood reached levels less than the 100-year flood. However, it is possible that flooding from the June 1972 flood could have reached higher levels if there had not been several alternative flow paths for diversion of discharge into other watersheds.

Given the parallel flow of the Susquehanna River and Penns Creek, considerable flooding can occur along the Market Street business district corridor in Selinsgrove. The South Tributary also causes damage. This is particularly relevant to the Sassafras Street area upstream.

Shamokin Dam Borough

Flood problems in Shamokin Dam are much like those in Monroe Township. Monroe Township completely surrounds the north, west, and south side of Shamokin Dam. The east side of the Borough is bordered by the Susquehanna River. Susquehanna River flood data in Shamokin Dam dates back to 1771. Other large floods have occurred in 1784, 1810, 1833, 1846, 1847, 1865, 1889, 1904, 1913, and 1920. Several hundreds of thousands of dollars in flood damage was caused by the Great Flood of 1936. This flood caused water levels on the Susquehanna River to rise to 34.8 feet in Snyder County. Tropical Storm Agnes caused the Susquehanna to rise to 35.65 feet. Residents then experienced the River cresting at 29.83 feet in September

1975. Road closures and evacuations are typical in flood-prone areas of Shamokin Dam during flood watches and warnings. Other large events include Tropical Storm Ivan of 2004 and Tropical Storm Dennis of 2005.

Spring Township

Approximately 40 miles northwest of the City of Harrisburg, Spring Township is located in northwestern Snyder County. Hartley Township, Union County is located to the north, while West Perry Township is located to the south. Adams Township is located to the northeast, Beaver Township to the southeast, and West Beaver Township to the west. Spring Township's population includes 1,574 citizens.

Minor flooding typically occurs along Middle Creek, South Branch Middle Creek, Beaver Creek, and Stony and Swift Runs.

Union Township

Union Township will experience about 41 inches of rainfall over the course of a year. This rain can have an adverse effect on the eastern part of the Township, with the Susquehanna River and Penns Creek. Middle Creek impacts the northern area of the Township, while Silver Creek impacts the southern area. Overall, the banks of these waterways are undeveloped. However, pockets of development can be found along the Susquehanna River and Silver Creek.

Flooding can occur during any season in Union Township. On average, 41 storms impact the Township (60 percent in the summer, 25 percent in the spring, 14 percent in the fall, and 1 percent in the winter). Flooding will typically occur on the smaller streams with localized storms. This increase in water flow may cause flooding along the Susquehanna River. Within the last 100 years, four major flood events have occurred along the Susquehanna River. In order of decreasing magnitude, these floods occurred in June 1972, March 1936, May 1946, and March 1964. The Susquehanna River experienced water levels that were comparable to a 100- to 500-year flood during the June 1972 flood. Other large events include Tropical Storm Ivan of 2004 and Tropical Storm Dennis of 2005.

Middle Creek does not have a gauge system; however, it is known that major flooding occurred in 1889, 1927, 1933, 1936, 1942, 1952, 1956, 1972, 2004, and 2005. Middle Creek experienced a recurrence interval of 500 years during June 1972. Silver Creek, however, was only listed between the 100- to 500-year level during the flood of June 1972.

West Perry Township

Sharing a border with Perry Township to the east, Franklin Township to the northeast, Beaver and Spring Townships to the north, West Beaver Township to the northwest, Fayette Township, Juniata County to the southwest, and Monroe Township, Juniata County to the south, West Perry Township is located in southern Snyder County. Approximately 1,060 citizens reside in the Township.

Limited flooding will affect the structures along the West Branch Mahantango Creek.

PAST OCCURRENCES

Snyder County has a long history of flooding events. Ten of the 15 Presidential Disaster and Emergency Declarations affecting Snyder County have been in response to hazard events related to flooding (see Table 4.2-1). Table 4.5.3-1 lists flood event information from 1993 to 2011 obtained from the National Oceanic and Atmospheric Administration (NOAA) database as well as SHELDUS records for flood events occurring before 1993.

Table 4.5.3-1: Past Occurrences from 1970-2018

DATE	EVENT	LOCATION	FATALITIES	INJURIES	PROPERTY DAMAGE ($)	CROP DAMAGE
04/2/1970	Flooding - Severe Storm/ Thunder Storm	Countywide	0	0	30000.00	0
06/21/1972	Flooding - Severe Storm/Thunder Storm	Countywide	0	0	7462686.57	746268.66
06/28/1973	Flooding - Hail - Lightning - Severe Storm/Thunder Storm - Tornado - Wind	Countywide	0	6	15151.50	0
09/23/1975	Flooding - Severe Storm/Thunder Storm	Countywide	0	0	1515151.51	1515.15
01/241979	Flooding - Severe Storm/Thunder Storm - Wind	Countywide	0	0	15151.52	0
02/23/1979	Flooding - Severe Storm/Thunder Storm - Wind	Countywide	0	0	15151.52	0
10/12/1995	Flood/Flash Flood	Countywide	0	0	30,000	0
01/09/1996	Flash Flood	Countywide	1	0	0	0
09/06/1996	Flash Flood	Countywide	0	0	0	0
09/13/1996	Flash Flood	Middleburg	0	0	0	0
12/01/1996	Flash Flood	Countywide	0	0	0	0

DATE	EVENT	LOCATION	FATALITIES	INJURIES	PROPERTY DAMAGE ($)	CROP DAMAGE
12/13/1996	Flash Flood	Countywide	0	0	0	0
09/11/1997	Flash Flood	West Portion	0	0	0	0
01/08/1998	Flash Flood	Countywide	0	0	0	0
03/19/1998	Flash Flood	Countywide	0	0	0	0
04/19/1998	Flash Flood	Countywide	0	0	0	0
08/20/1998	Flash Flood	Middleburg	0	0	100,000	0
09/06/1998	Flash Flood	East Portion	0	0	30,000	0
09/16/1998	Flash Flood	Countywide	0	0	30,000	0
09/30/1999	Flash Flood	Countywide	0	0	0	0
09/23/2000	Flash Flood	Middleburg	0	0	30,000	0
07/27/2006	Flash Flood	Countywide	0	0	30,000	0
08/27/2006	Flood	Countywide	0	0	30,000	0
09/02/2006	Flood	Middleburg	0	0	30,000	0
03/06/2011	Flood	Selinsgrove	0	0	30,000	0
03/10/2011	Flood	Penns Creek	0	0	30,000	0
04/27/2011	Heavy Rain / Wind	Countywide	0	0	0	0
05/03/2011	Flash Flood	Beaver Spgs Arpt	0	0	30,000	0
09/07/2011	Flood	Countywide	0	0	30,000	0
10/29/2012	Heavy Rain / Wind	Countywide	0	0	0	0
07/08/2013	Severe Thunder Storms	Countywide	0	0	0	0
08/04/2017	Heavy Rain / Tornado	East Portion	0	0	0	0

Table 4.5.3-2 describes some of the impacts flooding has caused in Snyder County.

TABLE 4.5.3-2 SNYDER COUNTY FLOODING IMPACTS

DATE	REMARKS
10/21/ 1995	Roads flooded and small streams went out of their banks across the county.
01/19/1996	One death occurred in Snyder County. A 75 year old man refused to abandon his home during evacuation of people near Selinsgrove. He later attempted to leave by auto and was swept away.
09/06/1996	Basements and small streams were flooded.
09/13/1996	Roads were flooded due to heavy rains across portions of western Snyder County.
08/20/1999	Major flooding across eastern sections.
09/06/1999	Heavy rains from Dennis caused flooding of roads, small streams, and basements in the early morning hours across eastern sections of the county. Areas from Middleburg, east to the Susquehanna River, were hard hit. Campers on the banks of Penns Creek had to be moved to safety. Near Kratzerville, about 30 people were moved to higher ground and campground workers attempted to move some trailers. Several trailers were carried away by the floodwaters. In addition, campers in Kreamer were evacuated when a tributary of Middle Creek flooded. Route 15, the major north/south highway to Harrisburg, was closed due to flooding.
09/30/1999	2.5 to 3 inches of rain caused poor drainage flooding.
09/23/2003	Heavy rain caused flooding along Middle Creek, Mahantango Creek and Penns Creek. Flooding was extensive throughout 4 townships in Snyder County, closing roads and flooding 4 homes.
06/27/2006	Heavy rain associated with a stalled frontal boundary, interacting with the remnants of a weak tropical system, caused flash flooding throughout central and eastern Pennsylvania from June 27 through June 28. While flash flooding ended on the 28th, flood waters continued in some locations until July 1st. In all, the governor signed a Declaration of Disaster Emergency for 46 Pennsylvania counties. 21 Counties were given federal disaster designation status, making them eligible for federal aid. Over 1200 water rescues were performed statewide. Hundreds of roads and bridges were closed during the event. At least 65 bridges were damaged, with an estimated 23 requiring total replacement. The American Red Cross opened 48 shelters statewide which housed more than 2500 people. More than 77,000 meals and snacks through 60 mobile feeding sites were also distributed by the American Red Cross. About 7800 residences were damaged, with between 275,000 and 300,000 voluntary evacuation orders being given. In Snyder County, numerous roads and bridges were closed due to flood waters. Middle Creek produced notable flooding in Penn and Washington Townships. A landslide closed State Route 104 in Perry Township.
08/27/2006	A slow moving area of moderate to heavy rain fell across Snyder County during the late afternoon and evening of August 27th. Between 1 and 3 inches of rain was measured by Doppler radar, which eventually caused a number of streams to come out of their banks. Most significant flooding occurred about 3 miles south of Freeburg, where 4.12 inches of rain was measured by a trained NWS spotter.

DATE	REMARKS
09/02/2006	Heavy rainfall from the remnants of Tropical Storm Lee produced widespread flooding, flash flooding and river flooding mainly near and to the east of the Susquehanna Valley from September 4-10. Several locations in the Susquehanna Basin came close to records set by Hurricane Agnes (June 1972) and a few points (Bloomsburg, Hershey and Loyalsockville) set new floods of record. Flooding along Swatara Creek resulted in property damage and several deaths. Severe flooding occurred along Loyalsock Creek and many points along the main-stem of the Susquehanna River. The interaction of a stalled frontal boundary over the Mid-Atlantic region, a strong northern stream short-wave (with a persistent jet entrance region) and deep tropical moisture associated the remnants of Tropical Storm Lee resulted in multi-day, significant heavy rainfall event over Pennsylvania. Tropical storm Lee was the twelfth named storm of the 2011 season forming over the Gulf of Mexico on September 1. A strong northern stream short-wave interacted with Lee causing the storm to re-curve to the north-northeast. By 1200 UTC September 6, having undergone extra-tropical transition, post-tropical Lee was located over northern Georgia. The surface low weakened as it moved up the Appalachian Mountain chain. However, the strong low-level flow and the above normal perceptible water produced an extensive, north-to-south oriented band of heavy rainfall. The rainfall associated with the remnants of Lee produced the 4th largest flood of record in the Mid-Atlantic Region. The five-day storm rainfall totals for September 5 to 9 were generally in the 5-8 inch range over the mid-section of central Pennsylvania and in the 8-12 inch range in the Susquehanna Valley region. There were local amounts reported in excess of 15 inches east of the Susquehanna River. The local climate sites in Harrisburg (KMDT) and Williamsport (KIPT) reported 13.44 and 9.03 inches respectively. Widespread small stream flooding was reported across Snyder County as a result of heavy rainfall from the remnants of Tropical Storm Lee. Flooding was reported on Middle Creek in the borough of Middleburg. Flooding was also reported in the borough of Selinsgrove. Ten roads were closed across the county due to high water. A preliminary total of 23 buildings were destroyed in Snyder County, with 382 suffering major damage and 59 suffering minor damage. A total of 799 structures were impacted during the event. Damages were estimated at $229,892 for public facilities in the county.
05/03/2011	A broken line of severe thunderstorms formed ahead of a cold front during the late afternoon, and produced localized wind damage and heavy rainfall across portions of east-central Pennsylvania. The heavy rain combined with above normal soil moisture and high stream-flows contributed to flash flooding. Flash flooding closed Ridge Road (SR 4004) in West Beaver Township near McClure.
03/10/2011	Heavy rainfall between 1 and 2 inches over northwest Pennsylvania and 2 to 4 inches across central and eastern Pennsylvania combined with snowmelt in the northern mountains to produce significant flooding. The worst flooding occurred over the eastern half of the Commonwealth. A dozen river forecast points crested over moderate flood stage, with many others rising over cautionary and minor flood levels. Numerous road closures resulted from flooding of low-lying areas and small streams and creeks overflowing their banks. Multiple water rescues and isolated evacuations were reported along with one drowning fatality. The Penns Creek at Penns Creek gauge crested at 10.06 feet on March 11th at 1245 pm. This was classified as a moderate flood. At 10.0 feet high water overflowed both banks.

DATE	REMARKS
	Several homes and cottages on the left or north bank were affected. Many secondary roads along the creek were closed due to high water levels. At 8.0 feet the left...or north bank overflowed downstream of the Route 104 bridge. A campground was affected. A number of secondary roads in the Penns Creek drainage were affected by high water.
09/07/2011	Heavy rainfall from the remnants of Tropical Storm Lee produced widespread flooding, flash flooding and river flooding mainly near and to the east of the Susquehanna Valley from September 4-10. Several locations in the Susquehanna Basin came close to records set by Hurricane Agnes (June 1972) and a few points (Bloomsburg, Hershey and Loyalsockville) set new floods of record. Flooding along Swatara Creek resulted in property damage and several deaths. Severe flooding occurred along Loyalsock Creek and many points along the main-stem of the Susquehanna River. The interaction of a stalled frontal boundary over the Mid-Atlantic region, a strong northern stream short-wave (with a persistent jet entrance region) and deep tropical moisture associated the remnants of Tropical Storm Lee resulted in multi-day, significant heavy rainfall event over Pennsylvania. Tropical storm Lee was the twelfth named storm of the 2011 season forming over the Gulf of Mexico on September 1. A strong northern stream short-wave interacted with Lee causing the storm to re-curve to the north-northeast. By 1200 UTC September 6, having undergone extra-tropical transition, post-tropical Lee was located over northern Georgia. The surface low weakened as it moved up the Appalachian Mountain chain. However, the strong low-level flow and the above normal perceptible water produced an extensive, north-to-south oriented band of heavy rainfall. The rainfall associated with the remnants of Lee produced the 4th largest flood of record in the Mid-Atlantic Region. The five-day storm rainfall totals for September 5 to 9 were generally in the 5-8 inch range over the mid-section of central Pennsylvania and in the 8-12 inch range in the Susquehanna Valley region. There were local amounts reported in excess of 15 inches east of the Susquehanna River. The local climate sites in Harrisburg (KMDT) and Williamsport (KIPT) reported 13.44 and 9.03 inches respectively. Widespread small stream flooding was reported across Snyder County as a result of heavy rainfall from the remnants of Tropical Storm Lee. Flooding was reported on Middle Creek in the borough of Middleburg. Flooding was also reported in the borough of Selinsgrove. Ten roads were closed across the county due to high water. A preliminary total of 23 buildings were destroyed in Snyder County, with 382 suffering major damage and 59 suffering minor damage. A total of 799 structures were impacted during the event. Damages were estimated at $229,892 for public facilities in the county.

SOURCE: SNYDER COUNTY HMP, 2006

Many of these flood events have resulted in historic crest levels. As reported by the NWS, the following historic crest levels have been seen at Penns Creek:

TABLE 4.5.3-3: PENNS CREEK - HISTORIC CRESTS

CREST LEVEL	DATE
14.85 ft	6/23/1972
13.74 ft	1/19/1996
13.00 ft	9/16/1934
13.00 ft	2/26/1979
12.19 ft	9/18/1936
12.12 ft	3/18/1936
11.73 ft	2/15/1984
11.62 ft	11/25/1950
11.61 ft	3/31/1940
11.00 ft	8/84/1933
10.00 ft	9/11/2011
PENNS CREEK FLOOD CATEGORIES	
Major Flood Stage	12 ft
Moderate Flood Stage	10 ft
Flood Stage	8 ft
Action Stage	6 ft

SOURCE: SNYDER COUNTY HMP, 2014

In addition to the aforementioned past flood events, the NFIP identifies properties that frequently experience flooding. Repetitive loss properties are structures insured under the NFIP that have had at least two paid flood losses of more than $1,000 over any 10-year period since 1978. A property is considered a severe repetitive loss property either when there are at least four losses (each exceeding $5,000) or when there are two or more losses where the building payments exceed the property value.

As of January 2017, there were 158 repetitive loss properties in Snyder County (Snyder County, 2017). These repetitive loss properties are located in 12 of the 21 municipalities in Snyder County: Center Township, Chapman Township, Franklin Township, Jackson Township, Middleburg Borough, Middlecreek Township, Monroe Township, Penn Township, Perry Township, Selinsgrove Borough, Shamokin Dam Borough, and Union Township. By far the most repetitive loss properties are located in Selinsgrove Borough and Monroe Township. Of the repetitive loss properties, none of the structures have been mitigated. Table 4.5.3-4 shows the number of repetitive loss properties by municipality.

TABLE 4.5.3-4: SUMMARY OF THE NUMBER AND TYPE OF REPETITIVE LOSS PROPERTIES BY MUNICIPALITY

MUNICIPALITY	TYPE					SUM OF REPETITIVE LOSS PROPERTIES
	NON-RESIDENTIAL	2-4 FAMILY	SINGLE FAMILY	CONDO	OTHER RESI-DENTIAL	
Adams Township	0	0	0	0	0	$0
Beaver Township	0	0	0	0	0	$0
Beavertown Borough	0	0	0	0	0	$0
Center Township	1	0	2	0	0	$36,271.94
Chapman Township	1	0	2	0	0	$104,840.12
Franklin Township	0	0	1	0	0	3,976.97
Freeburg Borough	0	0	0	0	0	$0
Jackson Township	0	0	9	0	0	$329,581.15
McClure Borough	0	0	0	0	0	$0
Middleburg Borough	0	0	4	0	0	$62,831.02
Middlecreek Township	1	0	3	0	0	$65,767.78
Monroe Township	0	0	33	0	0	$2,220,602.65
Penn Township	0	0	12	0	0	$664,288.94
Perry Township	1	0	2	0	0	$86,155.82
Selinsgrove Borough	2	4	74	0	0	$4,099,636.41
Shamokin Dam Borough	1	0	3	0	0	$114,751.74
Spring Township	0	0	0	0	0	$0
Union Township	0	0	2	0	0	$199,240.71
Washington Township	0	0	0	0	0	$0
West Beaver Township	0	0	0	0	0	$0
West Perry Township	0	0	0	0	0	$0
TOTALS	7	4	147	0	0	$3,257,127.05

FUTURE OCCURRENCE

In Snyder County, flooding occurs commonly and can occur during any season of the year. Therefore, the future occurrence of floods in Snyder County can be considered highly likely as defined by the Risk Factor Methodology probability criteria (see Table 4.7.2-1). Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. The NFIP uses historical records to determine the probability of occurrence for different extents of flooding. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year.

The NFIP recognizes the 1 percent annual chance flood, also known as the base flood, as the standard for identifying properties subject to federal flood insurance purchase requirements. A 1 percent annual chance flood is a flood that has a 1 percent chance of occurring over a given year. The Digital Flood Insurance Rate Maps (DFIRMs) are used to identify areas subject to the 1 and 0.2 percent annual chance flooding. Areas subject to 2 percent and 10 percent annual chance events are not shown on maps; however, water surface elevations associated with these events are included in the flood source profiles contained in the Flood Insurance Study Report. Table 4.5.3-5 shows a range of flood recurrence intervals and associated probabilities of occurrence.

TABLE 4.5.3.-5: RECURRENCE INTERVALS AND ASSOCIATED PROBABILITIES OF OCCURRENCE

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

VULNERABILITY ASSESSMENT

A flood, flash flood, ice jam occurrence is highly likely as defined by the Risk Factor Methodology (Section 4.4.1) and is a frequent event that affects every municipality annually in Snyder County. There is a high probability that the County will experience low- to high-impact flooding late in the winter and much of the spring seasons. The potential also exists for periodic flooding to occur along lakes, streams, rivers, and tributaries throughout the remainder of the calendar year.

The potential impacts that exist range from very low to catastrophic depending on the type and location of the flooding. The maximum threat to the County lies along the floodplains of the Susquehanna River and Penns Creek and the impact that flooding in these areas would have on the County's social and economic vitality. The eastern tier municipalities of Monroe, Penn, Union, and Chapman Townships, and the Boroughs of Shamokin Dam and Selinsgrove experience the maximum threat of flooding from the Susquehanna River. Selinsgrove Borough, Center, Jackson, and Penn Townships are at the maximum threat of flooding from Penn's Creek. The maximum threat for the County exists at the confluence of the Susquehanna River and Penns Creek, along the U.S. Route 11/15 transportation corridor in the vicinity of Selinsgrove and Shamokin Dam. Consequently, these dense population centers and surrounding residential communities would also experience the greatest impact.

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

The most likely secondary effect resulting from flooding is power failure. Power failures combined with a shortage of critical services and supplies could cause a public health emergency. Disruption in traffic patterns could place a strain on the County's transportation networks, increase the frequency of traffic accidents, and lead to a deterioration in emergency service coverage for both affected and unaffected areas. Flooding also has the potential to cause landslides along steep gradient areas and introduce hazardous materials into the environment as industrial, commercial, and public infrastructure facilities become inundated with floodwater. The most dangerous secondary effect would be the failure of dams in the County. Although unlikely, the possibility exists of the Susquehanna River forcing a total or partial failure of the Adam T. Bower Memorial Dam. More likely is the failure of smaller dams such as Walker and Faylor Lake Dams along Middle Creek and the Kern Run Dam. Additionally, small earthen and man-made dams along Penns Creek and Middle Creek are susceptible to failure, though their impact would be minimal.

Severe flooding may have long-term secondary effects that affect the population, economy, and infrastructure of the County. Escalating costs of damages to private structures and the frequency of flooding may cause permanent population displacement. Small businesses that contribute to the local economy may close if unable to recover from damages. Disruptions to commerce and/or transportation nodes may have an adverse effect on municipal economies in affected areas. And critical infrastructure, such as sewage and water treatment facilities, may be irreparably damaged.

PEMA conducted a 2018 HAZUS-MH report for 1 percent-annual-chance flood event in Pennsylvania. The County ran a similar report for 2019 through our GIS department. Estimated total economic losses for a 1 percent-annual-chance flood event across the entire Commonwealth equal $22,475,000,000, $22,329,000,000 of which are building-related losses. The 1 percent-annual-chance flood simulation results in displacement of 110,336 households and a corresponding shelter requirement of 158,820 people. In Table- 4.5.3-6 are the results for Snyder County.

TABLE 4.5.3-6: HAZUS-MH RESULTS FOR A 1 PERCENT-ANNUAL-CHANCE FLOOD EVENT IN SNYDER COUNTY

COUNTY	NO. OF BUILDINGS IMPACTED	TOTAL BUILDING-RELATED LOSSES (MILLION $)	TOTAL ECONOMIC LOSS (MILLION $)	SHELTER REQUIREMENTS (PEOPLE)	HOUSEHOLDS DISPLACED	ESTIMATED 2019 POPULATION
Snyder	186	147.81	148.66	827	749	40,372

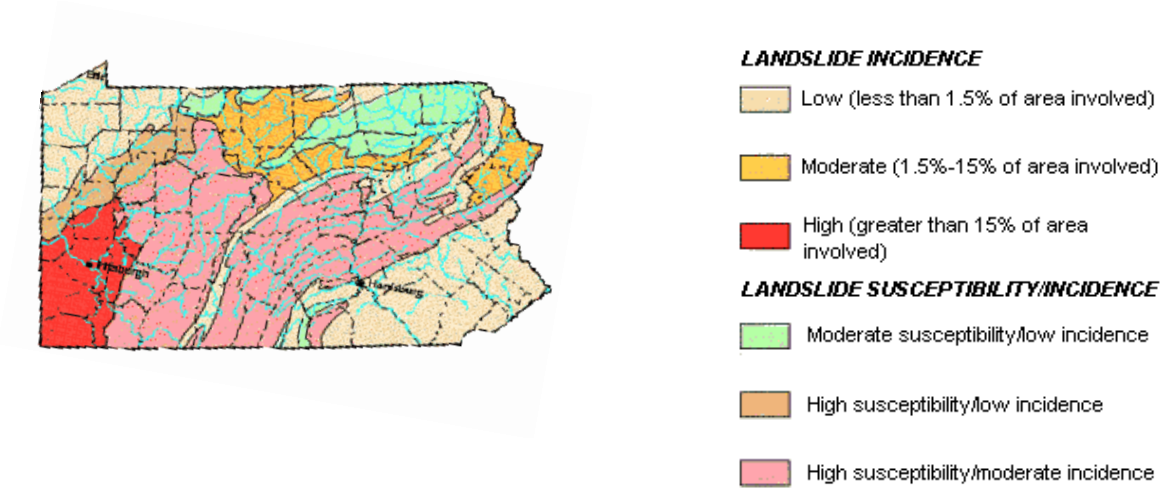
4.5.4 LANDSLIDE

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

LOCATION AND EXTENT

Snyder County is not prone to landslides. As seen in the Landslide Overview Map below by the USGS, Snyder County's vulnerability to a landslide is high with a moderate rate of incidence. The most vulnerable and dangerous places for landslides are along transportation routes and pipeline pathways. Roadways are often blocked with soil and rocks from recent landslides. The most likely time an injury or death from a landslide will be reported is when it happens on a roadway. Pipelines are dangerous places for landslides because of the materials in the pipeline. Often carrying hazardous materials through rural areas, pipeline breaks from landslides can contaminate soils, waterways, and other natural habitats. Some of the secondary effects of a landslide include utilities failure, dam failure, hazardous materials spill, and transportation accidents/roadway damage. Much like earthquakes, landslides will occur several times a year and may go unnoticed.

FIGURE 4.5.4-1: LANDSLIDE INCIDENCE



The USGS identifies Snyder County as falling Combo-High, meaning high susceptibility to land sliding and moderate incidence.

RANGE OF MAGNITUDE

Landslides cause damage to transportation routes, utilities, and buildings and create travel delays and other side effects. Fortunately, deaths and injuries due to landslides are rare in Pennsylvania and no deaths have been reported in Snyder County. Almost all of the known deaths due to landslides have occurred when rockfalls or other slides along highways have involved vehicles. Storm-induced debris flows are the only other type of landslide likely to cause death and injury. As residential and recreational development increases on and near steep mountain slopes, the hazard from these rapid events will also increase. Most Pennsylvania landslides are moderate to slow moving and damage property rather than people.

PennDOT and large municipalities incur substantial costs due to landslide damage and to extra construction costs for new roads in known landslide-prone areas. A 1991 estimate showed an average of $10 million per year is spent on landslide repair contracts across the Commonwealth, and a similar amount is spent on mitigation costs for grading projects (DCNR, 2010).

A worst-case scenario for a landslide incident in Snyder County would be for debris to slide onto Route 11/15, along the Susquehanna River, during peak hours. This could result in major backups and possibly traffic accidents.

PAST OCCURRENCES

No comprehensive list of landslide incidents is available at this time, as there is no formal reporting system in place in the County or the Commonwealth. Based on anecdotal information from the County and municipal officials, minor landslides occur each year, typically during periods of heavy rains.

FUTURE OCCURRENCES

Based on historical events, landslide events resulting in loss of life and property damage are unlikely in Snyder County. However, with mixed susceptibility to landslides, the probability of landslides occurring in the County is possible. Mismanaged, intense development in steeply sloped areas could increase the frequency of occurrence. Landslide is a low occurrence as defined by the Risk Factor Methodology (Section 4.7.2).

VULNERABILITY ASSESSMENT

Snyder County is not particularly vulnerable to landslides. However, transportation routes throughout the County located at the base or crest of cliffs should be considered vulnerable to this hazard.

4.5.5 TORNADO, WINDSTORM

A windstorm can occur during severe thunderstorms, winter storms, coastal storms, or tornadoes. Straight-line winds such as a downburst have the potential to cause wind gusts that exceed 100 miles per hour. Based on 40 years of tornado history and over 100 years of hurricane history, FEMA identifies western and central Pennsylvania as being more susceptible to higher winds than eastern Pennsylvania (FEMA, 1997). A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes or tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and windblown debris. According to the NWS, tornado wind speeds can range between 30 to more than 300 miles per hour.

Tornadoes are more likely to occur during the spring and early summer months of March through June and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small, short-lived tornadoes can inflict tremendous damage. Destruction ranges from minor to catastrophic depending on the intensity, size, and duration of the storm. Structures made of light materials such as mobile homes are most susceptible to damage.

LOCATION AND EXTENT

Tornadoes and windstorms can occur throughout Snyder County, though events are usually localized. However, severe thunderstorms may result in conditions favorable to the formation of numerous or long-lived tornadoes. Tornadoes can occur at any time during the day or night, but are most frequent during late afternoon into early evening, the warmest hours of the day, and most likely to occur during the spring and early summer months of March through June. Tornado movement is characterized in two ways: direction and speed of spinning winds, and forward movement of the tornado, also known as the storm track.

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

Straight-line winds and windstorms are experienced on a more regional scale. While such winds usually accompany tornadoes, straight-line winds are caused by the movement of air from areas of higher pressure to areas of lower pressure. Stronger winds are the result of greater differences in pressure. Windstorms are generally defined with sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration.

RANGE OF MAGNITUDE

Each year, tornadoes account for $1.1 billion in damages and cause over 80 deaths nationally (NCAR, 2001). While the extent of tornado damage is usually localized, the vortex of extreme wind associated with a tornado can result in some of the most destructive forces on Earth. Rotational wind speeds can range from 100 mph to more than 250 mph. In addition, the speed of forward motion can range from 0 to 50 mph. Therefore, some estimates place the maximum velocity (combination of ground speed, wind speed, and upper winds) of tornadoes at about 300 mph. The damage caused by a tornado is a result of the high wind velocity and windblown debris, also accompanied by lightning or large hail. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

Damages and deaths can be especially significant when tornadoes move through populated, developed areas. The destruction caused by tornadoes ranges from minor to extreme, depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light construction such as mobile homes. The Enhanced Fujita Scale, also known as the EF-Scale, measures tornado strength and associated damages. The EF-Scale is an update to the earlier Fujita Scale, also known as the F-Scale that was published in 1971. It classifies U.S. tornadoes into six intensity categories, as shown in Table 4.5.5-1, based upon the estimated maximum winds occurring within the wind vortex.

Since its implementation by the NWS in 2007, the EF-Scale has become the definitive metric for estimating wind speeds within tornadoes based upon damage to buildings and structures. F-Scale categories with corresponding EF-Scale wind speeds are provided in Table 4.5.5-1, since the magnitude of previous tornado occurrences is based on the F-Scale.

TABLE 4.5.5-1: ENHANCED FUJITA SCALE (EF-SCALE) CATEGORIES WITH ASSOCIATED WIND SPEEDS AND DESCRIPTION OF DAMAGES

EF-SCALE NUMBER	WIND SPEED (MPH)	F-SCALE NUMBER	TYPE OF DAMAGE POSSIBLE
EF0	65–85	F0-F1	Minor damage: Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	F1	Moderate damage: Roofs severely stripped; mobile homes overturned

EF-SCALE NUMBER	WIND SPEED (MPH)	F-SCALE NUMBER	TYPE OF DAMAGE POSSIBLE
			or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111–135	F1-F2	Considerable damage: Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136–165	F2-F3	Severe damage: Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166–200	F3	Devastating damage: Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	F3-F6	Extreme damage: Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft; steel reinforced concrete structure badly damaged; high-rise buildings have significant structural deformation.

The worst-case scenario of a tornado for Snyder County occurred in 1980 when a Category 2 storm hit the County. A total of $600,000 in damages and seven injuries were the result of the storm. On July 17, 1992, an F1 storm killed 1 people, injured 4, and caused $250,000 in property damage. Other tornadoes that have occurred in Snyder County have caused significant damage, but have not been as devastating as the 1980 incident.

On April 28, 2011, a fast-moving upper-level impulse and attendant surface low-pressure system moved across the Great Lakes Region. An unseasonably warm and relatively moist air mass/surface temperatures in the 70s to low 80s and dew points in the upper 50s resided over central Pennsylvania in advance of this system and aided in strong destabilization. The moderate instability combined with strong vertical wind shear profiles promoted organized thunderstorms with supercells and bowing line segments. Large hail and damaging winds were the main threats; however, sufficient low-level wind shear was present to support isolated tornadoes. A tornado watch was issued around 1500 EDT on April 27, 2011. The severe weather threat continued through the evening and into the overnight and early morning hours on April 28, 2011. By this time, thunderstorms had evolved into largely north-south oriented clusters or broken lines with embedded supercell structures. Above-normal soil moisture from recent heavy rains combined with high stream-flows and intense, short duration rainfall contributed to flash flooding. The storms finally exited the region by mid-morning on April 28, 2011. Thunderstorm winds estimated between 60 and 70 mph knocked down trees and caused minor structural damage in Middleburg. The structural damage was generally limited to only one or two concentrated areas. Since tornado events are typically localized, environmental impacts are rarely widespread. However, where these events occur, severe damage to plant species is likely. This includes loss of trees and an increased threat of wildfire in areas where dead trees are not removed.

PAST OCCURRENCES

Tornadoes have occurred in all seasons and in all regions of Pennsylvania, but the northern, western, and southeastern portions of the Commonwealth have been struck more frequently. A list of tornado events that have occurred in Snyder County between 1957 and 2011 is shown in Table 4.5.5-2 with an associated Fujita Tornado Scale magnitude, location, and losses to life and property.

TABLE 4.5.5-2: PAST OCCURRENCES OF TORNADOES, THUNDERSTORM WIND COMPILED BY NOAA

DATE	EVENT	LOCATION	MAGNITUDE	FATALITIES	INJURIES	PROPERTY DAMAGE ($)
09/15/1957	Tornado		0	0	2	25,000
06/06/1973	Thunderstorm Wind			0	0	0
08/10/1973	Thunderstorm Wind			0	0	0
07/10/1974	Thunderstorm Wind			0	0	0
08/02/1974	Thunderstorm Wind			0	0	0
07/19/1977	Thunderstorm Wind			0	0	0
08/28/1978	Tornado		2	0	1	25,000
06/05/1979	Thunderstorm Wind			0	0	0
04/09/1980	Tornado		2	0	0	250,000
04/17/1982	Thunderstorm Wind			0	0	0
11/20/1989	Thunderstorm Wind			0	0	0
07/09/1990	Thunderstorm Wind			0	0	0
05/13/1991	Thunderstorm Wind			0	0	0
11/17/1992	Tornado		1	0	4	250,000
04/16/1993	Tornado	Troxelville	0	0	0	50,000
06/24/1994	Thunderstorm Wind	Middleburg		0	0	0
06/06/1994*	Tornado		1	0	0	0
10/05/1995	Thunderstorm Wind	Middleburg		0	0	0
11/14/1995	Thunderstorm Wind	Selinsgrove		0	0	0
04/23/1996	Thunderstorm Wind	Beaver Springs		0	0	0
06/12/1996	Thunderstorm Wind	Port Trevorton		0	0	0
07/26/1996	Thunderstorm Wind	Kreamer		0	0	0
10/18/1996	Thunderstorm Wind	Selinsgrove		0	0	0
11/08/1996	Thunderstorm Wind	Beaver Spgs		0	0	0

DATE	EVENT	LOCATION	MAGNITUDE	FATALITIES	INJURIES	PROPERTY DAMAGE ($)
05/03/1997	Thunderstorm Wind	Mt Pleasant Mills		0	0	0
05/19/1997	Thunderstorm Wind	Shamokin Dam		0	0	0
08/16/1997	Thunderstorm Wind	Selinsgrove		0	0	0
06/16/1998	Thunderstorm Wind	Selinsgrove		0	0	0
06/30/1998	Thunderstorm Wind	Middleburg		0	0	0
09/07/1998	Thunderstorm Wind	McClure		0	0	0
07/09/1999	Thunderstorm Wind	Middleburg		0	0	10,000
08/13/1999	Thunderstorm Wind	Selinsgrove		0	0	10,000
09/29/1999	Thunderstorm Wind	Middleburg		0	0	5,000
06/02/2000	Thunderstorm Wind	Beaver Spgs		0	0	2,000
06/11/2000	Thunderstorm Wind	Kratzerville		0	0	3,000
06/11/2000	Thunderstorm Wind	Shamokin Dam		0	0	3,000
06/21/2000	Thunderstorm Wind	Selinsgrove		0	0	2,000
06/12/2001	Thunderstorm Wind	Selinsgrove		0	0	0
07/10/2001	Thunderstorm Wind	Selinsgrove		0	0	0
08/31/2001	Thunderstorm Wind	Port Trevorton		0	0	0
03/09/2002	Thunderstorm Wind	Selinsgrove		0	0	0
04/28/2002	Thunderstorm Wind	Kratzerville		0	0	0
07/21/2003	Thunderstorm Wind	Beaver Spgs		0	0	0
08/17/2003	Thunderstorm Wind	Shamokin Dam		0	0	0
06/17/2004	Thunderstorm Wind	Shamokin Dam		0	0	0
08/04/2004	Thunderstorm Wind	Selinsgrove		0	0	0
08/10/2004	Thunderstorm Wind	Middleburg		0	0	0
07/27/2005	Thunderstorm Wind	Port Trevorton		0	0	0
07/27/2006	Thunderstorm Wind	Selinsgrove		0	0	0
06/19/2006	Thunderstorm Wind	Freeburg		0	0	0
06/19/2006	Thunderstorm Wind	Selinsgrove		0	0	0
6/22/2006	Thunderstorm Wind	Selinsgrove		0	0	0

DATE	EVENT	LOCATION	MAGNITUDE	FATALITIES	INJURIES	PROPERTY DAMAGE ($)
07/02/2006	Thunderstorm Wind	Port Trevorton		0	0	0
10/04/2006	Thunderstorm Wind	Selinsgrove		0	0	0
12/01/2006	Thunderstorm Wind	Selinsgrove		0	0	0
06/08/2007	Thunderstorm Wind	Beaver Spgs Arpt		0	0	0
06/13/2007	Thunderstorm Wind	Middleburg		0	0	0
06/19/2007	Thunderstorm Wind	Beaver Spgs Arpt		0	0	0
06/19/2007	Thunderstorm Wind	Selinsgrove		0	0	0
06/27/2007	Thunderstorm Wind	Selinsgrove		0	0	0
6/29/2008	Thunderstorm Wind	Middleburg		0	0	0
07/17/2008	Thunderstorm Wind	Beaver Spgs Arpt		0	0	0
07/20/2008	Thunderstorm Wind	McClure		0	0	0
07/11/2009	Thunderstorm Wind	Selinsgrove Arpt		0	0	5,000
07/25/2009	Thunderstorm Wind	Clifford		0	0	5,000
08/18/2009	Thunderstorm Wind	Kreamer		0	0	5,000
04/16/2010	Thunderstorm Wind	Beaver Spgs Arpt		0	0	5,000
07/12/2010	Thunderstorm Wind	Mt Pleasant Mills		0	0	5,000
04/28/2011	Thunderstorm Wind	Middleburg		0	0	7,500
07/08/2011	Thunderstorm Wind	Middleburg Beavertown Beaver Spgs		0	0	8,500
07/09/2015	Tornado	Selinsgrove	EF0	0	0	10,000
08/04/2017	Thunderstorm Wind	Port Trevorton		0	0	30,000

SOURCE: "TORNADO PROJECT" (2018)

FUTURE OCCURRENCES

According to the NWS, the Commonwealth of Pennsylvania has an annual average of 10 tornadoes with two related deaths. While the chance of being hit by a tornado is small, the damage that results when the tornado arrives is devastating. An F4 tornado, with a 0.019 percent annual probability of occurring, can carry wind velocities of 200 mph, resulting in a force of more than 100 pounds per square foot of surface area. This is a "wind load" that exceeds the design limits of most buildings. Tornado,

Windstorm is moderately likely to occur in Snyder County as defined by the Risk Factor Methodology (Section 4.4.1)

Based on historical events between 1950 and 1998, there are three zones in Pennsylvania that experience less than one, one to five, and six to fifteen F3, F4, and F5 tornadoes per 3,700 square miles. Snyder County, as shown in the figure below, is expected to have one to five tornadoes annually. Using the Risk Factor Methodology in Table 4.7.2-1, participants in this Plan's development have indicated that they feel a tornado event is likely.

VULNERABILITY ASSESSMENT

Five tornadoes have occurred in Snyder County since 1957. Because of this, it is probable that a tornado could occur in the County every five years or less. However, the threat of such a storm depends largely on its strength and its location. Due to the size of the County, all municipalities are equally vulnerable to tornadoes. Yet, Snyder County does not fall into the major tornado pathways of the Commonwealth – the southeastern and southwestern corners.

Since high-wind events may affect the entire County, it is important to identify specific critical facilities and assets that are most vulnerable to the hazard. Due to their lightweight and often unanchored design, mobile homes and commercial trailers are extremely vulnerable to high winds and will generally sustain the most damage.

The most common secondary effect of tornadoes is power outages. The severe wind strength of these storms has the ability to dismantle power sources in its path. Structural damage can also be great, resulting in difficult redevelopment of the affected area.

4.5.6 WILDFIRE

A wildfire is a raging, uncontrolled fire that spreads rapidly through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that can be seen for miles. Wildfires can occur at any time of the year, but mostly occur during long, dry hot spells. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in fields, grass, brush, and forests. Ninety-eight percent of wildfires in Pennsylvania are a direct result of people, often caused by debris burns (PA DCNR, 2009).

LOCATION AND EXTENT

Wildfires take place in less developed or completely undeveloped areas, spreading rapidly through vegetative fuels. Because there are many areas throughout Snyder County that are covered by trees, the County is vulnerable to wildfires. The U.S. Environmental Protection Agency (EPA) estimates that Snyder County has over 101,435 acres of forest, making up 47.82 percent of Snyder County's overall land. The forest contains second- and third-growth trees. Deciduous trees are the most prevalent type. The most common deciduous species in Snyder County are oak and hickory. Other common deciduous species found in Snyder County include elm, ash, red maple, aspen, and birch.

Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands. The greatest potential for wildfires is in the spring months of March, April, and May, and the autumn months of October and November. In the spring, bare trees allow sunlight to reach the forest floor, drying fallen

leaves and other ground debris. In the fall, dried leaves are also fuel for fires. Ninety-eight percent of wildfires in Pennsylvania are caused by people, often by debris burns (DCNR, 2009).

RANGE OF MAGNITUDE

Wildfire events can range from small fires that can be managed by local firefighters to large fires impacting many acres of land. Large events may require evacuation from one or more communities and necessitate regional or national firefighting support. The impact of a severe wildfire can be devastating. A wildfire has the potential to kill people, livestock, fish, and wildlife. It often destroys property, valuable timber, forage, and recreational and scenic resources.

In addition to the risk wildfires pose to the general public and property owners, the safety of firefighters is also a concern. Although loss of life among firefighters does not occur often in Pennsylvania, it is always a risk. More common firefighting injuries include falls, sprains, abrasions, or heat-related injuries such as dehydration. Response to wildfires also exposes emergency responders to the risk of motor vehicle accidents and can place them in remote areas away from the communities that they are chartered to protect.

The impact of a severe wildfire can be devastating. The most significant environmental impact is the potential for severe erosion, silting of stream beds and reservoirs, and flooding due to ground cover loss following a fire event. Wildfires can also have a positive environmental impact, in that they burn dead trees, leaves, and grass to allow more open spaces for new vegetation to grow and receive sunlight. Another positive effect is that a wildfire stimulates the growth of new shoots on trees and shrubs, and its heat can open pine cones and other seed pods.

PAST OCCURRENCES

According to the NCDC, no significant wildfires have been recorded in Snyder County.

FUTURE OCCURRENCES

Weather conditions like drought can increase the likelihood of wildfires occurring. Any fire, without the quick response or attention of firefighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire.

Rural fires, or wildfires, have a low probability in Snyder County, happening every 30 years or more. The rural nature of the County makes it prone to wildfires; however, no significant fires have been recorded throughout the County's history. Wildfires are considered moderate risk as defined by the Risk Factor Methodology (see Section 4.7.2).

VULNERABILITY ASSESSMENT

Wildfires present a greater threat to the rural areas of the County than to the more populated areas. Snyder County is predominately rural. Therefore, most of the rural municipalities are susceptible to wildfires.

Although no significant wildfires have been recorded by the NCDC for Snyder County, the rural nature of the County makes it prone to wildfires. The size and impact of a wildfire depends on its location, climate conditions, and the response of firefighters. If the right conditions exist, these factors can usually mitigate the effects of wildfires. However, in times of drought wildfires can be devastating. Another

cause of wildfires is lightning strikes. However, human carelessness and negligence is the leading factor, causing 98 percent of wildfires in Pennsylvania.

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

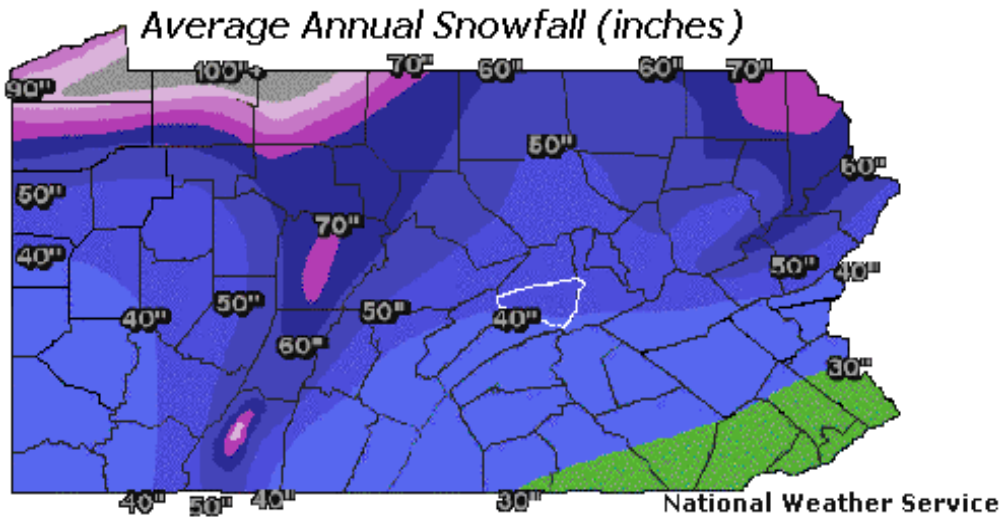
If a wildfire occurs, and is not confined, certain secondary hazards may affect the County. A power outage may be the most prevalent of these secondary effects. Environmental hazards may also happen as a result of a wildfire. The fire may spread to where certain chemical or debris is deposited in the water system. Other secondary effects include loss of property, disruption in the continuity of government, and loss of services.

4.5.7 WINTER STORM

LOCATION AND EXTENT

Winter storms are regional events. Every county in the Commonwealth is subject to severe winter storms, including Snyder County. Snyder County generally receives the same amount of snowfall throughout its area, with the exception being the most southern tip of the County. On average the County receives 40 to 50 inches of snow annually. The southern portion of the County receives 30 to 40 inches of snow annual (PEMA).

MAP 4.5.7-1: AVERAGE ANNUAL SNOWFALL (INCHES)



RANGE OF MAGNITUDE

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

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

Heavy Snowstorm: Accumulations of four inches or more in a six-hour period, or six inches or more in a 12-hour period.

Sleet Storm: Significant accumulations of solid pellets that form from the freezing of raindrops or partially melted snowflakes, causing slippery surfaces that pose hazards to pedestrians and motorists.

Ice Storm: Significant accumulations of rain or drizzle freezing on objects (trees, power lines, roadways, etc.) as it strikes them, cause slippery surfaces and damage from the sheer weight of ice accumulation.

Blizzard: Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile lasting over an extended period of time.

Severe Blizzard: Wind velocity of 45 miles per hour, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in feet lasting over an extended period of time.

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

Map 4.5.7-1 shows mean annual snowfall in Snyder County to be between 40 and 50 inches. Two of the 15 Presidential Disaster and Emergency Declarations affecting Snyder County have been in response to hazard events related to winter storms (see Table 4.3-1).

Snyder County has seen recorded snowstorms as well. In Table 4.5.7-1, records for consecutive snowfall (1-day, 2-day, and 3-day) are shown for each month. Measurements were taken from Beavertown Borough on the west side of the County and Selinsgrove Borough on the east side.

TABLE 4.5.7-1: SNYDER COUNTY HAS SEEN RECORD SNOWFALLS (MEASUREMENTS WERE TAKEN IN BEAVERTOWN/SELINSGROVE)

MONTH	1-DAY SNOWFALL	2-DAY SNOWFALL	3-DAY SNOWFALL	NYRS
January	29.0	30.0	30.0	41
February	22.0	22.3	22.3	40
March	21.0	27.0	27.0	43
April	28.0	33.0	33.0	83

MONTH	1-DAY SNOWFALL	2-DAY SNOWFALL	3-DAY SNOWFALL	NYRS
May	NA	NA	.3	74
June	0	0	0	70
July	0	0	0	70
August	0	0	0	70
September	0	0	0	70
October	4.0	4.0	4.0	79
November	22.1	25.6	25.6	52
December	14.0	18.0	18.0	83

- ALL SNOWFALL AMOUNTS ARE IN INCHES.
- NYRS = NUMBER OF YEARS WITH NON-MISSING DATA.
- SOURCE: NOAA

PAST OCCURRENCES

Snyder County and the Commonwealth of Pennsylvania have a long history of severe winter weather. Significant winter storm events that have affected Snyder County since 1994 are listed below. The NCDC data on past occurrence for winter storm events since 1994 is the only comprehensive list of data available for the County, aside from information from past disaster declarations.

TABLE 4.5.7-2: 1994-2018 WINTER STORM EVENTS

DATE	TYPE	DATE	TYPE
11/27/1994	Freezing Rain and Sleet	3/14/1999	Heavy Snow
12/9/1994	Freezing Rain	1/25/2000	Heavy Snow
1/1/1995	Snow Drought	1/30/2000	Heavy Snow
1/6/1995	Winter Strom	2/13/2000	Ice Storm
1/11/1995	Freezing Rain	2/18/2000	Winter Storm
1/31/1995	Freezing Rain	12/13/2000	Winter Storm
2/3/1995	Heavy Snow	3/4/2001	Heavy Snow
2/15/1995	Freezing Rain	1/6/2002	Heavy Snow
2/26/1995	Light Snow	12/5/2002	Heavy Snow
2/27/1995	Freezing Rain	12/10/2002	Ice Storm
3/8/1995	Snow	12/25/2002	Heavy Snow
6/1/1995	Snow Drought	2/16/2003	Heavy Snow
11/14/1995	Winter Storm	2/3/2004	Heavy Snow
12/19/1995	Winter Storm	2/6/2004	Ice Storm
1/2/1996	Heavy Snow	3/16/2004	Heavy Snow
1/12/1996	Heavy Snow	3/19/2004	Heavy Snow

3/7/1996	Heavy Snow	1/5/2005	Winter Storm
2/13/1997	Winter Strom	2/24/2005	Heavy Snow
12/29/1997	Heavy Snow	3/1/2005	Heavy Snow
1/15/1998	Ice Storm	2/13/2007	Winter Storm
1/22/1998	Ice Storm	2/1/2008	Winter Storm
2/23/1998	Heavy Snow	2/5/2010	Winter Storm
1/2/1999	Winter Storm	2/9/2010	Winter Storm
1/8/1999	Winter Storm	2/1/2011	Winter Storm
1/14/1999	Winter Storm	3/13/2017	Winter Storm

In the winter of 1993-1994, the Commonwealth was hit by a series of protracted winter storms. The severity and nature of these storms, combined with accompanying record-breaking frigid temperatures, posed a major threat to the lives, safety, and well-being of Commonwealth residents and caused major disruptions to the activities of schools, businesses, hospitals, and nursing homes.

One of these devastating winter storms occurred in early January 1994, with record snowfall depths in many areas of the Commonwealth, strong winds, and sleet/freezing rains. Numerous storm-related power outages were reported and as many as 600,000 residents were without electricity, in some cases for several days at a time. A ravaging ice storm followed that closed major arterial roads and downed trees and power lines. Utility crews from a five-state area were called to assist in power restoration repairs. Officials from PPL Corporation stated that this was the worst winter storm in the history of the company; related damage-repair costs exceeded $5,000,000.

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

The record cold conditions resulted in numerous water-main breaks and interruptions of service to thousands of municipal and city water customers throughout the Commonwealth. Additionally, the extreme cold in conjunction with accumulations of frozen precipitation resulted in acute shortages of road salt. As a result, trucks were dispatched to haul salt from New York to expedite deliveries to PennDOT storage sites.

FUTURE OCCURRENCE

Winter storms are a regular, annual occurrence in Snyder County and should be considered highly likely as defined by the Risk Factor Methodology (see Table 4.7.2-1).

VULNERABILITY ASSESSMENT

Based on the available information, all communities in Snyder County are essentially equally vulnerable to the direct impacts of winter storms. Because of the frequency of winter storms, strategies have been

developed to respond to these events. Snow removal and utility repair equipment is available to respond to typical events. The use of auxiliary heat and power supplies such as wood-burning stoves, kerosene heaters, and gasoline-power generators reduces the vulnerability of humans to extreme cold temperatures commonly associated with winter storms. People residing in structures lacking adequate equipment to protect against cold temperatures or significant snow and ice are more vulnerable to winter storm events. Even for communities that are prepared to respond to winter storms, severe events involving snow accumulations that exceed six or more inches in a 12-hour period can cause a large number of traffic accidents, cause motorists to be stranded due to snow drifts, interrupt power supply and communications, and cause the failure of inadequately designed and/or maintained roof systems

The major secondary effects of severe weather are flooding and power outages. Heavy rain, as well as melting snow, can lead to a large amount of groundwater that cannot be contained by streams and rivers. Power outages can be caused by large amounts of ice, as well as windstorms, winter storms, and heavy rain.

4.5.8 SUBSIDENCE

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

LOCATION AND EXTENT

There are two common causes of subsidence in Pennsylvania: (1) dissolution of carbonate rock such as limestone or dolomite and (2) mining activity. In the first case, water passing through naturally occurring fractures and bedding planes dissolves bedrock leaving voids below the surface. Eventually, overburden on top of the voids collapses, leaving surface depressions resulting in Karst topography. Characteristic structures associated with Karst topography include sinkholes, linear depressions, and caves. Often, a subsurface solution of limestone will not result in the immediate formation of Karst features. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material.

Snyder County has some distribution of limestone bedrock. The thick sequences of structurally deformed carbonates comprise the surface bedrock of a sizable area in central, south-central, and southeastern Pennsylvania. The carbonate rock formations, which are Cambrian through Devonian in age, have developed Karst landforms, resulting in significant land-subsidence problems. Common sinkhole locations in Pennsylvania include the Saucing Valley of Lehigh County, the greater Harrisburg metropolitan area in Dauphin and Cumberland Counties, and the Dittany Valley in Blair, Centre, and Clinton Counties.

Human activity can also result in subsidence or sinkhole events. Leaking water pipes or structures that convey stormwater runoff may also result in areas of subsidence as the water dissolves substantial amounts of rock over time. In some cases, construction, land grading, or earthmoving activities that

cause changes in stormwater flow can trigger sinkhole events. Subsidence or sinkhole events may occur in the presence of mining activity, even in areas where bedrock is not necessarily conducive to their formation. Subsurface (i.e., underground) extraction of materials such as oil, gas, coal, metal ores (i.e., copper, iron, and zinc), clay, shale, limestone, or water may result in slow-moving or abrupt shifts in the ground surface.

Sinkholes generally develop where the cover above a mine is thin. Piggott and Eynon (1978) indicated that sinkhole development normally occurs where the interval to the ground surface is less than three to five times the thickness of the extracted seam and the maximum interval is up to 10 times the thickness of the extracted seam. In western Pennsylvania, most sinkholes develop where the soil and rock above a mine are less than 50 feet thick (Bruhn et al., 1978). A study of subsidence in the Pittsburgh area revealed that the majority of sinkholes, which constituted about 95 percent of all reported subsidence incidents, occurred on sites located less than 60 feet above mine level (Bruhn et al., 1981).

RANGE OF MAGNITUDE

No two subsidence areas or sinkholes are exactly alike. Variations in size and shape, time period under which they occur (i.e., gradually or abruptly), and their proximity to development ultimately determines the magnitude of damage incurred. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs. Primarily, problems related to subsidence include the disruption of utility services and damages to private and public property including buildings, roads, and underground infrastructure. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result. If mitigation measures are not taken, the cost to fill in and stabilize sinkholes can be significant, although sinkholes are limited in extent.

PAST OCCURRENCES

There have been no recorded subsidence or sinkhole events in Snyder County.

FUTURE OCCURRENCES

Based on geological conditions and current mining activity in Pennsylvania, the annual occurrence of subsidence and sinkhole events in areas of the Commonwealth underlain by carbonate rock or where mining occurs is considered likely. Subsidence is classified as low risk, as defined by the Risk Factor Methodology (see Section 4.7.2).

VULNERABILITY ASSESSMENT

Careful planning is the least costly and most effective method for reducing vulnerability to subsidence incidents. Municipalities could minimize the potential for sinkhole development through proper maintenance and updating of water utility lines. Zoning laws can also be enacted to regulate development within highly Karst topography areas. Currently, Snyder County has 16 critical facilities that can be impacted by subsidence. Table 4.5.8-1 shows estimated jurisdictional losses due to subsidence and sinkholes.

TABLE 4.5.8-1 ESTIMATED JURISDICTIONAL LOSSES DUE TO SUBSIDENCE AND SINKHOLES

NUMBER OF IMPACTED BUILDINGS	DOLLAR VALUE OF EXPOSURE, BUILDING AND CONTENTS
2,138	$684,608,000

SOURCE: SNYDER COUNTY HMP, 2014

4.6 HUMAN-MADE HAZARDS

4.6.1 DAM FAILURE

A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Dams provide benefits such as flood protection, power generation, drinking water, irrigation, and recreation. Failure of these structures results in an uncontrolled release of impounded water. Failures are relatively rare, but immense damage and loss of life is possible in downstream communities when such events occur. Aging infrastructure, hydrologic, hydraulic and geologic characteristics, population growth, and design and maintenance practices should be considered when assessing dam failure hazards (FEMA, 1997).

LOCATION AND EXTENT

Dam failures most often occur during or after a massive rainfall, flooding, or spring thaw, sometimes with little to no warning. Depending on the size of the water body where the dam is constructed, water contributions may come from distant upstream locations.

There are six dams in Snyder County that are registered with the U.S. Army Corps of Engineers (USACE) in the National Inventory of Dams. Of the six dams, five are considered high hazard dams, and therefore require Emergency Action Plans (EAPs). However, according to the National Inventory of Dams, only four of the five high hazard dams have plans. An inventory of Snyder County dams, including those that require an EAP, can be seen below in Table 4.6.1-1.

TABLE 4.6.1-1: SNYDER COUNTY DAM INVENTORY

SNYDER COUNTY DAM INVENTORY					
DAM NAME	OTHER NAMES/ FORMER NAMES	RIVER	OWNER	HAZARD	EAP COMPLETED
Adam T. Bower Memorial Dam	Sunbury Fabridam (Former)	Susquehanna River	DCNR - Bureau of State Parks	Low	Not Required
Ash Pond Number 2		TR Susquehanna River	PPL Montour LLC	High	Yes
Ash Pond Number 3		TR Susquehanna River	PPL Montour LLC	High	Yes
Kern Run Dam (PA-638	Beaver Springs Water Supply (Former)	North Branch Middle Creek	Spring Township Municipal Authority	High	Yes
Walker (PA-637)	Middle Creek/ Clarence F. Walker Lake (Former)	North Branch Middle Creek	PA Fish & Boat Commission	High	Yes
Faylor Lake Dam (PA-636)	Faylor Lake	Middle Creek	Commissioners of Snyder County	High	Yes

RANGE OF MAGNITUDE

Dam failures can pose a serious threat to communities located downstream from major dams. The impact of a dam failure is dependent on the volume of water impounded by the dam and the amount of population or assets located downstream. Catastrophic failures are characterized by the sudden, rapid, and uncontrolled release of impounded water or any other fluid or semi-fluid from a dammed impoundment or water body. The PA DEP defines a high hazard dam as "any dam so located as to endanger populated areas downstream by its failure" (def. added May 16, 1985, P.L. 32, No. 15). High hazard dams receive two inspections each year: once by a professional engineer on behalf of the owner and once by a PA DEP inspector (PA DEP, 2008).

Dam failures may or may not leave enough time for the evacuation of people and property, depending on their abruptness. Seepages in earth dams usually develop gradually, and if the embankment damage is detected early, downhill residents have at least a few hours or days to evacuate. Failures of concrete or masonry dams tend to occur suddenly, sending a wall of water and debris down the valley at more than 100 mph. Survival would be a matter of having the good fortune not to be in the flood path at the time of the break. Dam failures due to the overtopping of a dam normally give sufficient lead time for evacuation.

The worst dam failure in Pennsylvania was the Johnstown Flood of 1889. The worst-case scenario for a dam failure event in Snyder County would be if either Faylor Lake Dam or Ash Dam No. 1 were to fail. A breach at either of these dams could not only cause flooding in the communities downstream from the dams but could also result in a reduction of the amount and availability of potable water. A substantial loss of life and excessive economic loss could be expected, according to the Pennsylvania dam hazard potential classifications.

PAST OCCURRENCES

There have been two significant dam failures in Pennsylvania. The worst dam failure to occur in the United States took place in Johnstown, Pennsylvania, in 1889, which claimed 2,209 lives. Another dam failure took place in Austin, Pennsylvania (Potter County) in 1911, which claimed 78 lives. No major dam failures have been recorded in Snyder County. According to PEMA, minor dam failures occur annually, but the impact of these events is considered minimal.

FUTURE OCCURRENCES

Provided that adequate engineering and maintenance measures are in place, the future occurrence of dam failures in Snyder County can be considered less probable but is a high risk as defined by the Risk Factor Methodology criteria (see Table 4.7.2-1).

The presence of structural integrity and inspection programs significantly reduces the potential for major dam failure events to occur. The PA DEP inventories and regulates all dams that meet or exceed the following criteria (PA DEP, 2008):

- Impound water from a drainage area of greater than 100 acres
- Have a maximum water depth greater than 15 feet
- Have a maximum storage capacity of 50 acre-feet or greater

The construction, operation, maintenance, modification, and abandonment of dams is reviewed and monitored by PA DEP's Division of Dam Safety. Dams are evaluated based on categories such as slope stability, undermining seepage, and spillway adequacy.

VULNERABILITY ASSESSMENT

There is always the possibility that any dam could fail; however, the probability is low. According to PEMA, minor dam failures occur every year, but their impact is minimal. Usually they are low-volume releases that are unexpected, and do not cause loss of life or damage to the environment.

Snyder County contains three dams. The municipalities that contain these high hazard dams face the maximum threat of a significant dam failure. Kern Run Dam located in Beavertown, Walker Dam located in Troxelville, and Faylor Lake Dam located in Beaver Springs are all high hazard dams requiring EAPs.

The most prominent secondary effect of a dam failure is flooding. If the dam failure is severe, a large amount of water will enter the riverbeds, overflowing their banks. Depending upon the contents of the water and the path it takes, there may be significant environmental vulnerability due to a severe dam failure. However, most often dam failures will be minor with little to no secondary effects.

4.6.2 ENVIRONMENTAL HAZARDS

One of the greatest threats to those who reside in the Commonwealth is the constant production, storage, use, and transportation of hazardous materials. The release of these materials from a facility is less dangerous than the release of these materials while being transported. Hazardous materials include flammable liquids, solids, and gases, combustible liquids, explosives, blasting agents, radioactive materials, oxidizing materials, corrosive materials, poisons, refrigerated liquids, hazardous waste/substances, and other regulated material. The City of Philadelphia and the Delaware Valley Region, which is about 150 miles southeast of Snyder County, make up one of the leading industrial trade complexes in the nation. With the numerous forms of transportation available in Snyder County, hazardous materials such as chemicals, fuels, and other hazardous materials are frequently transported through the County. The carriers of hazardous materials must have response plans in place in the event of an accident.

Any facility in Pennsylvania that uses, manufactures, or stores hazardous materials must comply with Title III of the Superfund Amendments and Reauthorization Act (SARA). This is also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). These facilities must also comply with the reporting requirements, as amended, in Pennsylvania's Hazardous Materials Emergency Planning and Response Act (1990-165). Information about the chemicals that are being manufactured or processed in facilities can be found in the U.S. Environmental Protection Agency's (EPA) Toxic Release Inventory (TRI) database.

LOCATION AND EXTENT

Hazardous material releases pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. Hazardous materials can include toxic chemicals, infectious substances, biohazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive (PL 1990-165, §207(e)). Hazardous material releases can occur wherever hazardous materials are manufactured, used, stored, or transported. Such releases can occur along transportation routes or at fixed-site facilities. Hazardous material releases can result in human and wildlife injury, property damage, and contamination of air, water, and soils. Transportation of hazardous materials on highways involves tanker trucks or trailers that are responsible for the greatest

number of hazardous material release incidents. There are over 120,000 miles of highway in the state and many of those are used to transport hazardous materials (Center for Rural Pennsylvania, 2008). These roads also cross rivers and streams at many points and have the potential to pollute watersheds that serve as domestic water supplies for parts of the state. The potential also exists for hazardous material releases to occur along rail lines, as collisions and derailments of train cars can result in large spills. A number of severe rail events have occurred in Pennsylvania.

Hazardous materials can be transported by aircraft or by watercraft as well. Crashes, spills of materials, and fires on these vessels can pose a hazard. Fixed-site facilities that use, manufacture, or store hazardous materials in Pennsylvania pose a risk and must comply with both SARA Title III and the Commonwealth's reporting requirements under the Hazardous Materials Emergency Planning and Response Act (1990-165), as amended. These legislations require that all owners or operators of facilities that manufacture, produce, use, import, export, store, supply, or distribute any extremely hazardous substance, as defined by the EPA, at or above the threshold planning quantity, as established by the EPA, shall report to the county where the facility is located and to the Commonwealth that the facility is subject to the requirement to assist the Local Emergency Planning Committee (LEPC) in the development of an Off-Site Emergency Response Plan. The community right-to-know reporting requirements keep communities abreast of the presence and release of chemicals at individual facilities. As of 2019, there are 3,301 SARA Title III facilities in Pennsylvania and 9 in Snyder County. All of Snyder County's SARA facilities are listed in Table 4.6.2-2.

RANGE OF MAGNITUDE

Hazardous material releases can contaminate air, water, and soil, possibly resulting in death and/or injuries. Dispersion can take place rapidly when transported by water and wind. While often accidental, releases can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events. Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas. With a hazardous material release, whether accidental or intentional, there are several potentially exacerbating or mitigating circumstances that will affect its severity or impact. Mitigating conditions are precautionary measures taken in advance to reduce the impact of a release on the surrounding environment. Primary and secondary containment or shielding by sheltering-in-place protects people and property from the harmful effects of a hazardous material release. Exacerbating conditions – characteristics that can enhance or magnify the effects of a hazardous material release – include the following:

- **Weather conditions:** affect how the hazard occurs and develops
- **Micro-meteorological effects of buildings and terrain:** alter the dispersion of hazardous materials
- **Noncompliance with applicable codes (e.g., building or fire codes) and maintenance failures (e.g., fire protection and containment features):** can substantially increase the damage to the facility itself and to surrounding buildings

The severity of the incident is dependent on the circumstances described above, as well as the type of material released and the distance and related response time for emergency response teams. The areas within closest proximity to the releases are generally at greatest risk; yet depending on the agent, a release can travel great distances or remain present in the environment for a long period of time (e.g., centuries to millennia for radioactive materials), resulting in extensive impacts on people and the

environment. A worst-case scenario event of a hazardous material release occurred in March 2009 when a tractor trailer overturned, spilling 33,000 pounds of toxic hydrofluoric acid near Wind Gap, Pennsylvania, resulting in the evacuation of 5,000 people (*CNN*, 2009). Residents were evacuated because contact with concentrated solutions of the acid can cause severe burns and inhaling the gas can cause respiratory irritation, severe eye damage, and pulmonary edema.

PAST OCCURRENCES

The Commonwealth as a whole experienced 1,000 spills in 2003. Most hazardous spills occur on highways. According to the Bureau of Transportation Statistics, in 2000, of the 1,115 spills in Pennsylvania, 1,065 happened on highways. These spills cost the Commonwealth approximately $2.5 million in cleanup efforts. Table 4.6.2 -1 shows all of the hazardous material spills reported to the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, Office of Hazardous Material Safety (Material Incidents Hazmat Intelligence Portal, U.S. Department of Transportation, data as of November 1, 2012).

TABLE 4.6.2-1: REPORTED HAZARDOUS MATERIAL SPILLS IN SNYDER COUNTY

LOCATION	DATE OF INCIDENT	HAZARDOUS MATERIAL	HAZARD	FATALITIES	INJURIES	TOTAL AMOUNT IN DAMAGES	MODE OF TRANSPORTATION
Selinsgrove	5/3/1989	Flammable Liquids N.O.S.	Flammable - Combustible Liquid	0	0	0	Highway
Selinsgrove	7/8/1989	Sulfuric Acid Spent	Corrosive Material	0	0	0	Highway
Selinsgrove: 11& 15 at 23 Miles South I-80	6/10/1999	Corrosive Liquids N.O.S.	Corrosive Material	0	0	195000	Highway
Selinsgrove	11/16/1999	Petroleum Distillates N.O.S. Or Petroleum Products N.O.S.	Flammable - Combustible Liquid	0	0	0	Highway
Shamokin Dam	6/11/2001	Sulfuric Acid	Corrosive Material	0	0	0	Highway
Shamokin Dam	6/12/2002	Sulfuric Acid	Corrosive Material	0	0	0	Highway
Spring Township	5/10/2010	Petroleum Distillates N.O.S. or Petroleum Products N.O.S.	Flammable – Combustible Liquid	0	1	0	Highway

The EPA Toxic Release Inventory reports that over 3.5 trillion pounds of chemicals were released from facilities located in Pennsylvania between 1987 and 2008. Many of the companies responsible for releases have or are federally listed SARA Title III facilities.

FUTURE OCCURRENCES

While many hazardous material release incidents have occurred in Pennsylvania in the past, they are generally considered difficult to predict. An occurrence is largely dependent upon the accidental or intentional actions of a person or group. Risk associated with a hazardous material release is expected to remain moderate. Hazardous material release incidents occur annually in Pennsylvania, so a 100 percent annual probability is anticipated.

It is difficult to predict when and where environmental hazards will arise, as they are often related to equipment failure and human error. Adequate monitoring through the PA DEP will reduce the likelihood of potential impacts to the community and the environment.

VULNERABILITY ASSESSMENT

A hazardous material spill can be the result of human carelessness, an intentional act, or a natural hazard. Human carelessness occurs predominantly during the manufacturing, transporting, or storing of the material. An intentional act would be considered either a terrorist act, criminal act, or act of vandalism. A hazardous materials spill can be a secondary effect of a natural hazard (e.g., flooding, earthquake, or severe weather). State Route 11/15 is the route most often traveled by vehicles transporting hazardous materials, according to the 2002 Commodity Flow Study completed in Snyder County. However, hazardous materials were identified on State Routes 104, 35, and 522 as well.

According to SARA, facilities that store hazardous chemicals must disclose to public officials and citizens the types of chemicals stored, the amount of chemicals stored, and the exact locations of the chemicals stored in their facilities. In Table 4.6.2-2, all of the SARA facilities in Snyder County are listed.

TABLE: 4.6.2-2: SNYDER COUNTY SARA FACILITIES

FACILITY NAME	CITY
Wood-Mode Inc.	Kreamer
Farmland National Beef	Hummels Wharf
Panda Hummel Station LLC.	Shamokin Dam
Ply Gem Stone	Selinsgrove
Verizon North	Selinsgrove
Verizon	Shamokin Dam
Willard Battery	Shamokin Dam
Walmart	Hummels Wharf
Sunbury Generation LLC	Shamokin Dam

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

The maximum threat of a hazardous material spill is along the major transportation corridors and at chemical storage facilities. Such roadways include State Routes 104, 35, 522, and 11/15. Chemical storage facilities can be seen in the SARA facilities listed above. If a spill does occur, its impact can be measured based on the environmental, economic, and societal impacts. The maximum threat would be a hazardous material spill in a populated area that will impact the environment as well as the economy.

If the materials spilled are flammable, both urban and rural fires can occur (depending on the venue of the spill).

4.6.3 TRANSPORTATION ACCIDENTS

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

LOCATION AND EXTENT

Penn Valley Airport is Snyder County's main aviation facility. PennDOT's Bureau of Aviation classifies this as a general aviation facility. Several privately owned airfields also can be found in the County. The longest runway at the Penn Valley Airport is 3,800 feet x 75 feet and has a gross weight rating of 12,500 pounds. Services at this facility include major/minor repair, hangar rental, air taxi, charter, instructional services, and rental services.

Snyder County has over 850 miles of roadway: 632.49 miles (74.2%) are classified as local roads; 130.83 miles (15.3%) are collector roadways; and 86.91 miles (2.46%) are considered freeway systems. This mix of roadways makes Snyder County a "Rural Area System" (Snyder County HMP, 2006).

Rail service in Snyder County is limited to freight service provided by Norfolk Southern. No commuter service or inner-city passenger service is provided in the County. The closest passenger facilities are in Lewistown and Harrisburg, Pennsylvania. The primary rail line is the Bridge Route Line. This track serves business and industry in Kreamer, Selinsgrove, and Shamokin Dam, and connects the County with Harrisburg, Sunbury, upstate New York, Canada, and New England. The principle commodities shipped include grain, lumber, and coal. Some hazardous materials are also shipped. According to the County's 2002 Commodity Flow Study, U.S. Route 11/15 is the road most often traveled by vehicles transporting hazardous materials. Of the 355 incidents recorded in the Commodity Flow Study, 319 were identified on U.S. Route 11/15. Hazardous materials are also transported on State Routes 35 and 104, and U.S. Route 522. The Union/Snyder Transportation Alliance (USTA) is Snyder County's public transit system. This system, which provides service to both Snyder and Union Counties, provides transportation service for many County agencies, including the Union/Snyder Area Agency on Aging and the Union/Snyder Foster Grandparent Program. Private transportation systems include Greyhound, Susquehanna Trailways, and Rohrer Bus Service, with stops at Shamokin Dam and Selinsgrove.

RANGE OF MAGNITUDE

Significant transportation accidents can result in death or serious injury or extensive property loss or damage. Road and railway accidents in particular have the potential to result in hazardous material release.

PAST OCCURRENCES

The Penn Valley Airport in Selinsgrove has not witnessed an aviation incident since 2000, which was not a fatal crash. The last fatal crash that happened in Selinsgrove was in 1987. The pilot was conducting a demonstration flight in an overweight aircraft. Probable causes for the crash included conditions of low cloud ceilings and fog.

TABLE 4.6.3-1: PENN VALLEY AIRPORT'S AVIATION CRASH HISTORY

EVENT DATE	SEVERITY
10/4/2013	Nonfatal
4/3/2000	Nonfatal
8/28/1987	Fatal (3)
12/5/1985	Fatal (2)
1/27/1974	Nonfatal
6/28/1967	Nonfatal

6/24/1967	Nonfatal
2/28/1967	Nonfatal
1/22/1967	Nonfatal
12/30/1966	Nonfatal
12/30/1966	Nonfatal
2/13/1965	Nonfatal
5/24/1964	Nonfatal

SOURCE: SNYDER COUNTY HMP 2006

In 2017, Snyder County had 393 automotive crashes. Of these crashes,4 were fatal, 169 were crashes with injuries only, and 220 were crashes with property damage only. Tables 4.6.3-2 and 4.6.3-3 show five-year trends within Snyder County. This data was taken from *2017 Pennsylvania Crash Facts and Statistics*.

TABLE 4.6.3-2: TOTAL CRASHES – FIVE-YEAR TENDS

YEAR	NUMBER OF CRASHES
2013	382
2014	333
2015	398
2016	384
2017	393

TABLE 4.6.3-3: TOTAL PEDESTRIAN DEATHS – FIVE-YEAR TRENDS

YEAR	DEATHS
2013	1
2014	0
2015	1
2016	0
2017	0

Snyder County has seen some minor train derailments; however, none have caused fatalities or injuries. Snyder County has no recorded major pipeline breaks. No significant transit accidents or terrorist activities have occurred that involved Snyder County's mass transit entities.

FUTURE OCCURRENCES

The number of transportation-related accidents is expected to increase with increased vehicular usage. The trucking industry is expected to continue to grow, increasing the number of long-haul trucks operating in the County on a daily basis. Transportation incidents may increase slightly over the next five years without proper mitigation strategies in place. Therefore, based on this and past occurrences, the probability of transportation accidents is characterized as moderately likely.

The National Transportation Safety Board 2017 Preliminary Aviation Statistics show an average rate of aviation accidents nationwide is 5.667 accidents per 100,000 (.057%) flight hours. Therefore, the likelihood of an aviation incident in the County is considered low.

VULNERABILITY ASSESSMENT

There are over 40 aircraft based at the Penn Valley Airport, which conducts over 26,000 flights annually.

The odds of an aviation accident increase as the amount of aviation traffic increases. The vulnerability for a rail or highway accident is directly related to the population and traffic density of that area. The more populated an area, the more vulnerable it is to an accident. In the County, U.S. Route 11/15, between Selinsgrove and Shamokin Dam, receives the highest volume of traffic during the year. Other segments of U.S. Route 11/15 receive high volumes of traffic, as well. U.S. Route 522, east and west of Kreamer, and State Route 104, north of Mount Pleasant Mills, do not receive as high a volume, but still see a significant amount of vehicular traffic.

Possible secondary effects of transportation accidents include chemical/hazardous material spills, fires (both urban and rural), and utility failures (depending on the accident venue).

4.6.4 UTILITY INTERRUPTION

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

- **Geomagnetic Storms**, including temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation, and satellite systems (National Research Council, 1986)
- **Fuel or Resource Shortage,** resulting from supply chain breaks or secondary to other hazard events, for example (Mercer County, PA, 2005)
- **Electromagnetic Pulse,** originating from an explosion or fluctuating magnetic field and causing damaging current surges in electrical and electronic systems (Institute for Telecommunications Sciences, 1996)
- **Information Technology Failure**, due to software bugs, viruses, or improper use (Rainer Jr. et al., 1991)
- **Ancillary Support Equipment,** including electrical generating, transmission, system control, and distribution system equipment for the energy industry (Hirst and Kirby, 1996)
- **Public Works Failure,** such as damage to or failure of highways, flood control systems, deepwater ports and harbors, public buildings, bridges, dams (U.S. Senate Committee on Environment and Public Works, 2009)

- **Telecommunications System Failure,** including damage to data transfer, communications, and processing equipment, for example (FEMA, 1997)
- **Transmission Facility or Linear Utility Accident,** including liquefied natural gas leakages, explosions, facility problems, for example (U.S. Department of Energy, 2005)
- **Major Energy, Power, Utility Failure:** such as interruptions of generation and distribution, power outages (U.S. Department of Energy, 2000)

LOCATION AND EXTENT

Utility interruptions in Snyder County include disruptions in fuel, water, electric, and telecommunications capabilities, but the primary focus is on electric power failures. Utility interruptions are often a secondary effect of another hazard event. For example, windstorms and severe winter storms may bring down power lines and cause widespread disruptions in the delivery of electricity. Flooding at utility facilities can also disrupt supplies of potable water, electricity, and fuel. Utility interruptions occur countywide, and their geographic extent typically depends on the source of the utility interruption. Severe thunderstorms, tornadoes, and winter storms can also lead to more regional utility interruptions, while localized outages can be caused by traffic accidents or wind damage. Heat waves may also result in rolling blackouts where power may not be available for an extended period of time.

Electric – All 21 municipalities within Snyder County receive electric service from PPL Utilities, Inc. According to the U.S. Department of Energy, a 500-volt line runs through Snyder County. Three 138-volt lines stem from this 500-volt line in Shamokin Dam, Pennsylvania.

Water – Water service in Snyder County is provided by various municipal and regional authorities, private water providers, and private well water sources.

Gas – PG Energy is the only gas provider in Snyder County, providing service to Jackson, Middlecreek, Monroe, and Penn Townships, as well as Selinsgrove and Shamokin Dam Boroughs.

Communications – Verizon of Pennsylvania provides telephone service to all 21 municipalities in Snyder County. Cable television service is provided by Service Electric Cablevision, Nittany Media, Inc., Zampelli Electronics, and Beaver Springs Community TV Association. High-speed Internet access is provided by Verizon DSL service or Service Electric Cablevision cable/Internet service.

TABLE 4.6.4-1: MUNICIPAL UTILITY PROVIDERS

MUNICIPALITY	ELECTRIC	WATER	GAS	TELEPHONE	PUBLIC SANITARY SEWER	CABLE
Adams Township	PPL Utilities, Inc.	Adams Township Municipal Authority	None	Verizon Pennsylvania	None	None
Beaver Township	PPL Utilities, Inc.	Private Well Water and Beavertown Municipal Authority	None	Verizon Pennsylvania	On-Lot Sewage Disposal and Beavertown Municipal Authority	Service Electric Cablevision

MUNICIPALITY	ELECTRIC	WATER	GAS	TELEPHONE	PUBLIC SANITARY SEWER	CABLE
Beavertown Borough	PPL Utilities, Inc.	Beavertown Municipal Authority	None	Verizon Pennsylvania	Beavertown Municipal Authority	Service Electric Cablevision and Nittany Media, Inc.
Center Township	PPL Utilities, Inc.	Penns Creek Municipal Authority	None	Verizon Pennsylvania	Penns Creek Municipal Authority	Service Electric Cablevision
Chapman Township	PPL Utilities, Inc.	None - Private Well Water	None	Verizon Pennsylvania	Union-Chapman Regional Authority	Zampelli Electronics
Franklin Township	PPL Utilities, Inc.	Middleburg Municipal Authority	None	Verizon Pennsylvania	On-Lot Sewage Disposal and Middleburg Municipal Authority	Service Electric Cablevision
Freeburg Borough	PPL Utilities, Inc.	Freeburg Municipal Authority	None	Verizon Pennsylvania	Freeburg Municipal Authority	Service Electric Cablevision
Jackson Township	PPL Utilities, Inc.	AQUA of Pennsylvania	None	Verizon Pennsylvania	None – On-lot Sewage Disposal System	Service Electric Cablevision
McClure Borough	PPL Utilities, Inc.	McClure Municipal Authority	None	Verizon Pennsylvania	McClure Municipal Authority	Nittany Media, Inc.
Middleburg Borough	PPL Utilities, Inc.	Middleburg Municipal Authority	None	Verizon Pennsylvania	Middleburg Municipal Authority	Service Electric Cablevision
Middlecreek Township	PPL Utilities, Inc.	Kreamer Municipal Authority	UGI	Verizon Pennsylvania	Kreamer Municipal Authority	Service Electric Cablevision
Monroe Township	PPL Utilities, Inc.	Aqua Pennsylvania	UGI	Verizon Pennsylvania	Hummels Wharf Municipal Authority	Service Electric Cablevision
Penn Township	PPL Utilities, Inc.	Penn Township Municipal Water and Sewer Authority and Pennsview Water Company	UGI	Verizon Pennsylvania	Penn Township Municipal Water & Sewer Authority	Service Electric Cablevision

MUNICIPALITY	ELECTRIC	WATER	GAS	TELEPHONE	PUBLIC SANITARY SEWER	CABLE
Perry Township	PPL Utilities, Inc.	Mt. Pleasant Mills Municipal Authority	None	Verizon Pennsylvania	Mt. Pleasant Mills Municipal Authority	Zampelli Electronics
Selinsgrove Borough	PPL Utilities, Inc.	Selinsgrove Borough Municipal Authority	UGI	Verizon Pennsylvania	Eastern Snyder County Regional Authority (Conveyance & Treatment)	Service Electric Cablevision
Shamokin Dam Borough	PPL Utilities, Inc.	Shamokin Dam Borough	UGI	Verizon Pennsylvania	Eastern Snyder County Regional Authority (Conveyance & Treatment)	Service Electric Cablevision
Spring Township	PPL Utilities, Inc.	Spring Township Municipal Authority	None	Verizon Pennsylvania	Spring Township Municipal Authority	Beaver Springs Community TV Association
Union Township	PPL Utilities, Inc.	None - Private Well Water	None	Verizon Pennsylvania	Union-Chapman Regional Authority	Zampelli Electronics
Washington Township	PPL Utilities, Inc.		None	Verizon Pennsylvania		Service Electric Cablevision and Zampelli Electronics
West Beaver Township	PPL Utilities, Inc.		None	Verizon Pennsylvania		
West Perry Township	PPL Utilities, Inc.	Richfield Area Joint Authority	None	Verizon Pennsylvania	Richfield Area Joint Authority	

B. RANGE OF MAGNITUDE

Most severe utility interruptions and power failures are regional events. A loss of utilities can have numerous impacts, including but not limited to food spoilage, loss of water supply (either because of a damaged pipeline or well pump failure), loss of heating or air conditioning, basement flooding (sump pump failure), lack of indoor lighting, and lack of telephone and Internet service. These issues range from a minor nuisance to a full hazard event, but the degree of damage or harm depends on the population affected and the severity of the outage. For example, loss of heating and cooling capability is more dangerous in the winter and summer months, when heat-sensitive populations like the elderly rely on utilities to maintain a safe temperature.

At a minimum, utility interruptions can cause short-term disruption in the orderly functioning of business, government, and private citizen functioning and activities like traffic signals, elevators, and retail sales.

PAST OCCURRENCES

While this information is not well documented, it is commonly known that utility failures occur annually, at a minimum. The future documentation of these failures may provide opportunities for the County to mitigate such service failures. According to PPL Utilities, Inc., Snyder County's electricity provider, customers have power more than 99.9 percent of the time, but when outages occur, they are overwhelmingly caused by severe weather, especially downed trees and tree limbs, animals, and "other" assorted issues (PPL, 2011).

FUTURE OCCURRENCES

Minor, short-term utility interruptions may occur several times a year for any given area in the County, while major, long-term events may take place once every few years, but utility interruptions are difficult to predict. However, because utility interruptions are frequent by-products of severe weather events, citizens should prepare for them during severe storms. Therefore, the future occurrence of utility interruptions should be considered moderately possible as defined by the Risk Factor Methodology probability criteria (see Table 4.7.2-1).

VULNERABILITY ASSESSMENT

Although the risk for future occurrence of utility interruptions is likely across Snyder County due to the frequency of contributing factors such as transportation accidents and severe weather events, these interruptions are typically short-lived. Hospitals and emergency medical facilities as well as retirement homes and senior centers are particularly vulnerable to power outages. While backup power generators are often used at these facilities, loss of electricity may result in hot or cold temperatures to which elderly populations are particularly vulnerable.

PPL Utilities, Inc., has also taken steps to reduce the vulnerability of its entire service area to utility interruptions. PPL trims trees on more than 5,500 miles of power lines in the Commonwealth each year, trimming the entire distribution system every four to five years. PPL has installed animal guards on all new and repaired equipment where animal involvement is suspected. PPL also uses infrared cameras to identify and correct hot spots, which are an early warning sign that there may be a problem in the electrical system. Finally, over the next five years, PPL has pledged $1.4 billion to maintain and improve the electric delivery system and reduce the number and duration of outages (PPL, 2011).

4.7 HAZARD VULNERABILITY SUMMARY

4.7.1 METHODOLOGY

Ranking hazards helps communities set goals and priorities for mitigation based on their vulnerabilities. A Risk Factor (RF) is a tool used to measure the degree of risk for identified hazards in a particular planning area. The RF can also be used to assist local community officials in ranking and prioritizing those hazards that pose the most significant threat to their area based on a variety of factors deemed important by the Planning Team and other stakeholders involved in the hazard mitigation planning process. The RF system relies mainly on historical data, local knowledge, general consensus opinions

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

RF values were obtained by assigning varying degrees of risk to five categories for each of the twelve hazards profiled in the 2019 HMP. Those categories include probability, impact, spatial extent, warning time, and duration. Each degree of risk was assigned a value ranging from 1 to 4. The weighting factor is shown in Table 4.7.1-1. To calculate the RF value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories equals the final RF value, as demonstrated in the following equation:

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

Table 4.7.1-1 summarizes each of the five categories used for calculating an RF for each hazard. According to the weighting scheme applied, the highest possible RF value is 4.

TABLE 4.7.1-1: SUMMARY OF RF APPROACH USED TO RANK HAZARD RISK

RISK ASSESSMENT CATEGORY	DEGREE OF RISK			WEIGHT VALUE
	LEVEL	CRITERIA	INDEX	
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1% AND 49.9% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 50% AND 90% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	GREATER THAN 90% ANNUAL PROBABILITY	4	

RISK ASSESSMENT CATEGORY	DEGREE OF RISK			WEIGHT VALUE
	LEVEL	CRITERIA	INDEX	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE AND MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	**1**	20%
	SMALL	BETWEEN 1 AND 10.9% OF AREA AFFECTED	**2**	
	MODERATE	BETWEEN 11 AND 25% OF AREA AFFECTED	**3**	
	LARGE	GREATER THAN 25% OF AREA AFFECTED	**4**	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**MORE THAN 24 HRS**	SELF-DEFINED	1	10%
	12 TO 24 HRS	SELF-DEFINED	2	
	6 TO 12 HRS	SELF-DEFINED	3	
	LESS THAN 6 HRS	SELF-DEFINED	4	

(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)

RISK ASSESSMENT CATEGORY	DEGREE OF RISK			WEIGHT VALUE
	LEVEL	CRITERIA	INDEX	
DURATION *How long does the hazard event usually last?*	**LESS THAN 6 HRS**	SELF-DEFINED	1	10%
	LESS THAN 24 HRS	SELF-DEFINED	2	
	LESS THAN 1 WEEK	SELF-DEFINED	3	
	MORE THAN 1 WEEK	SELF-DEFINED	4	

(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)

4.7.2 RANKING RESULTS

Using the methodology described in Section 4.4.1, Table 4.7.2-1 lists the RF calculated for each of the 12 potential hazards identified in the 2013 HMP update. Hazards identified as high risk have risk factors greater than or equal to 2.5. RFs ranging from 2.0 to 2.4 were deemed moderate risk hazards. Hazards with RFs of 1.9 and less are considered low risk.

Based on these results, there are three high-risk hazards, seven moderate-risk hazards and four low-risk hazards in Snyder County. Mitigation actions were developed for all high, moderate, and low risk hazards (see Section 6.4). The threat posed to life and property for moderate- and high-risk hazards is considered significant enough to warrant the need for establishing hazard-specific mitigation actions. Mitigation actions related to future public outreach and emergency service activities are identified to address low-risk hazard events.

A risk assessment result for the entire County does not mean that each municipality is at the same amount of risk to each hazard. Table 4.7.2-2 shows the different municipalities in Snyder County and whether their risk is greater than (>), less than (<), or equal to (=) the RF assigned to the County as a whole.

TABLE 4.7.2-1: COUNTY RANKING OF HAZARD TYPES BASED ON RISK FACTOR METHODOLOGY

HAZARD RISK	HAZARD NATURAL (N) OR HUMAN-MADE (M)	RISK ASSESSMENT CATEGORY					CALCULATED RISK FACTOR
		PROBABILITY (1-4)	IMPACT (1-4)	SPATIAL EXTENT (1-4)	WARNING TIME (1-4)	DURATION (1-4)	
High	Flood, Flash Flood, Ice Jam (N)	4	2	4	2	3	3.1
	Winter Storms (N)	4	2	4	1	3	3.0
	Dam Failure (N or M)	1	4	4	3	4	3.0
Moderate	Wildfire (N or M)	2	2	3	4	2	2.4
	Utility Interruption (N or M)	3	1	3	4	2	2.4
	Tornado/Windstorm (N)	2	3	2	4	1	2.4
	Drought (N)	2	1	4	1	4	2.2
	Environmental Hazards (M)	2	2	2	4	2	2.2
	Transportation Accidents (M)	4	1	1	4	1	2.2
Low	Earthquake (N)	1	1	3	4	1	1.7
	Landslide (N)	1	1	2	4	1	1.5
	Subsidence (N)	1	1	1	4	1	1.3

Based on these results, there are three high-risk hazards, six moderate-risk hazards, and three low-risk hazards in Snyder County. Mitigation actions were developed for all high-, moderate-, and low-risk hazards (see Section 6.4). The threat posed to life and property for moderate- and high-risk hazards is considered significant enough to warrant the need for establishing hazard-specific mitigation actions. Mitigation actions related to future public outreach and emergency service activities are identified to address low-risk hazard events.

A risk assessment result for the entire County does not mean that each municipality is at the same amount of risk to each hazard. Table 4.7.2-2 shows the different municipalities in Snyder County and whether their risk is greater than (>), less than (<), or equal to (=) the RF assigned to the County as a whole.

TABLE 4.7.2-2: CALCULATED COUNTYWIDE RISK FACTOR BY HAZARD AND COMPARATIVE JURISDICTIONAL RISK

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR											
	Flood, Flash Flood, Ice Jam	Winter Storm	Dam Failure	Wildfire	Tornado, Windstorm	Utility Interruption	Transportation Accidents	Environmental Hazards	Drought	Earthquake	Landslide	Subsidence
	3.1	3.0	3.0	2.4	2.4	2.4	2.2	2.2	2.2	1.7	1.5	1.3
Adams Township	=	=	<	=	=	=	<	=	>	=	=	=
Beaver Township	=	=	<	=	=	=	=	=	=	=	=	=
Beavertown Borough	=	=	=	=	=	=	=	=	=	=	=	=
Center Township	=	=	<	=	=	=	=	=	=	=	=	=
Chapman Township	=	=	<	=	=	=	>	=	=	=	=	=
Franklin Township	=	=	=	=	=	=	=	=	=	=	=	=
Freeburg Borough	=	=	<	=	=	=	=	=	=	=	=	=
Jackson Township	=	=	<	=	=	=	=	=	=	=	=	=
McClure Borough	=	=	<	=	=	=	=	=	=	=	=	=
Middleburg Borough	>	=	=	=	=	=	=	=	=	=	=	=
Middlecreek Township	=	=	=	=	=	=	=	=	=	=	=	=

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR											
	Flood, Flash Flood, Ice Jam	Winter Storm	Dam Failure	Wildfire	Tornado, Windstorm	Utility Interruption	Transportation Accidents	Environmental Hazards	Drought	Earthquake	Landslide	Subsidence
	3.1	3.0	3.0	2.4	2.4	2.4	2.2	2.2	2.2	1.7	1.5	1.3
Monroe Township	>	=	>	=	=	=	>	=	=	=	>	>
Penn Township	>	=	=	=	=	=	>	=	=	=	=	>
Perry Township	=	=	<	=	=	=	>	=	=	=	>	=
Selinsgrove Borough	>	=	<	=	=	=	>	=	=	=	=	>
Shamokin Dam Borough	>	=	>	=	=	=	>	=	=	=	<	>
Spring Township	=	=	>	=	=	=	=	=	=	=	=	=
Union Township	=	=	<	=	=	=	>	=	=	=	>	=
Washington Township	=	=	<	=	=	=	=	=	=	=	=	=
West Beaver Township	=	=	<	=	=	=	=	=	=	=	=	=
West Perry Township	=	=	<	=	=	=	=	=	=	=	=	=

4.8 FUTURE DEVELOPMENT AND VULNERABILITY

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

Population change and the age of the housing stock are main indicators of vulnerability change in Snyder County. All demographic data is based off of the 2010 Census and will be updated when the 2020 Census information is available. As discussed in Section 2.3, the total population of Snyder County has increased by more than 3 percent from 2000 to 2010. This overall change reflects areas of growth in fourteen municipalities along with loss in population in the remaining seven (U.S. Census, 2010). Of the fourteen municipalities that grew in this time period, five experienced growth of over 10 percent: Beavertown Borough grew by 10.92 percent, Center Township grew by 13.69 percent, Penn Township grew by 14.36 percent, Perry Township grew by 10.64 percent, and Shamokin Dam Borough grew by 12.25 percent.

Most of the municipalities that lost population between 2000 and 2010 did not lose large percentages. Franklin Township, which lost 23.53 percent, was the only municipality that lost over 10 percent of its population in this time.

Areas of higher density, in the larger municipalities and growing municipalities, face an increased vulnerability and loss estimates from most hazard events. In addition, municipalities that experienced a large increase in population experience a higher risk to hazards such as drought, wildfire, environmental hazards, utility interruption, and winter storms. The townships with the largest population increase percentages between 2000 and 2010 include Center Township and Penn Townships. However, although these townships experienced large population increase percentages since the 2000 Census, they do not have the largest overall populations. The municipality with the largest population and thus higher vulnerability to hazards is Selinsgrove.

In addition, remote and sparsely populated municipalities also face higher vulnerability to hazards because they do not have easy access to care facilities or response personnel. For instance, the sparsely populated municipalities such as Adams Township, Beaver Township, and McClure Borough have increased vulnerability to winter storms due to isolation, access issues, and longer emergency response times.

The aging housing stock in Snyder County is another source of current and future vulnerability in many hazard events. As previously discussed, a large percentage of the housing stock was built before 1960. These municipalities with older building structures may be at risk during flooding and winter storm events if the materials are either not strong enough to withstand the pressure or weight of the precipitation or are liable to leak, causing further risk of destruction to the structure. In addition, Snyder County can experience gusts of wind up to 100 miles per hour during windstorms or tornadoes. The structure of older houses may be more at risk of destruction under strong wind conditions.

Steering commercial, industrial, and residential growth to areas of existing development and facilities, such as roads, water, and sewer, will result in denser communities while keeping the same amount of open land in Snyder County. Concentrating growth may help to reduce isolation-based vulnerability of communities with few access routes, no municipal water supply, and low cell phone reception. Higher densities mean that more people are likely to be impacted in a hazard event, should it strike those more

populated areas. In addition, municipalities that experienced a large increase in population may have a slightly higher risk to hazards such as transportation accidents, environmental hazards, utility interruption, and dam failure.

5. CAPABILITY ASSESSMENT

Performing the Capability Assessment is important to formulate a viable mitigation strategy later in the planning process. A Capability Assessment has two components: (1) an inventory of a jurisdiction's existing planning and regulatory tools and (2) an analysis of its capacity to use them effectively. The assessment process helps identify existing gaps, conflicts, and/or weaknesses that may need to be addressed through future mitigation planning goals, objectives, and actions. It also highlights the measures in place or already undertaken that merit continued support and enhancement through future mitigation efforts. The Capability Assessment also helps to ensure that proposed mitigation actions are practical, considering the local ability to implement them.

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

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

Throughout the planning process, the Planning Team considered the County's 21 individual municipalities. Pennsylvania's municipalities have their own governing bodies, pass and enforce their own ordinances and regulations, purchase equipment, and manage their own resources, including critical infrastructure. Therefore, this Capability Assessment must consider the various characteristics and capabilities of each municipality.

5.1 PROCESS SUMMARY

Working with County officials, the Planning Team identified available resources. The Planning Team examined municipal capabilities compared to those of the County. The Planning Team identified the following list of capability needs:

HAZARD MITIGATION PLANNING COMMITTEE-IDENTIFIED CAPABILITY DEFICIENCIES
• Increase communication and coordination between departments
• Increase public awareness and communication
• Develop a list of contact people for each organization/department
• Provide education for local municipality-elected officials
• Improve communication systems
• Provide financial resources for education/information

HUMAN RESOURCES

Human resources include local fire, police, ambulance, and emergency management and response personnel. There are a total of 5 law enforcement agencies, 14 fire stations, 5 basic response ambulances, 2 advanced life support units, and 7 quick response squads in Snyder County. These units are dispatched by the Central Susquehanna Regional 9-1-1 Center headquartered in Penn Township.

PHYSICAL RESOURCES

Physical resources include the equipment, vehicles, public lands, facilities, and buildings available to the community. In addition, Snyder County has numerous privately owned, extended care facilities throughout the County.

The County also has numerous publicly owned facilities and land that may be available in various times of need as shown in Table 5.1-1.

TECHNOLOGICAL RESOURCES

Technological resources include early warning systems, stream-level monitoring gauges, computer systems, the Internet, and 9-1-1 communications systems. At the time of the HMP's development, a number of technological resources were available to aid in hazard mitigation:

- COMPUTER AIDED DISPATCH SYSTEMS
- STREAM-LEVEL MONITORING GAUGES

TABLE 5.1-1: COUNTY-OWNED PROPERTY

DESCRIPTION	PROPERTY LOCATION	ACRES
County Courthouse	9 West Market Street	
Sheriff's Office	12 S Main Street	
Parking Lot	West Willow Avenue	
Parking Lot	West Willow Avenue	
Courthouse Annex	1 West Market Street	
Memorial	29 East Market Street	
Vacant	336 River Road	1.12
Vacant	484 River Road	1.27
Prison	600 Old Colony Road	5.21
Faylor Lake	West of Route 235	
Field/Wooded	South of Middle Creek Road	36.72
Field/Wooded	South of Middle Creek Road	33.26
Lake/Field/Wooded	West of Route 235	66.45
Lake/Field/Wooded	West of Mattern Road	35.23
Lake/Field/Wooded	East of Shale Pit Road	61.75
Lake/Field/Wooded	North & South of Shale Pit Road	115.00
Lake/Wooded	South of Shale Pit Road	0.30
Wooded	South of Shale Pit Road	2.10
Field/Wooded	North of Ridge Road	60.30
Wooded	North of Stage Road	1.65
Field/Wooded	North & South of Shale Pit Road	87.64
Wooded	North of Stull Road	18.70
Field	West of Route 235	9.67
Lake/Wooded	East of Shale Pit Road	0.37
Wooded	South of Shale Pit Road	1.43
Field/Wooded	South of Middle Creek Road	89.75
Field/Lake	South of Middle Creek Road	68.98
Field/Wooded	North & South of Ridge Road	27.09
Wooded	West of Route 235	0.67
Faylor Lake	South of Shale Pit Road	12.26

INFORMATIONAL RESOURCES

Information resources include websites, brochures, pamphlets, workshops, and public service announcements.

FINANCIAL RESOURCES

Sources of funding were deemed difficult for small rural communities to secure. Known, available federal and state funds include the following:

Transportation Improvement Program (TIP): Provides funding for transportation improvement projects

Pennsylvania's Growing Greener: Provides funding to protect and restore natural resources by cleaning up source pollution

South Central Mountain Counter-Terrorism Task Force: Regional task force formed to integrate federal/state/county response to terrorism, institutionalize mutual aid, establish standing regional response groups, and encourage regional networking and communication. Homeland Security grants can be utilized through this group.

Community Development Block Grant (CDBG): Awards funds to municipalities through the Pennsylvania Department of Community and Economic Development. Provides funding to benefit low- to moderate-income persons for community development purposes.

Hazard Mitigation Grant Program (HMGP), High Hazard Potential Dam Grant Program (HHPD), Pre-Disaster Mitigation (PDM) Program: Provides hazard mitigation funding to communities. Snyder County's municipalities will be able to take advantage of these funds upon approval of the HMP.

5.2 CAPABILITY ASSESSMENT FINDINGS

Below are descriptions of the items listed in the Capabilities Assessment survey. The County's and each municipality's response to the survey can be found in the tables in this section.

5.2.1 EMERGENCY MANAGEMENT

Emergency management is a comprehensive, integrated program of mitigation, preparedness, response, and recovery for emergencies/disasters of any kind. No public or private entity is immune to disasters, and no single segment of society can meet the complex needs of a major emergency or disaster on its own. Responses to this section of the survey can be found in Table 5.2.2-3.

EMERGENCY OPERATIONS PLAN

The Pennsylvania Emergency Management Services Code, Title 35, requires all political jurisdictions in the Commonwealth to have an Emergency Operations Plan (EOP), an Emergency Management Coordinator (EMC), and an Emergency Operations Center (EOC).

Snyder County's EOP is updated every two years and complies with the National Incident Management System (NIMS) and is the basis for a coordinated and effective response to any disaster that may affect lives and property in Snyder County. The EOP, or portions thereof, would be implemented when emergency circumstances warrant it. According to the Snyder County Emergency Management Agency (EMA), all 21 municipalities within Snyder County have updated local EOPs.

CONTINUITY OF OPERATIONS PLAN

Continuity of Operations (COOP) is a critically important planning principle for emergency managers as well as for municipal officials. National Fire Protection Association (NFPA) 1600 provides those with the responsibility for disaster and emergency management and COOP planning programs with the criteria to assess current programs or to develop, implement, and maintain a program to mitigate, prepare for, respond to, and recover from disasters and emergencies.

EVACUATION PLAN

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

DISASTER RECOVERY PLAN

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

STORMREADY

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

5.2.2 PARTICIPATION IN THE NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

The Pennsylvania Flood Plain Management Act (Act 166 of 1978) requires every municipality identified by FEMA to participate in the NFIP and permits all municipalities to adopt floodplain management regulations. It is in the interest of all property owners in the floodplain to keep development and land usage within the scope of the floodplain regulations for their community. This helps keep insurance rates low and makes sure that the risk of flood damage is not increased by property development.

The NFIP defines Repetitive Loss as 2 or more claims of at least $1000 over a 10 year rolling period. This is the data that appears in this plan. The Hazard Mitigation Assistance program defines Repetitive Loss as having incurred flood-related damage on 2 occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event and at the time of the second incidence of flood-related damage, the contract for flood insurance increased cost of compliance coverage.

All of the County's 21 municipalities participate in the NFIP. This information is reflected in Table 5.2.8-2.

FEMA Region III makes available to communities an ordinance review checklist that lists required provisions for floodplain management ordinances. This checklist helps communities develop an effective floodplain management ordinance that meets federal requirements for participation in the NFIP.

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

- Prohibiting manufactured homes in the floodway
- Prohibiting manufactured homes within the area measured 50 feet landward from the top of a bank of any watercourse within a special flood hazard area
- Special requirements for recreational vehicles within the special flood hazard area
- Special requirements for accessory structures
- Prohibiting new construction and development within the area measured 50 feet landward from the top of a bank of any watercourse within a special flood hazard area
- Providing the County Conservation District an opportunity to review and comment on all applications and plans for any proposed construction or development in any identified floodplain area

Table 5.2.2-1 shows the number of NFIP policies and the date of the most recent official Flood Insurance Rate Map (FIRM).

Table 5.2.2-2 shows municipal floodplain ordinance components that were available for review by the Steering Committee at the time of the update process. There may be additional ordinances in place that are not reflected in the table.

The Planning Team was also interested in the specific planning and regulatory elements of the municipalities' floodplain management. The results of the survey are located in Table 5.2.2-3.

TABLE 5.2.2-1: NFIP PARTICIPATION

MUNICIPALITY	# OF POLICIES	FIRM DATE
Adams Township	76	16-Nov-07
Beaver Township	17	15-Mar-12
Beavertown Borough	3	16-Nov-07
Center Township	56	16-Nov-07
Chapman Township	6	26-Sept-08
Franklin Township	1	25-Sept-09
Freeburg Borough	4	16-Nov-07
Jackson Township	3	25-Sept-09
McClure Borough	2	16-Nov-07
Middleburg Borough	29	16-Nov-07

MUNICIPALITY	# OF POLICIES	FIRM DATE
Middlecreek Township	40	16-Nov-07
Monroe Township	240	02-Dec-11
Penn Township	271	02-Nov-11
Perry Township	87	15-Mar-12
Selinsgrove Borough	242	16-Nov-07
Shamokin Dam Borough	23	16-Nov-07
Spring Township	84	16-Jun-09
Union Township	170	15-Mar-12
Washington Township	200	15-Mar-12
West Beaver Township	1	16-Nov-07
West Perry Township	1	16-Nov-07

There have not been any NFIP sanctions against Snyder County's municipalities.

TABLE 5.2.2-2: MUNICIPAL FLOODPLAIN ORDINANCE COMPONENTS

MUNICIPALITY	18" FREEBOARD REQUIREMENT	BUILDING RESTRICTION HOSPITAL (H) NURSING HOMES (N) SCHOOLS (S) RESIDENTIAL (R) JAIL (J)	HAZARDOUS MATERIAL RESTRICTIONS
Adams Township	No	R, H, N, J	Yes
Beaver Township			
Beavertown Borough			
Center Township			
Chapman Township			
Franklin Township			
Freeburg Borough	No	R, H, N, J, S	Yes
Jackson Township			
McClure Borough			
Middleburg Borough	No	R, H, N, J	Yes
Middlecreek Township	No	R, H, N, J	Yes
Monroe Township	Yes	R, H, N, J	Yes
Penn Township	No	R, H, N, J	Yes
Perry Township	No	R, H, N, J	Yes

MUNICIPALITY	18" FREEBOARD REQUIREMENT	BUILDING RESTRICTION HOSPITAL (H) NURSING HOMES (N) SCHOOLS (S) RESIDENTIAL (R) JAIL (J)	HAZARDOUS MATERIAL RESTRICTIONS
Selinsgrove Borough	No	R, H, N, J, S	Yes
Shamokin Dam Borough	No	R, H, N, J	Yes
Spring Township			
Union Township			
Washington Township	No	R, H, N, J	Yes
West Beaver Township			
West Perry Township			

The Planning Team was also interested in the specific planning and regulatory elements of the municipalities' floodplain management. The Planning Team distributed a survey that measured various elements related to the NFIP and floodplain management. The results of the survey are located in Table 5.2.2-3.

TABLE 5.2.2-3: FLOOD MANAGEMENT SURVEY RESULTS

MUNICIPALITY	MAINTAINS A COPY EFFECTIVE FIRM/FIS	ADOPTED THE MOST CURRENT DFIRM OR FIRM AND FIS	SUPPORTS REQUEST FOR MAP UPDATES	SHARES ANY NEW TECHNICAL OR SCIENTIFIC DATA WITH FEMA	PROVIDES ASSISTANCE WITH LOCAL FLOODPLAIN DETERMINATIONS	MAINTAINS A RECORD OF APPROVED LETTERS OF MAP CHANGE	ADOPTED A COMPLIANT FLOODPLAIN MANAGEMENT ORDINANCE	ISSUES PERMITS FOR ALL PROPOSED DEVELOPMENT IN THE SFHA	OBTAINS, REVIEWS, AND UTILIZES BFE FOR SUBDIVISION PROPOSALS	KEEPS SUBSTANTIALLY IMPROVED CONSTRUCTION SAFE ABOVE THE BFE	DOCUMENTS AND MAINTAINS RECORDS OF ELEVATION DATA FOR NEW STRUCTURES	ENFORCES THE ORDINANCE BY MONITORING COMPLIANCE	CONSIDERED ADOPTION OF ACTIVITIES THAT EXTEND BEYOND THE MINIMUM REQUIREMENTS	EDUCATES COMMUNITY MEMBERS ABOUT THE AVAILABILITY AND VALUE OF FLOOD INSURANCE	INFORMS COMMUNITY PROPERTY OWNERS ABOUT CHANGES TO THE DFIRM/FIRM	PROVIDES GENERAL ASSISTANCE TO COMMUNITY MEMBERS RELATING TO INSURANCE
Adams Township															
Beaver Township															
Beavertown Borough															
Center Township															
Chapman Township															
Franklin Township															
Freeburg Borough															
Jackson Township															
McClure Borough															
Middleburg Borough															
Middlecreek Township															
Monroe Township	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Penn Township	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

MUNICIPALITY	MAINTAINS A COPY EFFECTIVE FIRM/FIS	ADOPTED THE MOST CURRENT DFIRM OR FIRM AND FIS	SUPPORTS REQUEST FOR MAP UPDATES	SHARES ANY NEW TECHNICAL OR SCIENTIFIC DATA WITH FEMA	PROVIDES ASSISTANCE WITH LOCAL FLOODPLAIN DETERMINATIONS	MAINTAINS A RECORD OF APPROVED LETTERS OF MAP CHANGE	ADOPTED A COMPLIANT FLOODPLAIN MANAGEMENT ORDINANCE	ISSUES PERMITS FOR ALL PROPOSED DEVELOPMENT IN THE SFHA	OBTAINS, REVIEWS, AND UTILIZES BFE FOR SUBDIVISION PROPOSALS	KEEPS SUBSTANTIALLY IMPROVED CONSTRUCTION SAFE ABOVE THE BFE	DOCUMENTS AND MAINTAINS RECORDS OF ELEVATION DATA FOR NEW STRUCTURES	ENFORCES THE ORDINANCE BY MONITORING COMPLIANCE	CONSIDERED ADOPTION OF ACTIVITIES THAT EXTEND BEYOND THE MINIMUM REQUIREMENTS	EDUCATES COMMUNITY MEMBERS ABOUT THE AVAILABILITY AND VALUE OF FLOOD INSURANCE	INFORMS COMMUNITY PROPERTY OWNERS ABOUT CHANGES TO THE DFIRM/FIRM	PROVIDES GENERAL ASSISTANCE TO COMMUNITY MEMBERS RELATING TO INSURANCE
Perry Township																
Selinsgrove Borough	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Shamokin Dam Borough	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Spring Township																
Union Township																
Washington Township	N	N	N	N	N	N	Y	Y	N	Y	Y	Y	N	N	N	N
West Beaver Township																
West Perry Township																

NATIONAL FLOOD INSURANCE PROGRAM – COMMUNITY RATING SYSTEM (CRS)

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

The CRS was implemented in 1990 to recognize and encourage community floodplain management activities that exceed the minimum NFIP standards. Section 541 of the 1994 Act amends Section 1315 of the 1968 Act to codify the CRS in the NFIP, and expands the CRS goals to specifically include incentives to reduce the risk of flood-related erosion and to encourage measures that protect natural and beneficial floodplain functions. These goals have been incorporated into the CRS, and communities now receive credit toward premium reductions for activities that contribute to them.

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

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

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

The three Snyder County jurisdictions that are participating in the CRS are depicted in Table 5.2.2-4.

1FEDERAL EMERGENCY MANAGEMENT AGENCY, FEDERAL INSURANCE AND MITIGATION ADMINISTRATION, NATIONAL FLOOD INSURANCE PROGRAM: PROGRAM DESCRIPTION (AUGUST 2002).

TABLE 5.2.2-4 – SNYDER COUNTY CRS JURISDICTIONS

COMMUNITY NUMBER	JURISDICTION	CLASS
421020	Monroe Township	9
421024	Penn Township	8
425387	Selinsgrove Borough	7

SOURCE: FEMA (HTTP://WWW.FEMA.GOV/LIBRARY/VIEWRECORD.DO?ID=3629)

5.2.3 PLANNING AND REGULATORY CAPABILITY

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

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

HAZARD MITIGATION PLAN

HMPs describe in detail the hazards that may affect the community, the community's vulnerability to those hazards, and an action plan for how the community plans to minimize or eliminate that vulnerability. HMPs are governed by the DMA 2000, and having a FEMA-approved HMP makes the jurisdiction eligible for federal mitigation funding.

COMPREHENSIVE LAND USE PLAN (OR GENERAL, MASTER, OR GROWTH MANAGEMENT PLAN)

A Comprehensive Plan is a policy document that states objectives and guides the future growth and physical development of a municipality. The Comprehensive Plan is a blueprint for housing, transportation, community facilities, utilities, and land use. It examines how the past led to the present and charts the community's future path. The MPC Act 247 of 1968, as reauthorized and amended, requires counties to prepare and maintain a county Comprehensive Plan. In addition, the MPC requires counties to update the Comprehensive Plan every 10 years.

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

FLOODPLAIN MANAGEMENT PLAN

Floodplain Management Plans describe how the community will reduce the impact of flood events through preventive and corrective actions. These actions may include mandated open space and prohibition of development in floodplains, property buyout, and other measures.

OPEN SPACE MANAGEMENT PLAN (OR PARKS/REC OR GREENWAYS PLAN)

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

STORMWATER MANAGEMENT PLAN/ORDINANCE

The proper management of stormwater runoff can improve conditions and decrease the chance of flooding. These ordinances are developed in conjunction with the guidelines established in the Pennsylvania Stormwater Management Act (Act 167 of 1978).

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

Municipalities have an obligation to implement the criteria and standards developed in each watershed stormwater management plan by amending or adopting laws and regulations for land use and development. The implementation of stormwater management criteria and standards at the local level is necessary, since municipalities are responsible for local land use decisions and planning. The degree of detail in the ordinances depends on the extent of existing and projected development. Municipalities within rapidly developing watersheds will benefit from the Watershed Stormwater Management Plan and will use the information for sound land use considerations. The Watershed Stormwater Management Plan is designed to aid the municipality in setting standards for the land uses it has proposed. The Watershed Plan and the attendant municipal regulations are intended to prevent future drainage problems and avoid the aggravation of existing problems. There are seven watersheds in Snyder County, three of which are minor to the county, flow into Juniata County and are considered to be Juniata County watersheds. There are 4 main watersheds within Snyder County which eventually flow into the Susquehanna River. The watersheds are the Mahantango, Middle Creek, Penns Creek, and the West Branch Susquehanna River Watersheds.

NATURAL RESOURCE PROTECTION PLAN

Natural Resource Protection Plans are designed to protect woodlands, steep slopes, waterways, floodplains, wetlands, and coastal buffers through prohibiting or severely limiting development in these areas. Emergency managers and community planners have been made more and more aware of the benefits of protecting these areas as mitigation measures over the last few decades.

FLOOD RESPONSE PLAN

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

CAPITAL IMPROVEMENTS PLAN

The Capital Improvements Plan is a multiyear policy guide that identifies needed capital projects and is used to coordinate the financing and timing of public improvements. Capital improvements relate to streets, stormwater systems, water distribution, sewage treatment, and other major public facilities. A Capital Improvements Plan should be prepared by the respective county's planning commission and should include a capital budget. This budget identifies the highest-priority projects recommended for funding in the next annual budget. The Capital Improvements Plan is dynamic and can be tailored to specific circumstances.

ECONOMIC DEVELOPMENT PLAN

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

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

HISTORIC PRESERVATION PLAN

These plans describe how the community will preserve the historic structures and areas within them. Since these structures pre-date building codes and modern community planning requirements, many of them are especially vulnerable to a variety of hazards. The Historic Preservation Plan may include measures to retrofit or relocate historic treasures out of hazard impact areas.

FLOODPLAIN REGULATIONS

Through administration of the floodplain ordinances, the municipalities can ensure that all new construction or substantial improvements to existing structures that are located in the 1 percent chance floodplain are built with first-floor elevations above the Base Flood Elevation (BFE).

ZONING REGULATIONS

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

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

Zoning ordinances contain both a map that delineates zoning districts and text documenting the regulations that apply in each zoning district.

SUBDIVISION REGULATIONS

Article V of the MPC authorizes municipalities to prepare, enact, and enforce a subdivision and land development ordinance, including regulations to control the layout of streets, minimum lot sizes, and the provision of utilities. The objectives of a subdivision and land development ordinance are to do the following:

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

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

In cases where municipalities have their own Subdivision and Land Development Ordinance, plans must be submitted to the County Planning Commission for review, and the Planning Commission provides comments to the municipality within 30 days.

UNIFIED DEVELOPMENT ORDINANCE

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

POST-DISASTER REDEVELOPMENT/RECONSTRUCTION ORDINANCE

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

BUILDING CODE

Building codes are important in mitigation, because codes are developed for regions of the country in consideration of the hazards present within that region. Consequently, structures that are built to applicable codes are inherently resistant to many hazards like strong winds, floods, and earthquakes, and can help mitigate regional hazards like wildfires. In 2003 the Commonwealth of Pennsylvania implemented the Uniform Construction Code (UCC) (Act 45 of 1999), a comprehensive building code that establishes minimum regulations for most new construction, including additions and renovations to existing structures.

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

If a municipality has "opted in," all UCC enforcement is local, except where municipal (or third-party) code officials lack the certification necessary to approve plans and inspect commercial construction for compliance with UCC accessibility requirements.[2] If a municipality has "opted out," the Department of Labor and Industry is responsible for all commercial code enforcement in that municipality. The Department of Labor and Industry also has sole jurisdiction for all state-owned buildings no matter where they are located.[3]

FIRE CODE

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

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

2 IBID.

3 PENNSYLVANIA DEPARTMENT OF LABOR AND INDUSTRY, BUILDING CODES: UNIFORM CONSTRUCTION CODE.

FIREWISE

Firewise is a national program that brings together the response community, community planners, and homeowners to minimize the risk of wildfires. The program focuses on development that is compatible with the natural environment. Participation in the program is begun and maintained by groups of homeowners.

FARMLAND PRESERVATION[4]

Farmland preservation measures are important to hazard mitigation. Preserved farms protect soil from erosion and prevent the contamination of local surface water. In addition, farms and forest land are important for recharging the community's aquifer, and provide habitat for local wildlife.

5.2.4 ADMINISTRATIVE AND TECHNICAL CAPABILITY

Responses to this section of the survey can be found in Table 5.2.8-2.

PLANNERS WITH KNOWLEDGE OF LAND DEVELOPMENT/MANAGEMENT PRACTICES

COUNTY PLANNING COMMISSION

In Pennsylvania, planning responsibilities traditionally have been delegated to each county and local municipality through the MPC.

A planning agency acts as an advisor to the governing body on matters of community growth and development. A governing body may appoint individuals to serve as legal and engineering advisors to the planning agency. In addition to the duties and responsibilities authorized by Article II of the MPC, a governing body may, by ordinance, delegate approval authority to a planning agency for subdivision and land development applications. A governing body has considerable flexibility, not only as to which powers and duties are assigned to a planning agency, but also as to what form an agency will possess. A governing body can create a planning commission, a planning department, or both.

The purpose of the Snyder County Planning Commission is to receive and make recommendations on public and private proposals for development, and to prepare and administer planning regulations. Subdivision and land development plans are also reviewed and approved by the Snyder County Planning Commission, which works in conjunction with the municipal planning commissions, where applicable.

MUNICIPAL PLANNING COMMISSION

The MPC conveys that the planning authority establishes the requirements that a municipality must follow.

ENGINEERS OR PROFESSIONALS TRAINED IN CONSTRUCTION PRACTICES RELATED TO BUILDINGS AND/OR INFRASTRUCTURE (INCLUDES BUILDING INSPECTORS)

A municipal engineer performs duties as directed in the areas of construction, reconstruction, maintenance and repair of streets, roads, pavements, sanitary sewers, bridges, culverts, and other engineering work. The municipal engineer reviews and/or prepares plans, specifications, and estimates of the work undertaken within the municipality.

4 PENNSYLVANIA FARMLAND PRESERVATION ASSOCIATION, "WHY PRESERVE FARMLAND?" ACCESSED NOVEMBER 13, 2009, HTTP://WWW.PAFARMLAND.ORG/WHY_PRESERVE_FARMLAND.HTM.

PLANNERS OR ENGINEERS WITH AN UNDERSTANDING OF NATURAL AND/OR HUMAN-CAUSED HAZARDS

When staff who are responsible for community planning or engineering the structures on which people rely are familiar with the hazards that can impact the community, there is a great potential for synergy. These staff members will design the communities and structures with hazard impacts in mind, resulting in more sustainable communities and stronger structures.

EMERGENCY MANAGEMENT COORDINATOR

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

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

FLOODPLAIN MANAGER

Floodplain managers are experts in the rules and regulations of development in a floodplain, and can provide vast amounts of information on the risks and impacts of building within those hazard areas. They are an integral part of the mitigation planning team, and can make recommendations based on the needs and conditions of the community.

LAND SURVEYORS

Land surveyors determine, among other things, the elevation of a given point (e.g., a structure). This is especially useful in determining what development lies in the floodplain, but can also be useful in examining vulnerability to other hazards as well.

SCIENTIST FAMILIAR WITH THE HAZARDS OF THE COMMUNITY

Natural and human-made hazards' characteristics and impacts can be highly technical. Meteorology, aerodynamics, fluid dynamics, physics and health physics, chemistry, and several other scientific fields are involved in determining the impacts of a hazard event. Having access to a scientist who can describe the technical aspects of hazards in lay terms is important to having a sound mitigation strategy.

STAFF WITH THE EDUCATION OR EXPERTISE TO ASSESS THE COMMUNITY'S VULNERABILITY TO HAZARDS

The basis of hazard mitigation is hazard identification and vulnerability assessment. Conducting the vulnerability assessment is a complicated process. Planners must know where to find data on the

hazards and their impacts, and the characteristics of the community. More importantly, they must be able to combine these two sets of knowledge to make the analysis useful.

PERSONNEL SKILLED IN GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND/OR FEMA'S HAZUS PROGRAM

Spatial and tabular data are linked in a computerized, visual format through the use of sophisticated GIS technology. Through GIS projects, it is possible to accomplish environmental restoration, economic development, "smart growth" land use planning, infrastructure development, and training to use GIS for decision support. Snyder County has GIS capabilities that can assist the municipalities.

RESOURCE DEVELOPMENT STAFF OR GRANT WRITERS

Few communities have the financial resources that are required to implement all of its potential programs (e.g., mitigation measures). Therefore, they must rely on grants and other fundraising opportunities to obtain the money necessary to perform mitigation projects. Many grants are competitive, and individuals can provide donations to a vast array of causes, so the community must demonstrate that it can use those funds better than other applicants. This may be difficult, but having a specialist on staff will likely increase the community's chances of receiving funding.

FISCAL STAFF TO HANDLE LARGE/COMPLEX GRANTS

Many of the funding streams that can be used for hazard mitigation have substantial management and reporting requirements. Employing or having access to staff specializing in grants management will help the community ensure that it does not lose a grant opportunity because it did not meet the administrative requirements of that grant.

5.2.5 FISCAL CAPABILITY

Fiscal capability is important to the implementation of hazard mitigation activities. Every jurisdiction must operate within the constraints of limited financial resources. During the 1960s and 1970s, state and federal grants-in-aid were available to finance a large number of programs, including streets, water and sewer facilities, airports, and parks and playgrounds. During the early 1980s, there was a significant change in federal policy, based on rising deficits and a political philosophy that encouraged states and local governments to raise their own revenues for capital programs. The result has been a growing interest in "creative financing."[5]

The following information pertains to various financial assistance programs pertinent to hazard mitigation. Responses to this section of the survey can be found in Table 5.2.8-3

CAPITAL IMPROVEMENT PROGRAMMING

Most capital improvement projects involve the outlay of substantial funds, and local government can seldom budget for these improvements in the annual operating budget. Therefore, numerous techniques have evolved to enable local governments to finance for capital improvements over a time period exceeding one year. Public finance literature and state laws governing local government finance classify techniques that are allowed to finance capital improvements. These techniques include revenue

5 FRANK S. SO AND JUDITH GETZELS, EDS., *THE PRACTICE OF LOCAL GOVERNMENT PLANNING*, 2ND ED. (WASHINGTON, D.C.: INTERNATIONAL CITY MANAGEMENT ASSOCIATION, 1988), 451.

bonds; lease-purchase, authorities and special districts; current revenue (pay-as-you-go); reserve funds; and tax increment financing.

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

MUNICIPAL AUTHORITIES

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

COMMUNITY DEVELOPMENT BLOCK GRANTS[6]

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

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

States provide CDBG funds to non-entitlement jurisdictions.

The majority of CDBG funds are required to be spent to benefit low- and moderate-income people. Also, there is a set of national objectives for the program, including addressing existing conditions that pose a threat to the health and welfare of the community (e.g., low-income housing in a floodplain).

SPECIAL PURPOSE TAXES

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

6 U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, "COMMUNITY DEVELOPMENT BLOCK GRANT – CDBG," ACCESSED SEPTEMBER 21, 2009, HTTP://WWW.HUD.GOV/OFFICES/CPD/COMMUNITYDEVELOPMENT/PROGRAMS/.

GAS/ELECTRIC UTILITY FEES

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

WATER/SEWER FEES

WATER AUTHORITIES AND FEES

Water authorities are multipurpose authorities with water projects, many of which operate both water and sewer systems. The financing of water systems for lease back to the municipality is among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage.

The cost of constructing or extending water supply lines can be funded by special assessments against abutting property owners. Tapping fees also help fund water system capital costs. Water utilities are directly operated by municipal governments and by privately owned public utilities regulated by the Pennsylvania Public Utility Commission. The Pennsylvania Department of Environmental Protection has a program to assist with consolidation of small individual water systems to make system upgrades more cost effective.

SEWER AUTHORITIES AND FEES

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

STORMWATER UTILITY FEES

Stormwater utility fees are assessed and collected to offset the cost of maintaining and upgrading stormwater management structures such as drains, retention ponds, and culverts.

DEVELOPMENT IMPACT FEES

Development impact fees are one-time fees assessed to offset the cost of providing public services to a new development. They may be dedicated to providing the related new water or sewer infrastructure, roads, parks and recreational areas, libraries, schools, etc. The new infrastructure may be less vulnerable to hazard impacts.

GENERAL OBLIGATION, REVENUE, AND/OR SPECIAL TAX BONDS

Jurisdictions may simply decide to dedicate general fund or similar financing to implement hazard mitigation projects.

PARTNERING ARRANGEMENTS OR INTERGOVERNMENTAL AGREEMENTS

Intergovernmental cooperation is one manner of accomplishing common goals, solving mutual problems, and reducing expenditures. The 21 municipalities within Snyder County include six boroughs and 15 townships. Each of these municipalities conducts its daily operations and provides various community services according to local needs and limitations. Each municipality varies in staff size, resource availability, fiscal status, service provision, constituent population, overall size, and vulnerability to the identified hazards.

CIRCUIT RIDER PROGRAM (ENGINEER)

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

TABLE 5.2.8-1: PLANNING AND REGULATORY CAPABILITY

	HAZARD MITIGATION PLAN	COMPREHENSIVE LAND USE PLAN (OR GENERAL, MASTER, OR GROWTH MGMT. PLAN)	FLOODPLAIN MANAGEMENT PLAN	OPEN SPACE MANAGEMENT PLAN (OR PARKS/REC OR GREENWAYS PLAN)	STORMWATER MANAGEMENT PLAN/ORDINANCE	NATURAL RESOURCE PROTECTION PLAN	FLOOD RESPONSE PLAN	EMERGENCY OPERATIONS PLAN	CONTINUITY OF OPERATIONS PLAN	EVACUATION PLAN	DISASTER RECOVERY PLAN	CAPITAL IMPROVEMENT PLAN	ECONOMIC DEVELOPMENT PLAN	HISTORIC PRESERVATION PLAN	FLOODPLAIN REGULATIONS	ZONING REGULATIONS	SUBDIVISION REGULATIONS	UNIFIED DEVELOPMENT ORDINANCE	POST-DISASTER REDEVELOPMENT/RECONSTRUCTION ORDINANCE	BUILDING CODE	FIRE CODE	NATIONAL FLOOD INSURANCE PROGRAM	NATIONAL FLOOD INSURANCE PROGRAM – CRS	FIREWISE	STORM READY	FARMLAND PRESERVATION	OTHER
Adams Township																											
Beaver Township																											
Beavertown Borough																											
Center Township																											
Chapman Township																											
Franklin Township																											
Freeburg Borough																											
Jackson Township																											
McClure Borough																											
Middleburg Borough																											
Middlecreek Township																											
Monroe Township	X	X	X		X		X		X			X	X	X	X	X	X	X	X	X		X	X				
Penn Township	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X		X		
Perry Township																											
Selinsgrove Borough		X	X	X	X	X							X	X		X	X				X	X	X			
Shamokin Dam Borough																											
Spring Township																											
Union Township																											
Washington Township							X								X		X										
West Beaver Township																											
West Perry Township																											

TABLE 5.2.8-2: ADMINISTRATIVE AND TECHNICAL CAPABILITY

	PLANNERS WITH KNOWLEDGE OF LAND DEVELOPMENT/ MANAGEMENT PRACTICES	ENGINEERS OR PROFESSIONALS TRAINED IN CONSTRUCTION PRACTICES RELATED TO BUILDINGS AND/OR INFRASTRUCTURE (INCLUDES BUILDING INSPECTORS)	PLANNERS OR ENGINEERS WITH AN UNDERSTANDING OF NATURAL AND/OR HUMAN-CAUSED HAZARDS	EMERGENCY MANAGEMENT COORDINATOR	FLOODPLAIN MANAGER	LAND SURVEYORS	SCIENTIST FAMILIAR WITH THE HAZARDS OF THE COMMUNITY	STAFF WITH THE EDUCATION OR EXPERTISE TO ASSESS THE COMMUNITY'S VULNERABILITY TO HAZARDS	PERSONNEL SKILLED IN GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND/OR FEMA'S HAZUS PROGRAM	RESOURCE DEVELOPMENT STAFF OR GRANT WRITERS	FISCAL STAFF TO HANDLE LARGE/COMPLEX GRANTS	OTHER
Adams Township												
Beaver Township												
Beavertown Borough												
Center Township												
Chapman Township												
Franklin Township												
Freeburg Borough												
Jackson Township												
McClure Borough												
Middleburg Borough												
Middlecreek Township												
Monroe Township												
Penn Township	Y	Y	Y	Y	Y	N	Y	Y				
Perry Township												
Selinsgrove Borough	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	
Shamokin Dam Borough												
Spring Township												
Union Township												
Washington Township	N	N	N	Y	N		N	N	N	N		
West Beaver Township												
West Perry Township												

TABLE 5.2.8-3: FISCAL CAPABILITY

	CAPITAL IMPROVEMENT PROGRAMMING	COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBGS)	SPECIAL PURPOSE TAXES	GAS/ELECTRIC UTILITY FEES	WATER/SEWER FEES	STORMWATER UTILITY FEES	DEVELOPMENT IMPACT FEES	GENERAL OBLIGATION, REVENUE, AND/OR SPECIAL TAX BONDS	PARTNERING ARRANGEMENTS OR INTER-GOVERNMENTAL AGREEMENTS	OTHER
Adams Township										
Beaver Township										
Beavertown Borough										
Center Township										
Chapman Township										
Franklin Township										
Freeburg Borough										
Jackson Township										
McClure Borough										
Middleburg Borough										
Middlecreek Township										
Monroe Township	Y	Y	Y		Y	N		Y	Y	
Penn Township	N	Y	Y	N	Y	N	Y	N	Y	
Perry Township										
Selinsgrove Borough	Y	Y	N	Y	Y	N	N	Y	N	
Shamokin Dam Borough										
Spring Township										
Union Township										
Washington Township	N	Y	Y	N	N	N	N	Y		
West Beaver Township										
West Perry Township										

TABLE 5.2.8-4: COMMUNITY POLITICAL CAPABILITY

	5 – Definitely Willing	4 – Very Willing	3 – Moderately Willing	2 – Somewhat Willing	1 – Not Very Willing	0 – Unwilling to Adopt Policies/Programs
Adams Township						
Beaver Township						
Beavertown Borough		X				
Center Township						
Chapman Township						
Franklin Township						
Freeburg Borough						
Jackson Township						
McClure Borough						
Middleburg Borough	X					
Middlecreek Township	X					
Monroe Township	X					
Penn Township	X					
Perry Township						
Selinsgrove Borough	X					
Shamokin Dam Borough						
Spring Township		X				
Union Township						
Washington Township			X			
West Beaver Township	X					
West Perry Township						

TABLE 5.2.8-5: SELF-ASSESSMENT OF CAPABILITY

H – HIGH M – MODERATE L – LIMITED	PLANNING AND REGULATORY CAPABILITY	ADMINISTRATIVE AND TECHNICAL CAPABILITY	FISCAL CAPABILITY	COMMUNITY POLITICAL CAPABILITY	COMMUNITY RESILIENCY CAPABILITY
Adams Township					
Beaver Township					
Beavertown Borough					
Center Township					
Chapman Township					
Franklin Township					
Freeburg Borough					
Jackson Township					
McClure Borough					
Middleburg Borough					
Middlecreek Township					
Monroe Township	H	H	H	H	H
Penn Township	H	M	H	M	H
Perry Township					
Selinsgrove Borough	H	H	H	H	H
Shamokin Dam Borough	H	M	H	H	H
Spring Township					
Union Township					
Washington Township	M	M	M	M	
West Beaver Township					
West Perry Township					

6. MITIGATION STRATEGY

This section of the Snyder County HMP identifies the goals,

objectives, actions, and mitigation action plan for mitigating against the impacts of hazards.

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

Objectives describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals; the described steps are usually measurable and can have a defined completion date.

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

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

6.1 UPDATE PROCESS SUMMARY

The goals and objectives listed in the existing HMP were first examined by the County during an internal Kick-off Meeting and then by the Planning Team and stakeholders during a public meeting to review the updated Risk Assessment and to discuss the mitigation strategy. During this review, the Planning Team members and stakeholders were afforded the opportunity to comment on the goals, objectives, and actions that were listed in the existing HMP. In addition, throughout the course of the plan update, the HMP was posted on a website established specifically for this plan update (http://www.snydercounty911.org/). All correspondence that was distributed to the municipalities referenced the website and welcomed comments on the HMP to the County EMA or Planning Commission, or to Delta.

The following list shows the mitigation goals and objectives identified in the 2019 version of the HMP.

Each of the goals and objectives was carried over to the updated version of the HMP.

GOAL 1: Strengthen County and local capabilities to reduce the potential impact of flooding on existing and future public/partner assets, including structures, critical facilities, and technological hazards

- *Objective 1.1* *Protect existing structures from damage that can be caused by hazards*
- *Objective 1.2* *Promote management and regulatory procedures that would reduce the impacts of hazards on public and private property*
- *Objective 1.3* *Develop local structural projects to reduce the impacts of natural and human-caused hazards on public and private property*
- *Objective 1.4* *Maintain streams and culverts to reduce backup and flooding*
- *Objective 1.5* *Protect critical facilities from the impacts of natural and human-caused hazards*

GOAL 2: Increase intergovernmental cooperation and build public-private partnerships to implement activities that will reduce the impact of natural, human-made, and technological disasters

Objective 2.1 *Develop regulations limiting development in hazard-prone areas*

Objective 2.2 *Lessen impacts on natural resources and open space from natural and human-caused hazards*

Objective 2.3 *Direct new growth away from hazard-prone areas*

GOAL 3: Enhance planning and emergency response efforts among state, county, and local emergency management personnel to protect public health and safety

Objective 3.1 *Improve coordination and communication between departments*

Objective 3.2 *Ensure adequate training and resources for those involved in emergency response, services, relief, or hazard mitigation*

Objective 3.3 *Ensure adequacy of equipment and technology*

Objective 3.4 *Ensure that residents receive relief and are evacuated as quickly as possible in the event of a disaster*

GOAL 4: Continue to build Snyder County's spatial informational resources to strengthen public and private hazard mitigation planning and decision support capabilities

Objective 4.1 *Develop data management policies to ensure adequate data management*

Objective 4.2 *Develop and update detailed databases related to hazards and hazard mitigation*

GOAL 5: Increase public awareness on both the potential impacts of natural hazards and activities to reduce those hazards

Objective 5.1 *Develop public education and outreach programs on hazards and hazard mitigation*

Objective 5.2 *Educate property owners in hazard-risk areas regarding their risks and the precautions they can take*

Objective 5.3 *Encourage property owners in the 1 percent annual chance floodplain to purchase flood insurance*

On December 14, 2017, the Planning Team hosted a public meeting to review the risk assessment and existing and potential mitigation goals, objectives, and actions, which was attended by several County and municipal representatives. This meeting provided another opportunity to review the current goals, objectives, and actions listed in the HMP, and to determine what the revised HMP's goals, objectives, and actions would be. The goals, objectives, and mitigation techniques to be considered in the document were identified.

The Planning Team determined that most of the actions listed in the 2014 version of this HMP will be continued (i.e., deferred) in the current version of the Plan, but some could be deleted due to their being completed or being determined to be obsolete/irrelevant. Based on the revised and additional goals and objectives, however, the exact wording of the mitigation actions may have changed. Table 6.1-1 shows the state of the mitigation actions listed in the existing HMP.

The actions highlighted in red have been discontinued, the actions highlighted in green have been completed, and the actions heighted in blue are new actions added as part of the 2019 HMP update.

TABLE 6.1-1: DISPOSITION OF EXISTING MITIGATION ACTIONS

EXISTING MITIGATION ACTION	STATUS						REVIEW COMMENTS
	NO PROGRESS	UNKNOWN	IN PROGRESS/NOT YET COMPLETE	CONTINUOUS	COMPLETED	DISCONTINUED	
Nonstructural Hazard Mitigation Projects							
Action 3.4.1: Create and Maintain a web-based inventory of the County's special needs population to strengthen emergency response and evacuation operations				X			
Action 4.2.2: Strengthen the County's domestic animal health surveillance by familiarizing the Snyder County agricultural community with the list of reportable diseases and conditions related to animal health per the Office of International Epizootics (OIE) and the Pennsylvania Domestic Animal Act (Act 100 of 1996).	X			X			The project is ongoing; however, a lack of funding has impeded progress.
Action 4.2.3: Develop and maintain a GIS dataset of all municipal TCPs and ACPs for evacuation route planning.				X			Ongoing effort
Action 2.3.4: Continue to participate in the Wyoming Valley Levee Raising project through Luzerne County and the USACE.						X	Discontinued
Action 3.1.5: Continue to work with the County's agricultural community to develop and implement the County Animal Response Team (CART) to strengthen the County's comprehensive emergency management program.				X			This is an ongoing effort. The County has established a SOG that addresses this.
Action 3.2.6: Integrate the 5-year maintenance cycle of the Hazard Mitigation Plan with both the 10-year and biennial review and maintenance cycles of the County Comprehensive Plan and County Regional Emergency Operations Plan, respectively (see Plan Maintenance Process Section of the HMP).				X			This is an ongoing effort.
Action 1.2.7: Ensure County and municipal subdivision and land development ordinances are consistent with Chapter 102 Erosion & Sedimentation Control requirements.				X			All new construction must be approved prior to permitting.
Action 2.1.8: Develop a countywide greenway plan as an integral part of the County Comprehensive Plan update to manage development and its encroachment on floodplains, and impact on riparian buffers and stream corridors.	X						No progress made due to a lack of political will
Action 1.2.9: Consider adopting a countywide post-disaster recovery and reconstruction ordinance using the model ordinance included in the APA/FEMA PAS Report No. 483/484.				X			Continuous action
Action 3.2.10: Maintain a countywide capital improvements plan to program, schedule, prioritize, and budget both county and municipal capital improvements.				X			Continuous action
Action 5.3.11: Encourage the County's National Flood Program communities to participate in the NFIP Community Rating System (CRS) and attain discount opportunities on flood insurance premiums.				X			Continuous action
Action 4.1.12: Maintain the County's Hazard Mitigation Planning GIS datasets and disseminate the information to municipalities through ESRI's free ArcGIS Explorer software.				X			Continuous action
Action 3.1.13: Collaborate with the DEP Bureau of Radiation Protection to ensure the State's Radon Awareness Campaign and public service announcements are disseminated throughout Snyder County.				X			Continuous project
Action 4.1.14: Maintain and disseminate a list of DEP-certified radon testers, mitigators, and laboratories (current lists are available through DEP at http://www.dep.state.pa.us/dep/deputate/airwaste/rp/Radon_Division/Radon_Homepage.htm)				X			Continuous project
Action 4.2.15: Incorporate the County's Flood Warning and Response System (FWRS) Procedures into Emergency Support Function 2 (Communications and Warning) of the County's Regional EOP.			X				Ongoing project
Action 3.3.16: Purchase/install portable/fixed generators to be able to provide power to key facilities in the event of a wide-spread and prolonged loss of electric service to water supply wells, police department, borough office, public works department. (Selinsgrove Borough)		X					No Comment, Unknown progress at this point.
Action 3.3.17: Purchase base and portable radios to keep in contact with 911 Center (1) Base (4) Mobile (4) portable (plus install). (Jackson Township)							No comment, Unknown progress at this point.
Action 3.3.18: Install 3 phase standby generator with transfer switch. (Kratzerville Municipal Authority (Jackson Township))		X					No comment, Unknown progress at this point.

EXISTING MITIGATION ACTION	STATUS						REVIEW COMMENTS
	NO PROGRESS	UNKNOWN	IN PROGRESS/NOT YET COMPLETE	CONTINUOUS	COMPLETED	DISCONTINUED	
Action 3.3.19: Storage trailer for disaster supplies with generator. (Jackson Township)			X				No comment, Unknown progress at this point.
Action 5.1.20: Increase awareness of extreme temperature risk and safety (Spring Township)			X				New project
Action 3.3.21: Storage trailer for disaster equipment with generator (Beaver Township)			X				New project
Action 3.3.22: Purchase base radio and portable radio to contact the 911 center (Beaver Township)			X				New project
Action 3.3.23: : PTO generator to be used at the township shed (evacuation center) and as needed elsewhere in the county during emergencies. 27,500 Watt generator - trailer and driveshaft.(Washington Township)			X				New project
Action 3.3.24: Large snow blower to fit the front of our 6 wheel drive Motor Grader. (Washington Township)			X				New project
Structural Hazard Mitigation Projects							
Action 1.4.25: The existing 36" diameter galvanized steel pipe currently is inadequate for flood waters and overtops the township roadway and damages the culvert, roadway, and abutting private property during periods of flooding. The pipe is over Luphers Run access road to Beavertown Borough's water treatment system. (Beaver Township)	X						A study will need to be done before the pipe can be replaced. Funds are not available.
Action 1.4.26: Construct reinforced concrete headwalls on the existing twin 48" diameter PE smooth bore plastic culvert pipes on inlet and outlet ends. Also provide a bituminous paving of the shoulders areas at each new headwall and wing walls. (Beaver Township)	X						This project lacks funding to execute it.
Action 1.4.27: Replacing the existing inadequate 5 foot diameter galvanized steel pipe with a 67" x 95" galvanized metal squash pipe (equivalent 7 foot diameter) 40 foot in length and construct new reinforced concrete headwalls and wing walls on the new culvert pipe on inlet and outlet ends. Also provide for bituminous paving of the shoulders areas at each new headwall and wing wall. (Beaver Township)	X						A study will need to be done before replacement. Funds are not available to execute the project.
Action 1.5.28: Construct new reinforced concrete headwalls and wing walls on the existing twin 24" diameter PE smooth bore plastic pipes on the inlet and outlet ends. Also provide the bituminous paving of the shoulders areas at each new headwall and wing walls. (Beaver Township)	X						Funds are not available at this time.
Action 1.5.29: Pave ditch to ditch on Bowersox, Salem Church, Scholl, and Bickel Roads and head walls along Kerr Road.(Center Township)			X				Ongoing action in the municipality
Action 1.3.30: Stumps Run is a major contributor to the flooding of many homes and businesses in the north end of the borough. Each time there is a flood, the banks of the run are drastically eroded, which adds to the destruction during each consecutive flood. The proposed area of rehabilitation might be around 3,000 feet in length. East Market Street Bridge, crossing Stumps Run, should be replaced by a much higher and wider structure to accommodate the flooding situation. (Middleburg Borough)			X				Some progress has been made but the project is not complete.
Action 1.4.31: A culvert pipe running from the south side of Route 522 under the roadway, emptying on the north side of Route 522 (along North Creamery Avenue) needs to be enlarged and extended so it can safely dump into Middle Creek. Currently the pipe is too small creating a dangerous situation that generates excessive currents that could suck in a small child or animal. The flow then erodes the edge of the roadway, travels though a business parking lot into a field severely eroding everything in its path (Middleburg Borough).			X				Ongoing project
Action 1.5.32: Storm water travels down West Willow Avenue spreading into neighboring residents' yards as well as eroding farm land. (Middleburg Borough)	X						The project lacks sufficient funding
Action 1.5.33: This project involves implementation of good management practices and restoration practices to improve stream bank stability, to restore channel equity, of a 70 foot section east of SR 235 and 250 west of SR 235 of Swift Run. Placement of a rip/rap, other materials and/or Gabion baskets is proposed.(Spring Township)	X						No action has been taken to implement this project at this time.
Action 1.4.34: This project involves implementation of sound management practices and restoration methods to improve stream bank stability to restore channel equilibrium within a 200-foot section of Beaver Creek. Placement of rip rap and/or Gabion Baskets is proposed.(Spring Township)	X						No action has been taken to implement this project at this time.
Action 1.5.35: Bridge J-2 is undersized and has severe scour and undermining due to high velocity stream flows. During a flood event, the failure probability of bridge J-2 is high.		X					No comment, Unknown progress at this point.

EXISTING MITIGATION ACTION	STATUS						REVIEW COMMENTS
	NO PROGRESS	UNKNOWN	IN PROGRESS/NOT YET COMPLETE	CONTINUOUS	COMPLETED	DISCONTINUED	
Action 1.5.36: Bridge J-5 is undersized and has severe scour and undermining due to high velocity stream flows. Bridge J-5 has already been closed due to failure of the foundation from severe footing undermining (a replacement is planned).		X					No comment, Unknown progress at this point.
Action 1.5.37: Bridge WP-2 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge openings will result in more severe flooding upstream.		X					No comment, Unknown progress at this point.
Action 1.5.38: Bridge WP-3 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge.		X					No comment, Unknown progress at this point.
Action 1.5.39: Bridge WP-4 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge.		X					No comment, Unknown progress at this point.
Action 1.5.40: Bridge S-4 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area presents a hazard to the bridges and local traffic networks.		X					No comment, Unknown progress at this point.
Action 1.4.41: The dam was built as a flood control measure and a major component of that protection is the storage capacity of a lake. Over the years the lake loses some of that storage capacity due to sediment build-up. (Spring Township)		X					No comment, unknown progress at this point.
Action 1.5.42: The hazard mitigation plan may consider this an evacuation route during a disaster. Some part of the trail would follow existing power line easements, which would also provide better access and protection for these facilities.		X					No comment, unknown progress at this point.
Action 2.2.43 Cleaning out creek from bridge culvert west to West Perry Township line, also possibly lining the Mahantango Creek with large quarry rock or rip rap.(Perry Township)		X					No comment, Unknown progress at this point.
Action 2.3.44. Development along natural drainage ways of the Borough of Selinsgrove, occurring at a time before current day storm water management requirements, has created streams with inadequate capacity for storm flows greater than those associated with a 25-year frequency. These streams pass through build-up neighborhoods of residential dwellings and businesses located relatively close to the stream banks. As a result, stream flows routinely overtop the primary bank and result in flooding of properties. The two primary streams within the Borough of Selinsgrove for which these mitigation measures would provide great benefits are: Weiser Run (0.75 sq. mi. drainage area, 4800LF) and South Tributary (2.0 sq. mi. drainage area, 6000LF). (Selinsgrove Borough)		X					No comment, Unknown progress at this point.
Action 1.4.45: This project involves implementation of good management and restoration practices to improve stream equilibrium for this 400-foot section of the Beaver Creek. Stabilizing the bank with 20 ton of Rip Rap and removal of debris from stream channel along this 400-foot section of the Beaver Creek. (Spring Township)	X						No action has been taken to implement this project at this time.
Action 1.4.46: This project involves implementation of good management and restoration practices to improve stream bank stability and restore channel for this 2,000 feet up stream from Snyder Avenue. Removal of trees that have fallen into the stream causing a dam effect and placing 20 tons of Rip Rap to stabilize stream bank.(Spring Township)	X						No action has been taken to implement this project at this time.
Action 1.4.47: This project involves implementation of good management and restoration practices to improve stream equilibrium for this 500-foot section of the Middle Creek placing 100-150 tons of Rip Rap along the stream banks and removal of debris within the channel. (Spring Township)	X						No action has been taken to implement this project at this time.
Action 1.4.48: Tie into existing inlet just off 522, replace existing 15” pipe with smooth bore ADS plastic, install 5 type M inlets, frame and grate, furnish and place 850 L.F. of plastic pipe, backfill pipe under roadway with 2A sub base, backfill pipe through grass area, pave roadway with 4” of BCBC Flush surface (Franklin Township)		X					No comment, Unknown progress at this point.
Action 1.5.49: To elevate existing road (furnace) above flood level to control flooding. (Franklin Township)		X					No comment, Unknown progress at this point.
Action 1.5.50: Site 1: remove existing damage/failed concrete wall and replace with new precast concrete block wall. Site 2: along the 45 reach of the north stream bank, remove 3-6 rip rap and replace 45 precast concrete modular block wall. Install a 4 feet high chain link fence adjacent to the new concrete wall. (Franklin Township)		X					No comment, Unknown progress at this point.
Action 1.5.51: Snyder county has many “one street towns”, when traffic accident occurs it create increase risk because traffic volume increase, in some cases force hazardous material tractor-trailers through small communities				X			Continuous
Action 1.5.52. Elevate, Acquire, and demolish homes within the floodplain that are subject to flooding.				X			Continuous
Action 3.2 – 3.3.53 Remodel operations center and purchase new equipment. (Beavertown Borough)				X			New Project

EXISTING MITIGATION ACTION	STATUS						REVIEW COMMENTS
	NO PROGRESS	UNKNOWN	IN PROGRESS/NOT YET COMPLETE	CONTINUOUS	COMPLETED	DISCONTINUED	
Action 1.4.54: Replace drainage pipes along Kern Street and Kern Run to prevent flood water back-up (Beavertown Borough)				X			New Project
Action 1.4.55: Replace existing steel water pipe and add an inlet box at Center St. and Chestnut St. intersection. (Beavertown Borough)				X			New Project
Action 1.4.56: Install drainage pipe along Parkay Avenue and 3 additional inlet boxes in the Old Orchard housing development. (Beavertown Borough)				X			New Project
Action 1.4.57: Install a large culvert pipe between 200 – 227 East Walnut Street. (Beavertown Borough)				X			New Project
Action 1.4.58: Install a large culvert pipe at the intersection of Hahn Street and Quarry Road and 500 – 579 Quarry Road. (Beavertown Borough)				X			New Project
Action 1.4.59: Place inlet box at 420 East Market Street and drain pipe from 410 – 420 East Market Street. (Beavertown Borough)				X			New Project
Wyoming Valley Levee Raising Projects							
Action 1.4.60: This project involves the implementation of traditional engineering best management practices and restoration methods to improve steam bank stability and restore channel equilibrium within a 200 foot reach of Chapman Creek. Placing large quarry rock/rip rap or installing gabion baskets is proposed. (Union Township)						X	Discontinued
1.4.61: This project involves (1) acquisition, (2) elevation, or (3) flood proofing of a residential structure located in the backwater base floodplain area of the Susquehanna River along Aqueduct Hollow Road. A specific flood mitigation recommendation will be made based on the USACE's elevation survey data. (Union Township)						X	Discontinued
Action 3.3.62: To provide a tone alert radio receiver system as part of the county emergency notification system for natural and man-made disasters of flooding. To warn all residents of potential or actual occurrences of flooding						X	Discontinued
Action 1.5.63: Eight (8) residential properties on the Isle of Que have not been mapped in the USACE GIS. These properties are located on the southern end of the Isle of Que and have been flooded frequently. Elevated water heaters, furnaces, and electric panels along with anchoring fuel oil tanks so they will not float. (Penn Township)						X	Discontinued
Action 1.5.64: T-501 Clean Drains -- $400, T-389 Clean Ditches, Repair Shoulders -- $900, T-506 Clean out Drop boxes -- $1,800, T-389 Pipe Removal and Replacement --$2,760, T-443 Inlet Cleanout and Repair -- $800, T-486 Repair Shoulders -- $600. (Penn Township)						X	Discontinued
Action 1.5.65: This project involves improving a farm road from Front Street (T-500) through Elden Heimback farm to the off ramp of 11/15. This will provide access off the Isle of Que when the main road is flooded. (Penn Township)						X	Discontinued
Action 3.3.66: Install in Snyder County Center an automatic call system to alert of Flood Event, using existing telephone lines. (Penn Township)						X	Discontinued
Action 3.3.67: Establish warning system whereby expected river stages can be translated into property danger zones. Purchase computer and appropriate software to translate river stages to elevations, and map elevations to identify properties in danger. (Penn Township)						X	Discontinued
Action 1.5.68: Elevate house to regulatory flood elevation, or (2)Construct small addition at regulatory flood elevation, move utilities, furnace, hot water heater, appliances into elevated addition. (Selinsgrove Borough)						X	Discontinued
Action 1.5.69: Move furnace, water heater and softener, and electrical panel out of basement either to attic or addition to house (Selinsgrove Borough)						X	Discontinued
Action 1.5.70: Remove furnace and water heater from basement by adding small addition and rising above flood level. (Selinsgrove Borough)						X	Discontinued
Action 1.5.71: Relocate heating system and water heater and central vacuum unit out of basement to a position above the 100 yr. flood plain. (Selinsgrove Borough)						X	Discontinued
Action 1.5.72: Raise equipment from basement to 2nd floor addition. Install backflow valves. (Selinsgrove Borough)						X	Discontinued

Existing Mitigation Action	Status						Review Comments
	No Progress	Unknown	In Progress/Not Yet Complete	Continuous	Completed	Discontinued	
Action 1.1.73: Acquire property - 80x180 lot, 2 story frame houses, and lower floor 0-2 feet below 200-year flood level. (Selinsgrove Borough)						X	Discontinued
Action 1.5.74: Retrofit electric, hot water heater, and furnace with addition of room above flood elevation. (Selinsgrove Borough)						X	Discontinued
Action 2.3.75: Double home located along Penns Creek in the 100- year flood plain. (Selinsgrove Borough)						X	Discontinued
Action 1.5.76: Raise sidewalks average of 6" to act as flood barrier. (Selinsgrove Borough)						X	Discontinued
Action 1.4.77: Design and construct a portable, watertight three-foot vertical wall extension for the top of the Borough's raw water pumping station. (Shamokin Dam Borough)					X		Completed
Action 2.3.78: The two-story frame residential property at 100 E. 8th Avenue is located within the 100-year flood plain and is in poor condition. (Shamokin Dam Borough)						X	Discontinued
Action 2.3.79: Two family, two-story frame residential dwelling. Located within 100-year flood plain. Structure is not for sale and is in poor condition. (Shamokin Dam Borough)						X	Discontinued
Action 2.3.80: Acquisition and Demolition of two-story block house. This property is proposed for acquisition by the Selinsgrove Borough Hazard Mitigation Plan to facilitate access to the proposed emergency evacuation route. (Selinsgrove Borough)					X		Completed
Action 2.3.81: Build a room onto home above flood stage to house water heater and furnace. (Shamokin Dam Borough)						X	Discontinued
Action 1.5.82: Relocate breaker box with associated wiring interior chase way, water heater relocate with associated wiring and plumbing, relocate furnace and change over from up draft to down draft associated exterior chase way for gas line and duct work. (Shamokin Dam Borough)						X	Discontinued
Action 1.5.83: Water heater relocates with associated plumbing and electrical. Furnace relocate and changeover from updraft to downdraft with associated exterior chase way for gas line and duct work. (Shamokin Dam Borough)						X	Discontinued
Action 1.5.84: Build on elevated room, upgrade and relocate has hot air furnace, gas water heater, possibly water softener, panel box. If big enough, deep freezer, too. Also build brackets and elevate air conditioner compressor. (Shamokin Dam Borough)						X	Discontinued
Action 1.4.85: (1) Sewer valve to prevent sewage from entering basement during flooding. (2) Storm drain - one way valve to prevent river water from entering street and basement during low level flooding. (Shamokin Dam Borough)						X	Discontinued
Action 3.3.86: Computer equipment for the township, EMA and Emergency Response Team is needed to enable Internet and Cellular Communications between EMA, Township Officials, PEMA, FEMA, and the County EOC. The combination of laptop computers with cellular capabilities with digital cameras would provide an effective means of recoding information, writing and filing reports and communicating in a secure environment. This project will serve areas within the 100-year flood plain of the Susquehanna River Basin and is part of the Monroe Township's Hazard Mitigation Plan. (Monroe Township)						X	Discontinued
Action 3.3.87: A boat, trailer, and motor with all necessary safety equipment must be purchased along with cold water suits and rope guns. This project will serve areas within the 100-year flood plain of the Susquehanna River Basin and is a part of the Monroe Township's Hazard Mitigation Plan. (Monroe Township)						X	Discontinued
Action 3.3.88: Radios with a common frequency would expedite response times during flooding situations. They would enable conversation between the EOC, EMA Officials, Township Officials, Township equipment and operators and the Fire Department. A coordinated response of the right equipment at the right time and place would be possible. This project will serve areas within the 100-year flood plain of the Susquehanna River Basin and is part of the Monroe Township's Hazard Mitigation Plan. (Monroe Township)						X	Discontinued
Action 3.3.89: A vehicle with exceptional traction and high ground clearance is needed to traverse flooded areas with relative safety. A vehicle like a "Hum-Vee" would work well. This project will serve areas within the 100-year flood plain of the Susquehanna River Basin and is a part of the Monroe Township's Hazard Mitigation Plan. (Monroe Township)						X	Discontinued

6.2 NEW MITIGATION GOALS AND OBJECTIVES – 2019-2023

The Planning Team made the decision to continue to use the same goals from the 2014 HMP due to the fact that many of the mitigation actions are continuous. The five goals still best fit what the County is planning to achieve in the next five years.

Goals

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

1. STRENGTHEN COUNTY AND LOCAL CAPABILITIES TO REDUCE THE POTENTIAL IMPACTS OF FLOODING ON EXISTING AND FUTURE PUBLIC/PRIVATE ASSETS, INCLUDING STRUCTURES, CRITICAL FACILITIES, AND INFRASTRUCTURE.
2. INCREASE INTERGOVERNMENTAL COOPERATION AND BUILD PUBLIC-PRIVATE PARTNERSHIPS TO IMPLEMENT ACTIVITIES THAT WILL REDUCE THE IMPACTS OF NATURAL, HUMAN-MADE, AND TECHNOLOGICAL HAZARDS.
3. ENHANCE PLANNING AND EMERGENCY RESPONSE EFFORTS AMONG STATE, COUNTY, AND LOCAL EMERGENCY MANAGEMENT PERSONNEL TO PROTECT PUBLIC HEALTH AND SAFETY.
4. CONTINUE TO BUILD SNYDER COUNTY'S SPATIAL INFORMATION RESOURCES TO STRENGTHEN PUBLIC AND PRIVATE HAZARD MITIGATION PLANNING AND DECISION-SUPPORT CAPABILITIES.
5. INCREASE PUBLIC AWARENESS ON BOTH THE POTENTIAL IMPACTS OF NATURAL HAZARDS AND ACTIVITIES TO REDUCE THOSE IMPACTS.

Objectives

The goals in this section were used to develop objectives. These objectives addressed in more specific terms the results of the vulnerability assessment and reflected the nature of what can be mitigated for the identified hazards, as well as existing limitations in data and information. These draft objectives were presented to the Planning Team for review and comment, and are listed on the following page.

GOAL 1: Strengthen County and local capabilities to reduce the potential impacts of flooding on existing and future public/private assets, including structures, critical facilities, and infrastructure.

Objective 1.1 *Protect existing structures from damage that can be caused by hazards*

Objective 1.2 *Promote management and regulatory procedures that would reduce the impacts of hazards on public and private property*

Objective 1.3 *Develop local structural projects to reduce the impacts of natural and human-caused hazards on public and private property*

Objective 1.4 *Maintain streams and culverts to reduce backup and flooding*

Objective 1.5 *Protect critical facilities from the impacts of natural and human-caused hazards*

GOAL 2: Increase intergovernmental cooperation and build public-private partnerships to implement activities that will reduce the impacts of natural, human-made, and technological hazards.

Objective 2.1 *Develop regulations limiting development in hazard-prone areas*

Objective 2.2 *Lessen impacts on natural resources and open space from natural and human-caused hazards*

Objective 2.3 *Direct new growth away from hazard-prone areas*

GOAL 3: Enhance planning and emergency response efforts among state, county, and local emergency management personnel to protect public health and safety.

Objective 3.1 *Improve coordination and communication between departments*

Objective 3.2 *Ensure adequate training and resources for those involved in emergency response, services, relief, or hazard mitigation*

Objective 3.3 *Ensure adequacy of equipment and technology*

Objective 3.4 *Ensure that residents receive relief and are evacuated as quickly as possible in the event of a disaster*

GOAL 4: Continue to build Snyder County's spatial informational resources to strengthen public and private hazard mitigation planning and decision-support capabilities.

Objective 4.1 *Develop data management policies to ensure adequate data management*

Objective 4.2 *Develop and update detailed databases related to hazards and hazard mitigation*

GOAL 5: Increase public awareness on both the potential impacts of natural hazards and activities to reduce those hazards.

Objective 5.1 *Develop public education and outreach programs on hazards and hazard mitigation*

Objective 5.2 *Educate property owners in hazard-risk areas regarding their risks and the precautions they can take*

Objective 5.3 *Encourage property owners in the 1 percent annual chance floodplain to purchase flood insurance*

6.3 IDENTIFICATION OF MITIGATION

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

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

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

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

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

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

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

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

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

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

Non-Structural Projects are done before a disaster to minimize its impact. The following measures are the responsibility of municipal or County emergency management staff, operators of major and critical facilities, and other organizations:

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

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

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

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

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

The participants of the March 1, 2019 public meeting and the Planning Team identified the techniques indicated in Table 6.3-1 for each hazard.

TABLE 6.3-1: MITIGATION TECHNIQUE MATRIX

MITIGATION TECHNIQUE	LOCAL PLANS AND REGULATIONS	STRUCTURAL AND NON STRUCTURAL PROJECTS	NATURAL SYSTEMS PROTECTION	PUBLIC EDUCATION/ AWARENESS
Flood, Flash Flood, Ice Jam	X	X	X	X
Utility Interruption	X			X
Winter Storms	X	X		X
Tornadoes and Windstorms	X	X		X
Environmental Hazards	X		X	X
Wildfires	X			X
Dam Failures	X	X		X
Drought	X	X	X	X
Landslide	X		X	X
Transportation Accidents	X			X
Earthquakes	X	X		X
Subsidence and Sinkholes	X			X

6.4 MITIGATION ACTION PLAN

6.4.1 IDENTIFICATION OF MITIGATION ACTIONS

The following table presents the set of Mitigation Actions for each goal and objective identified by the Planning Team. Mitigation Action Forms for each can be found in Appendix K.

TABLE 6.4.1-1: MITIGATION ACTIONS

NONSTRUCTURAL HAZARD MITIGATION PROJECTS
1. Create and maintain a web-based inventory of the County's access and functional needs population to strengthen emergency response and evacuation operations.
2. Strengthen the County's domestic animal health surveillance by familiarizing the Snyder County agricultural community with the list of reportable diseases and conditions related to animal health per the OIE and the Pennsylvania Domestic Animal Act (Act 100 of 1996).
3. Develop and maintain a GIS dataset of all municipal TCPs and ACPs for evacuation route planning.
4. Continue to participate in the Wyoming Valley Levee Raising project through Luzerne County and the USACE.
5. Continue to work with the County's agricultural community to develop and implement the County Animal Response Team (CART) to strengthen the County's comprehensive emergency management program.
6. Integrate the five-year maintenance cycle of the HMP with both the 10-year and biennial review and maintenance cycles of the County Comprehensive Plan and County Regional Emergency Operations Plan, respectively (see Section 7 on the Plan Maintenance Process).
7. Ensure County and municipal subdivision and land development ordinances are consistent with Chapter 102 Erosion and Sedimentation Control requirements.
8. Develop a countywide greenway plan as an integral part of the County Comprehensive Plan update to manage development and its encroachment on floodplains, and impact on riparian buffers and stream corridors.
9. Consider adopting a countywide post-disaster recovery and reconstruction ordinance using the model ordinance included in the APA/FEMA PAS Report No. 483/484.
10. Maintain a countywide capital improvements plan to program, schedule, prioritize, and budget both County and municipal capital improvements.
11. Encourage the County's National Flood Program communities to participate in the NFIP CRS and attain discount opportunities on flood insurance premiums.
12. Maintain the County's Hazard Mitigation Planning GIS datasets and disseminate the information to municipalities through ESRI's free ArcGIS Explorer software.
13. Collaborate with the PA DEP Bureau of Radiation Protection to ensure the state's Radon Awareness Campaign and public service announcements are disseminated throughout Snyder County.
14. Maintain and disseminate a list of PA DEP-certified radon testers, mitigators, and laboratories (current lists are available through PA DEP at http://www.dep.state.pa.us/dep/deputate/airwaste/rp/Radon_Division/Radon_Homepage.htm).
15. Incorporate the County's Flood Warning and Response System (FWRS) Procedures into ESF #2 (Communications and Warning) of the County's Regional EOP.

16. Purchase/install portable/fixed generators to be able to provide power to key facilities in the event of a wide-spread and prolonged loss of electric service to water supply wells, police department, borough office, public works department.
17. Purchase base and portable radios to keep in contact with 911 Center (1) Base (4) Mobile (4) portable (plus install).
18. Install 3 phase standby generator with transfer switch. (Kratzerville Municipal Authority)
19. Storage trailer for disaster supplies with generator.
20. Increase awareness of extreme temperature risk and safety
21. Storage trailer for disaster equipment with generator
22. Purchase base radio and portable radio to communicate with the 911 center
23. PTO generator to be used at the township shed (evacuation center) and as needed elsewhere in the county during emergencies. 27,500 Watt generator - trailer and driveshaft.
24. Large snow blower to fit the front of our 6 wheel drive Motor Grader.
STRUCTURAL HAZARD MITIGATION PROJECTS
25. The existing 36" diameter galvanized steel pipe currently is inadequate for flood waters and overtops the township roadway and damages the culvert, roadway, and abutting private property during periods of flooding. The pipe is over Luphers Run access road to Beavertown Borough's water treatment system. (Beaver Township)
26. Construct reinforced concrete headwalls on the existing twin 48" diameter PE smooth bore plastic culvert pipes on inlet and outlet ends. Also provide a bituminous paving of the shoulders areas at each new headwall and wing walls. (Beaver Township)
27. Replace the existing inadequate 5-foot diameter galvanized steel pipe with a 67" x 95" galvanized metal squash pipe (equivalent 7 foot diameter) 40 feet in length and construct new reinforced concrete headwalls and wing walls on the new culvert pipe on inlet and outlet ends. Also provide for bituminous paving of the shoulders areas at each new headwall and wing wall. (Beaver Township)
28. Construct new reinforced concrete headwalls and wing walls on the existing twin 24" diameter PE smooth bore plastic pipes on the inlet and outlet ends. Also provide the bituminous paving of the shoulders areas at each new headwall and wing walls. (Beaver Township)
29. Pave ditch to ditch on Bowersox, Salem Church, Scholl, and Bickel Roads and head walls along Kerr Road. (Center Township)
30. Stumps Run is a major contributor to the flooding of many homes and businesses in the north end of the borough. Each time there is a flood, the banks of the run are drastically eroded, which adds to the destruction during each consecutive flood. The proposed area of rehabilitation might be around 3,000 feet in length. East Market Street Bridge, crossing Stumps Run should be replaced by a much higher and wider structure to accommodate the flooding situation. (Middleburg Borough)
31. A culvert pipe running from the south side of Route 522 under the roadway, emptying on the north side of Route 522 (along North Creamery Avenue) needs to be enlarged and extended so it can safely dump into Middle Creek. Currently the pipe is too small creating a dangerous situation that generates excessive currents that could suck in a small child or animal. The flow then erodes the edge of the roadway, travels through a business parking lot into a field, severely eroding everything in its path (Middleburg Borough).
32. Stormwater travels down West Willow Avenue, spreading into neighboring residents' yards as well as eroding farm land. (Middleburg Borough)

33. This project involves implementation of good management practices and restoration practices to improve stream bank stability, to restore channel equity, of a 70-foot section east of State Routes 235 and 250 west of State Route 235 of Swift Run. Placement of a Rip Rap, other materials and/or Gabion Baskets is proposed. (Spring Township)
34. This project involves implementation of sound management practices and restoration methods to improve stream bank stability to restore channel equilibrium within a 200-foot section of Beaver Creek. Placement of Rip Rap and/or Gabion Baskets is proposed. (Spring Township)
35. Bridge J-2 is undersized and has severe scour and undermining due to high-velocity stream flows. During a flood event, the failure probability of Bridge J-2 is high.
36. Bridge J-5 is undersized and has severe scour and undermining due to high velocity stream flows. Bridge J-5 has already been closed due to failure of the foundation from severe footing undermining (a replacement is planned).
37. Bridge WP-2 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge openings will result in more severe flooding upstream.
38. Bridge WP-3 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge.
39. Bridge WP-4 is undersized and has severe scour and undermining due to high-velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge.
40. Bridge S-4 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area presents a hazard to the bridges and local traffic networks.
41. The dam was built as a flood control measure and a major component of that protection is the storage capacity of a lake. Over the years the lake lost some of that storage capacity due to sediment build-up.
42. The hazard mitigation plan may consider this an evacuation route during a disaster. Some part of the trail would follow existing power line easements, which would also provide better access and protection for these facilities.
43. Cleaning out creek from bridge culvert west to West Perry Township line, also possibly lining the Mahantango Creek with large quarry rock or Rip Rap. (Perry Township)
44. Development along natural drainage ways of the Borough of Selinsgrove, occurring at a time before current day stormwater management requirements, has created streams with inadequate capacity for storm flows greater than those associated with a 25-year frequency. These streams pass through built-up neighborhoods of residential dwellings and businesses located relatively close to the stream banks. As a result, stream flows routinely overtop the primary bank and result in flooding of properties. The two primary streams within the Borough of Selinsgrove for which these mitigation measures would provide great benefits are Weiser Run (0.75 sq. mi. drainage area, 4800LF) and South Tributary (2.0 sq. mi. drainage area, 6000LF). (Selinsgrove Borough)
45. This project involves implementation of good management and restoration practices to improve stream equilibrium for this 400-foot section of the Beaver Creek. Stabilizing the bank with 20 tons of Rip Rap and removal of debris from stream channel along this 400-foot section of the Beaver Creek. (Spring Township)

46. This project involves implementation of good management and restoration practices to improve stream bank stability and restore channel for this 2,000 feet upstream from Snyder Avenue. Removal of trees that have fallen into the stream causing a dam effect and placing 20 tons of Rip Rap to stabilize stream bank. (Spring Township)
47. This project involves implementation of good management and restoration practices to improve stream equilibrium for this 500-foot section of the Middle Creek placing 100-150 tons of Rip Rap along the stream banks and removal of debris within the channel. (Spring Township)
48. Tie into existing inlet just off 522, replace existing 15" pipe with smooth bore ADS plastic, install 5 type M inlets, frame and grate, furnish and place 850 L.F. of plastic pipe, backfill pipe under roadway with 2A subbase, backfill pipe through grass area, pave roadway with 4" of BCBC Flush surface (Franklin Township)
49. To elevate existing road (furnace) above flood level to control flooding. (Franklin Township)
50. Site 1: remove existing damage/failed concrete wall and replace with new precast concrete block wall. Site 2: along the 45 reach of the north stream bank, remove 3-6 rip rap and replace 45 precast concrete modular block wall. Install a 4 feet high chain link fence adjacent to the new concrete wall. (Franklin Township)
51. Snyder county has many "one street towns", when traffic accident occurs it create increase risk because traffic volume increase, in some cases force hazardous material tractor-trailers through small communities
52. Elevate, Acquire, and demolish homes within the floodplain that are subject to flooding.
53. Remodel operations center and purchase new equipment.
54. Replace drainage pipes along Kern Street and Kern Run to prevent flood water back-up
55. Replace existing steel water pipe and add an inlet box at Center St. and Chestnut St. intersection.
56. Install drainage pipe along Parkay Avenue and 3 additional inlet boxes in the Old Orchard housing development.
57. Install a large culvert pipe between 200 – 227 East Walnut Street.
58. Install a large culvert pipe at the intersection of Hahn Street and Quarry Road and 500 – 579 Quarry Road.
59. Place inlet box at 420 East Market Street and drain pipe from 410 – 420 East Market Street.
WYOMING VALLEY LEVEE RAISING PROJECTS
60. This project involves the implementation of traditional engineering best management practices and restoration methods to improve steam bank stability and restore channel equilibrium within a 200-foot reach of Chapman Creek. Placing large quarry rock/Rip Rap or installing gabion baskets is proposed. (Union Township)
61. This project involves (1) acquisition, (2) elevation, or (3) demolition/reconstruction of a residential structure located in the backwater base floodplain area of the Susquehanna River along Aqueduct Hollow Road. A specific flood mitigation recommendation will be made based on the USACE's elevation survey data. (Union Township)
62. To provide a tone alert radio receiver system as part of the County emergency notification system for natural and human-made disasters of flooding. To warn all residents of potential or actual occurrences of flooding.
63. Eight (8) residential properties on the Isle of Que have not been mapped in the USACE GIS. These properties are located on the southern end of the Isle of Que and have been flooded frequently. Elevated water heaters, furnaces, and electric panels along with anchoring fuel oil tanks so they will not float. (Penn Township)
64. T-501 Clean Drains -- $400, T-389 Clean Ditches, Repair Shoulders -- $900, T-506 Clean out Drop boxes -- $1,800, T-389 Pipe Removal and Replacement --$2,760, T-443 Inlet Cleanout and Repair -- $800, T-486 Repair Shoulders -- $600. (Penn Township)

65. This project involves improving a farm road from Front Street (T-500) through Elden Heimback farm to the off-ramp of U.S. Route 11/15. This will provide access off the Isle of Que when the main road is flooded. (Penn Township)
66. Install in the Snyder County 9-1-1 Center an automatic call system to alert of flood event, using existing telephone lines. (Penn Township)
67. Establish warning system whereby expected river stages can be translated into property danger zones. Purchase computer and appropriate software to translate river stages to elevations, and map elevations to identify properties in danger. (Penn Township)
68. (1) Elevate house to regulatory flood elevation, or (2) construct small addition at regulatory flood elevation, move utilities, furnace, hot water heater, appliances into elevated addition. (Selinsgrove Borough)
69. Move furnace, water heater and softener, and electrical panel out of basement either to attic or addition to house. (Selinsgrove Borough)
70. Remove furnace and water heater from basement by adding small addition and rising above flood level. (Selinsgrove Borough)
71. Relocate heating system and water heater and central vacuum unit out of basement to a position above the 100-year floodplain. (Selinsgrove Borough)
72. Raise equipment from basement to second-floor addition. Install backflow valves. (Selinsgrove Borough)
73. Acquire property - 80x180 lot, two-story frame house, and lower floor 0-2 feet below 200-year flood level. (Selinsgrove Borough)
74. Retrofit electric, hot water heater, and furnace with addition of room above flood elevation. (Selinsgrove Borough)
75. Double home located along Penns Creek in the 100-year floodplain. (Selinsgrove Borough)
76. Raise sidewalks average of 6" to act as flood barrier. (Selinsgrove Borough)
77. Design and construct a portable, watertight three-foot vertical wall extension for the top of the Borough's raw water pumping station. (Shamokin Dam Borough)
78. The two-story frame residential property at 100 E. 8th Avenue is located within the 100-year floodplain and is in poor condition. (Shamokin Dam Borough)
79. Two-family, two-story frame residential dwelling. Located within 100-year flood-plain. Structure is not for sale and is in poor condition. (Shamokin Dam Borough)
80. Acquisition and demolition of two-story block house. This property is proposed for acquisition by the Selinsgrove Borough HMP to facilitate access to the proposed emergency evacuation route. (Selinsgrove Borough)
81. Build a room onto home above flood stage to house water heater and furnace. (Shamokin Dam Borough)
82. Relocate breaker box with associated wiring interior chase way, water heater relocate with associated wiring and plumbing, relocate furnace and change over from updraft to downdraft associated exterior chase way for gas line and duct work. (Shamokin Dam Borough)
83. Water heater relocate with associated plumbing and electrical. Furnace relocate and change over from updraft to downdraft with associated exterior chase way for gas line and duct work. (Shamokin Dam Borough)
84. Build on elevated room, upgrade and relocate has hot air furnace, gas water heater, possibly water softener, panel box. If big enough, deep freezer, too. Also build brackets and elevate air conditioner compressor. (Shamokin Dam Borough)

85. (1) Sewer valve to prevent sewage from entering basement during flooding. (2) Storm drain – one-way valve to prevent river water from entering street and basement during low level flooding. (Shamokin Dam Borough)
86. Computer equipment for the township, EMA and Emergency Response Team is needed to enable Internet and Cellular Communications between EMA, Township officials, PEMA, FEMA, and the County EOC. The combination of laptop computers with cellular capabilities with digital cameras would provide an effective means of recoding information, writing and filing reports and communicating in a secure environment. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)
87. A boat, trailer, and motor with all necessary safety equipment must be purchased along with cold-water suits and rope guns. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is a part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)
88. Radios with a common frequency would expedite response times during flooding situations. They would enable conversation between the EOC, EMA officials, Township officials, Township equipment and operators and the Fire Department. A coordinated response of the right equipment at the right time and place would be possible. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)
89. A vehicle with exceptional traction and high ground clearance is needed to traverse flooded areas with relative safety. A vehicle like a "Hum-Vee" would work well. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is a part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)

* THIS ACTION RELATES TO RESPONSE AND RECOVERY IN SNYDER COUNTY.

6.4.2 EVALUATION OF MITIGATION ACTIONS

The preceding list includes 89 action items, many of which will require substantial commitments of time by County and municipal staff. It is unrealistic to assume that the individuals working for these entities will have the time and resources to pursue all of these activities within the planning horizon for this Plan (i.e., over the next five years, which is the planning horizon for this Plan relative to the requirements of DMA 2000). To focus the energies of these individuals and related organizations, it was necessary to determine priorities for actions.

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

TABLE 6.4.2-1: PA-STEEL CRITERIA

CRITERIA	CONSIDERATIONS
Political	Who are the stakeholders in this proposed action? Have all of the stakeholders been offered an opportunity to participate in the planning process? How can the mitigation goals be accomplished at the lowest cost to the stakeholders? Is there public support to implement and maintain this measure? Is the political leadership willing to propose and support the favored measure?
Administrative	Does the community have the capability to accomplish the action (i.e., can it implement the mitigation action)? Can the community provide any necessary maintenance? Is there enough staff, technical experts, and funding? Can it be accomplished in a timely manner?
Social	Will it cause any one segment of the population to be treated unfairly? Will the action disrupt established neighborhoods, break up voting districts or cause the relocation of low- and moderate-income people? Is the action compatible with present and future community values? Will the measures adversely affect cultural values or resources?
Technical	How effective is the measure in avoiding or reducing future losses? Will it create more problems than it solves? Does it solve a problem or only a symptom? In light of other community goals, is it the most useful?
Economic	What are the costs and benefits of this measure? How will the implementation of this measure affect the pocketbook of the community?
Environmental	Is the action consistent with the community's environmental goals?
Legal	Does the community have the authority to implement the proposed measure? Is there a clear legal basis for the mitigation action? Is an ordinance or resolution necessary? What are the legal side effects? Will the community be liable for the actions or support of actions, or lack of action? Is it likely to be challenged?

Using PA-STEEL criteria, the mitigation alternatives were scored as shown in Table 6.4.2-2.

TABLE 6.4.2-2: PA-STEEL EVALUATION OF MITIGATION ACTIONS

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																								
	P			A			S		T			E				E					L				
	Political			Administrative			Social		Technical			Economic				Environmental					Legal				
	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
1. Create and maintain a web-based inventory of the County's access and functional needs population to strengthen emergency response and evacuation operations.	+	+	+	+	+	+	+	N	+	+	+	+	+	-	+	N	N	N	N	+	+	+	+	17 (+) 5 (N) 1 (-)	21 (+) 5 (N) 3 (-)
2. Strengthen the County's domestic animal health surveillance by familiarizing the Snyder County agricultural community with the list of reportable diseases and conditions related to animal health per the Office of International Epizootics (OIE) and the Pennsylvania Domestic Animal Act (Act 100 of 1996).	+	+	+	+	+	+	+	N	+	+	+	+	+	-	+	N	+	N	+	+	+	+	+	19 (+) 3 (N) 1 (-)	23 (+) 5 (N) 1 (-)
3. Develop and maintain a GIS dataset of all municipal TCPs and ACPs for evacuation route planning.	+	+	+	+	+	+	+	N	+	+	+	+	+	-	+	N	N	N	N	+	+	+	+	17 (+) 5 (N) 1 (-)	21 (+) 5 (N) 1 (-)
4. Continue to participate in the Wyoming Valley Levee Raising project through Luzerne County and the USACE.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
5. Continue to work with the County's agricultural community to develop and implement the County Animal Response Team (CART) to strengthen the County's comprehensive emergency management program.	+	+	+	+	+	+	+	N	+	+	+	+	+	-	+	N	+	N	+	+	+	+	+	19 (+) 3 (N) 1 (-)	23 (+) 5 (N) 1 (-)
6. Integrate the 5-year maintenance cycle of the Hazard Mitigation Plan with both the 10-year and biennial review and maintenance cycles of the County Comprehensive Plan and County Regional Emergency Operations Plan, respectively (see Section 7 on the Plan Maintenance Process).	+	+	N	+	+	N	+	N	+	N	N	+	+	N	+	N	N	N	N	N	+	+	-	11 (+) 11 (N) 1 (-)	15 (+) 11 (N) 1 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																								
	P			A			S		T			E				E					L				
	Political			Administrative			Social		Technical			Economic				Environmental					Legal				
	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
7. Ensure County and municipal subdivision and land development ordinances are consistent with Chapter 102 Erosion and Sedimentation Control requirements.	+	+	+	+	+	+	+	N	+	-	+	+	-	N	-	+	+	+	+	+	+	+	+	18 (+) 2 (N) 3 (-)	20 (+) 2 (N) 5 (-)
8. Develop a countywide greenway plan as an integral part of the County Comprehensive Plan update to manage development and its encroachment on floodplains, and impact on riparian buffers and stream corridors.	+	+	N	+	+	N	+	N	+	N	N	+	+	N	+	N	N	N	N	N	+	+	-	11 (+) 11 (N) 1 (-)	15 (+) 11 (N) 1 (-)
9. Consider adopting a countywide post-disaster recovery and reconstruction ordinance using the model ordinance included in the APA/FEMA PAS Report No. 483/484.	+	+	N	+	+	N	+	N	+	N	N	+	+	N	+	N	N	N	N	N	+	+	-	11 (+) 11 (N) 1 (-)	15 (+) 11 (N) 1 (-)
10. Maintain a countywide capital improvements plan to program, schedule, prioritize, and budget both county and municipal capital improvements.	+	+	N	+	+	N	+	N	+	N	N	+	+	N	+	N	N	N	N	N	+	+	-	11 (+) 11 (N) 1 (-)	15 (+) 11 (N) 1 (-)
11. Encourage the County's National Flood Program communities to participate in the NFIP Community Rating System (CRS) and attain discount opportunities on flood insurance premiums.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	22 (+) 1 (N) 0 (-)	26 (+) 1 (N) 0 (-)
12. Maintain the County's Hazard Mitigation Planning GIS datasets and disseminate the information to municipalities through ESRI's free ArcGIS Explorer software.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	22 (+) 1 (N) 0 (-)	26 (+) 1 (N) 0 (-)
13. Collaborate with the PA DEP Bureau of Radiation Protection to ensure the state's Radon Awareness Campaign and public service announcements are disseminated throughout Snyder County.	+	+	+	-	-	-	+	N	+	-	-	+	-	+	-	N	N	N	N	+	+	+	+	11 (+) 5 (N) 7 (-)	13(+) 4 (N) 9 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																							
	P			A			S		T			E				E					L				
	Political			Administrative			Social		Technical			Economic				Environmental					Legal				
	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
14. Maintain and disseminate a list of PA DEP-certified radon testers, mitigators, and laboratories (current lists are available through PA DEP at http://www.dep.state.pa.us/dep/deputate/airwaste/rp/Radon_Division/Radon_Homepage.htm).	N	N	N	+	-	+	+	N	+	-	-	+	+	+	N	N	N	N	N	+	+	+	+	11 (+) 9 (N) 3 (-)	15 (+) 9 (N) 3 (-)
15. Incorporate the County's Flood Warning and Response System (FWRS) procedures into ESF #2 (Communications and Warning) of the County's Regional EOP.	+	+	N	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	18 (+) 5 (N) 0 (-)	22 (+) 5 (N) 0 (-)
16. Purchase/install portable/fixed generators to be able to provide power to key facilities in the event of a wide-spread and prolonged loss of electric service to water supply wells, police department, borough office, public works department. (Selinsgrove Borough)	+	+	N	+	+	+	N	+	+	+	N	+	-	N	N	N	N	N	N	+	N	+	N	11 (+) 11 (N) 1 (-)	13 (+) 11 (N) 3 (-)
17. Purchase base and portable radios to keep in contact with 911 Center (1) Base (4) Mobile (4) portable (plus install). (Jackson Township)	+	+	N	+	-	+	N	N	+	+	N	+	-	N	+	N	N	+	N	+	N	+	N	11 (+) 10 (N) 2 (-)	13 (+) 10 (N) 4 (-)
18. Install 3 phase standby generator with transfer switch. (Kratzerville Municipal Authority (Jackson Township)	+	+	N	+	+	+	N	N	+	+	-	+	-	-	+	N	N	N	N	+	N	+	N	11 (+) 9 (N) 3 (-)	13 (+) 9 (N) 5 (-)
19. Storage trailer for disaster supplies with generator . (Jackson Township)	+	N	+	+	-	+	+	+	+	+	N	+	-	-	+	N	N	N	N	+	N	+	N	12 (+) 8 (N) 3 (-)	14 (+) 8 (N) 5 (-)
20. Increase awareness of extreme temperature risk and safety (Spring Township)	+	+	+	+	-	+	+	+	+	+	-	+	+	-	N	+	+	+	+	+	-	+	-	17 (+) 1 (N) 5 (-)	21 (+) 1 (N) 5 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																								
	P			A			S		T			E				E					L				
	Political			Administrative			Social		Technical			Economic				Environmental					Legal				
	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
21. Storage trailer for disaster equipment with generator (Beaver Township)	+	N	N	+	-	+	+	+	+	+	+	+	-	-	+	N	N	N	N	+	N	+	N	12 (+) 8 (N) 3 (-)	14 (+) 8 (N) 5 (-)
22. Purchase base radio and portable radio to contact the 911 center (Beaver Township)	+	N	N	+	-	+	+	N	+	+	N	+	-	N	-	N	N	N	N	+	N	+	N	9 (+) 11 (N) 3 (-)	11 (+) 11 (N) 5 (-)
23. PTO generator to be used at the township shed (evacuation center) and as needed elsewhere in the county during emergencies. 27,500 Watt generator - trailer and driveshaft.(Washington Township)	+	+	+	+	-	+	+	+	+	+	N	+	-	N	-	N	N	N	N	N	N	+	N	11 (+) 9 (N) 3 (-)	13 (+) 9 (N) 5 (-)
24. Large snow blower to fit the front of our 6 wheel drive Motor Grader. (Washington Township)	+	N	+	+	-	-	+	+	+	+	N	+	-	N	+	N	N	N	N	N	N	+	N	10 (+) 10 (N) 3 (-)	12 (+) 10 (N) 5 (-)
25. The existing 36" diameter galvanized steel pipe currently is inadequate for flood waters and overtops the township roadway and damages the culvert, roadway, and abutting private property during periods of flooding. The pipe is over Luphers Run access road to Beavertown Borough's water treatment system. (Beaver Township)	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	N	+	+	21 (+) 1 (N) 1 (-)	23 (+) 1 (N) 3 (-)
26. Construct reinforced concrete headwalls on the existing twin 48" diameter PE smooth bore plastic culvert pipes on inlet and outlet ends. Also provide a bituminous paving of the shoulders areas at each new headwall and wing walls. (Beaver Township)	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	N	N	+	+	+	+	+	20 (+) 2 (N) 1 (-)	22 (+) 2 (N) 3 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																								
	P			A			S		T			E				E					L				
	Political			Administrative			Social		Technical			Economic				Environmental					Legal				
	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
27. Replacing the existing inadequate 5 foot diameter galvanized steel pipe with a 67" x 95" galvanized metal squash pipe (equivalent 7 foot diameter) 40 foot in length and construct new reinforced concrete headwalls and wing walls on the new culvert pipe on inlet and outlet ends. Also provide for bituminous paving of the shoulders areas at each new headwall and wing wall. (Beaver Township)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	-	+	+	N	+	+	+	+	+	19 (+) 1 (N) 3 (-)	21 (+) 1 (N) 5 (-)
28. Construct new reinforced concrete headwalls and wing walls on the existing twin 24" diameter PE smooth bore plastic pipes on the inlet and outlet ends. Also provide the bituminous paving of the shoulders areas at each new headwall and wing walls. (Beaver Township)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	-	+	+	N	+	+	+	+	+	19 (+) 1 (N) 3 (-)	21 (+) 1 (N) 5 (-)
29. Pave ditch to ditch on Bowersox, Salem Church, Scholl, and Bickel Roads and head walls along Kerr Road.(Center Township)	+	+	+	-	-	-	-	N	+	+	+	+	-	-	-	+	+	+	+	+	+	+	+	15 (+) 1(N) 7 (-)	17 (+) 0 (N) 9 (-)
30. Stumps Run is a major contributor to the flooding of many homes and businesses in the north end of the borough. Each time there is a flood, the banks of the run are drastically eroded, which adds to the destruction during each consecutive flood. The proposed area of rehabilitation might be around 3,000 feet in length. East Market Street Bridge, crossing Stumps Run should be replaced by a much higher and wider structure to accommodate the flooding situation. (Middleburg Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	22 (+) 1 (N) 0 (-)	26 (+) 1 (N) 0 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																								
	P			A			S		T			E				E					L				
	Political			Administrative			Social		Technical			Economic				Environmental					Legal				
	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
31. A culvert pipe running from the south side of Route 522 under the roadway, emptying on the north side of Route 522 (along North Creamery Avenue) needs to be enlarged and extended so it can safely dump into Middle Creek. Currently the pipe is too small, creating a dangerous situation that generates excessive currents that could suck in a small child or animal. The flow then erodes the edge of the roadway, travels through a business parking lot into a field, severely eroding everything in its path. (Middleburg Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	22 (+) 1 (N) 0 (-)	26 (+) 1 (N) 0 (-)
32. Stormwater travels down West Willow Avenue spreading into neighboring residents' yards as well as eroding farm land. (Middleburg Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	22 (+) 1 (N) 0 (-)	26 (+) 1 (N) 0 (-)
33. This project involves implementation of good management practices and restoration practices to improve stream bank stability, to restore channel equity, of a 70-foot section east of State Routes 235 and 250 west of State Route 235 of Swift Run. Placement of a Rip Rap, other materials and/or Gabion Baskets is proposed. (Spring Township)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	22 (+) 1 (N) 0 (-)	26 (+) 1 (N) 0 (-)
34. This project involves implementation of sound management practices and restoration methods to improve stream bank stability to restore channel equilibrium within a 200-foot section of Beaver Creek. Placement of Rip Rap and/or Gabion Baskets is proposed. (Spring Township)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	+	+	+	+	+	22 (+) 1 (N) 0 (-)	26 (+) 1 (N) 0 (-)
35. Bridge J-2 is undersized and has severe scour and undermining due to high-velocity stream flows. During a flood event, the failure probability of Bridge J-2 is high.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																							
	P			A			S		T			E				E					L				
	Political			Administrative			Social		Technical			Economic				Environmental					Legal				
	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
36. Bridge J-5 is undersized and has severe scour and undermining due to high-velocity stream flows. Bridge J-5 has already been closed due to failure of the foundation from severe footing undermining (a replacement is planned).	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
37. Bridge WP-2 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge openings will result in more severe flooding upstream.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
38. Bridge WP-3 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
39. Bridge WP-4 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
40. Bridge S-4 is undersized and has severe scour and undermining due to high-velocity stream flows. Flooding in this area presents a hazard to the bridges and local traffic networks.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
41. The dam was built as a flood control measure and a major component of that protection is the storage capacity of a lake. Over the years the lake lost some of that storage capacity due to sediment build-up.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
42. The HMP may consider this an evacuation route during a disaster. Some part of the trail would follow existing power line easements, which would also provide better access and protection for these facilities.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	N	N	N	N	+	+	+	+	19 (+) 4 (N) 0 (-)	23 (+) 4 (N) 0 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																								
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	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
43. Cleaning out creek from bridge culvert west to West Perry Township line, also possibly lining the Mahantango Creek with large quarry rock or Rip Rap. (Perry Township)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	20 (+) 0 (N) 3 (-)	22 (+) 0 (N) 5 (-)
44. Development along natural drainage ways of the Borough of Selinsgrove, occurring at a time before current-day stormwater management requirements, has created streams with inadequate capacity for storm flows greater than those associated with a 25-year frequency. These streams pass through built-up neighborhoods of residential dwellings and businesses located relatively close to the stream banks. As a result, stream flows routinely overtop the primary bank and result in flooding of properties. The two primary streams within the Borough of Selinsgrove for which these mitigation measures would provide great benefits are Weiser Run (0.75 sq. mi. drainage area, 4800LF) and South Tributary (2.0 sq. mi. drainage area, 6000LF). (Selinsgrove Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
45. This project involves implementation of good management and restoration practices to improve stream equilibrium for this 400-foot section of the Beaver Creek. Stabilizing the bank with 20 tons of Rip Rap and removal of debris from stream channel along this 400-foot section of the Beaver Creek. (Spring Township)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
46. This project involves implementation of good management and restoration practices to improve stream bank stability and restore channel for this 2,000 feet upstream from Snyder Avenue. Removal of trees that have fallen into the stream causing a dam effect and placing 20 tons of Rip Rap to stabilize stream bank. (Spring Township)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)

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47. This project involves implementation of good management and restoration practices to improve stream equilibrium for this 500-foot section of the Middle Creek placing 100-150 tons of Rip Rap along the stream banks and removal of debris within the channel. (Spring Township)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
48. Tie into existing inlet just off 522, replace existing 15” pipe with smooth bore ADS plastic, install 5 type M inlets, frame and grate, furnish and place 850 L.F. of plastic pipe, backfill pipe under roadway with 2A sub-base, backfill pipe through grass area, pave roadway with 4” of BCBC Flush surface. (Franklin Township)	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	22 (+) 0 (N) 1(-)	24 (+) 0 (N) 3 (-)
49. To elevate existing road (furnace) above flood level to control flooding. (Franklin Township)	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	22 (+) 0 (N) 1 (-)	24 (+) 0 (N) 3 (-)
50. Site 1: remove existing damage/failed concrete wall and replace with new precast concrete block wall. Site 2: along the 45 reach of the north stream bank, remove 3-6 Rip Rap and replace 45 precast concrete modular block wall. Install a 4-foot high chain link fence adjacent to the new concrete wall. (Franklin Township)	+	+	+	+	-	+	+	+	+	+	+	+	-	-	-	+	+	+	+	+	+	+	+	19 (+) 0 (N) 4 (-)	21 (+) 0 (N) 6 (-)
51. Snyder County has many “one-street towns,” when traffic accident occurs it creates increased risk because traffic volume increases, in some cases force hazardous material tractor-trailers through small communities.	+	+	+	-	-	+	+	+	-	+	-	+	-	-	-	+	+	+	+	+	+	+	+	16 (+) 0 (N) 7 (-)	18 (+) 0 (N) 9 (-)
52. Elevate, acquire, and demolish homes within the floodplain that are subject to flooding.	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	21 (+) 0 (N) 2 (-)	23 (+) 0 (N) 4 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																								
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	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
53. Remodel operations center and purchase new equipment. (Beavertown Borough)	+	N	+	+	-	+	+	+	+	+	+	+	+	+	-	N	N	N	+	+	+	+	+	17 (+) 4 (N) 2 (-)	21 (+) 4 (N) 2 (-)
54. Replace drainage pipes along Kern Street and Kern Run to prevent flood water back-up (Beavertown Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	N	+	+	+	+	+	20 (+) 1 (N) 2 (-)	22 (+) 1 (N) 4 (-)
55. Replace existing steel water pipe and add an inlet box at Center St. and Chestnut St. intersection. (Beavertown Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	N	+	+	+	+	+	20 (+) 1 (N) 2 (-)	22 (+) 1 (N) 4 (-)
56. Install drainage pipe along Parkay Avenue and 3 additional inlet boxes in the Old Orchard housing development. (Beavertown Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	N	+	+	+	+	+	20 (+) 1 (N) 2 (-)	22 (+) 1 (N) 4 (-)
57. Install a large culvert pipe between 200 – 227 East Walnut Street. (Beavertown Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	N	+	+	+	+	+	20 (+) 1 (N) 2 (-)	22 (+) 1 (N) 4 (-)
58. Install a large culvert pipe at the intersection of Hahn Street and Quarry Road and 500 – 579 Quarry Road. (Beavertown Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	N	+	+	+	+	+	20 (+) 1 (N) 2 (-)	22 (+) 1 (N) 4 (-)
59. Place inlet box at 420 East Market Street and drain pipe from 410 – 420 East Market Street. (Beavertown Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	N	+	+	+	+	+	20 (+) 1 (N) 2 (-)	22 (+) 1 (N) 4 (-)

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	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
60. This project involves the implementation of traditional engineering best management practices and restoration methods to improve steam bank stability and restore channel equilibrium within a 200-foot reach of Chapman Creek. Placing large quarry rock/Rip Rap or installing gabion baskets is proposed. (Union Township)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	21 (+) 0 (N) 2 (-)	23 (+) 0 (N) 4 (-)
61. This project involves (1) acquisition, (2) elevation, or (3) flood-proofing of a residential structure located in the backwater base floodplain area of the Susquehanna River along Aqueduct Hollow Road. A specific flood mitigation recommendation will be made based on the USACE's elevation survey data. (Union Township)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	21 (+) 0 (N) 2 (-)	23 (+) 0 (N) 4 (-)
62. To provide a tone alert radio receiver system as part of the County emergency notification system for natural and human-made disasters of flooding. To warn all residents of potential or actual occurrences of flooding.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
63. Eight (8) residential properties on the Isle of Que have not been mapped in the USACE GIS. These properties are located on the southern end of the Isle of Que and have been flooded frequently. Elevated water heaters, furnaces, and electric panels along with anchoring fuel oil tanks so they will not float. (Penn Township)	+	+	+	-	-	+	+	+	+	-	-	+	-	+	-	+	+	+	+	+	+	+	+	17 (+) 0 (N) 6 (-)	19 (+) 0 (N) 8 (-)
64. T-501 Clean Drains -- $400, T-389 Clean Ditches, Repair Shoulders -- $900, T-506 Clean out Drop boxes -- $1,800, T-389 Pipe Removal and Replacement --$2,760, T-443 Inlet Cleanout and Repair -- $800, T-486 Repair Shoulders -- $600. (Penn Township)	-	+	+	-	-	+	+	+	+	-	-	+	-	+	-	+	+	N	+	+	+	+	+	15 (+) 1 (N) 7 (-)	17 (+) 1 (N) 9 (-)
65. This project involves improving a farm road from Front Street (T-500) through Elden Heimback farm to the off-ramp of U.S. Route 11/15. This will provide access off the Isle of Que when the main road is flooded. (Penn Township)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	20 (+) 0 (N) 3 (-)	22 (+) 0 (N) 5 (-)

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66. Install in Snyder County 9-1-1 Center an automatic call system to alert of flood event, using existing telephone lines. (Penn Township)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
67. Establish warning system whereby expected river stages can be translated into property danger zones. Purchase computer and appropriate software to translate river stages to elevations, and map elevations to identify properties in danger. (Penn Township)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
68. (1) Elevate house to regulatory flood elevation, or (2) construct small addition at regulatory flood elevation, move utilities, furnace, hot water heater, appliances into elevated addition. (Selinsgrove Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
69. Move furnace, water heater and softener, and electrical panel out of basement either to attic or addition to house. (Selinsgrove Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
70. Remove furnace and water heater from basement by adding small addition and rising above flood level. (Selinsgrove Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
71. Relocate heating system and water heater and central vacuum unit out of basement to a position above the 100-year floodplain. (Selinsgrove Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
72. Raise equipment from basement to second-floor addition. Install backflow valves. (Selinsgrove Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
73. Acquire property - 80x180 lot, 2-story frame house, and lower floor 0-2 feet below 200-year flood level. (Selinsgrove Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	-	-	+	+	+	+	+	+	+	+	19 (+) 0 (N) 4 (-)	21 (+) 0 (N) 6 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																							
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	Political Support	Local Champion	Public Support	Staffing	Funding Allocation	Maintenance / Operations	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent w/ Community Environmental Goals	Consistent w/ Federal Laws	State Authority	Existing Local Authority	Potential Legal Challenge	Summary (Equal Weighting)	Summary (Benefits and Costs Prioritized)
74. Retrofit electric, hot water heater, and furnace with addition of room above flood elevation. (Selinsgrove Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
75. Double home located along Penns Creek in the 100- year floodplain. (Selinsgrove Borough)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	23 (+) 0 (N) 0 (-)	27 (+) 0 (N) 0 (-)
76. Raise sidewalks average of 6" to act as flood barrier. (Selinsgrove Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	20 (+) 0 (N) 3 (-)	22 (+) 0 (N) 5 (-)
77. Design and construct a portable, watertight three-foot vertical wall extension for the top of the Borough's raw water pumping station. (Shamokin Dam Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	20 (+) 0 (N) 3 (-)	22 (+) 0 (N) 5 (-)
78. The two-story frame residential property at 100 E. 8th Avenue is located within the 100-year floodplain and is in poor condition. (Shamokin Dam Borough)	+	+	+	+	-	+	+	+	+	-	-	+	-	+	-	+	+	+	+	+	+	+	+	18 (+) 0 (N) 5 (-)	20 (+) 0 (N) 7 (-)
79. Two-family, two-story frame residential dwelling. Located within 100-year floodplain. Structure is not for sale and is in poor condition. (Shamokin Dam Borough)	+	+	+	+	-	+	+	+	+	-	-	+	-	+	-	+	+	+	+	+	+	+	+	18 (+) 0 (N) 5 (-)	20 (+) 0 (N) 7 (-)
80. Acquisition and demolition of two-story block house. This property is proposed for acquisition by the Selinsgrove Borough HMP to facilitate access to the proposed emergency evacuation route. (Shamokin Dam Borough)	+	+	+	+	-	+	+	+	+	-	-	+	-	+	-	+	+	+	+	+	+	+	+	18 (+) 0 (N) 5 (-)	20 (+) 0 (N) 7 (-)
81. Build a room onto home above floodplain to house water heater and furnace. (Shamokin Dam Borough)	+	+	+	+	-	+	+	+	+	-	-	+	-	+	-	+	+	+	+	+	+	+	+	18 (+) 0 (N) 5 (-)	20 (+) 0 (N) 7 (-)

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82. Relocate breaker box with associated wiring interior chase way, water heater relocate with associated wiring and plumbing, relocate furnace and change over from updraft to downdraft associated exterior chase way for gas line and duct work. (Shamokin Dam Borough)	+	+	+	+	-	+	+	+	+	-	-	+	-	+	-	+	+	+	+	+	+	+	+	18 (+) 0 (N) 5 (-)	20 (+) 0 (N) 7 (-)
83. Water heater relocate with associated plumbing and electrical. Furnace relocate and changeover from updraft to downdraft with associated exterior chase way for gas line and duct work. (Shamokin Dam Borough)	+	+	+	+	-	+	+	+	+	-	-	+	-	+	-	+	+	+	+	+	+	+	+	18 (+) 0 (N) 5 (-)	20 (+) 0 (N) 7 (-)
84. Build on elevated room, upgrade and relocate has hot air furnace, gas water heater, possibly water softener, panel box. If big enough, deep freezer, too. Also build brackets and elevate air conditioner compressor. (Shamokin Dam Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	20 (+) 0 (N) 3 (-)	22 (+) 0 (N) 5 (-)
85. (1) Sewer valve to prevent sewage from entering basement during flooding. (2) Storm drain – one-way valve to prevent river water from entering street and basement during low level flooding. (Shamokin Dam Borough)	+	+	+	+	-	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	20 (+) 0 (N) 3 (-)	22 (+) 0 (N) 5 (-)
86. Computer equipment for the township, EMA and Emergency Response Team is needed to enable Internet and cellular communications between EMA, township officials, PEMA, FEMA, and the County EOC. The combination of laptop computers with cellular capabilities with digital cameras would provide an effective means of recoding information, writing and filing reports and communicating in a secure environment. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)	+	+	+	-	-	-	+	+	+	+	+	+	-	+	-	N	N	N	N	+	+	+	+	14 (+) 4 (N) 5 (-)	16 (+) 4 (N) 7 (-)

ACTIONS	PA-STEEL CRITERIA CONSIDERATIONS + FAVORABLE - LESS FAVORABLE N NOT APPLICABLE																								
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87. A boat, trailer, and motor with all necessary safety equipment must be purchased along with cold-water suits and rope guns. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is a part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)	+	+	+	-	-	-	+	+	+	+	+	+	-	+	-	N	N	N	N	+	+	+	+	14 (+) 4 (N) 5 (-)	16 (+) 4 (N) 7 (-)
88. Radios with a common frequency would expedite response times during flooding situations. They would enable conversation between the EOC, EMA officials, township officials, township equipment and operators and the Fire Department. A coordinated response of the right equipment at the right time and place would be possible. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)	+	+	+	-	-	-	+	+	+	+	+	+	-	+	-	N	N	N	N	+	+	+	+	14 (+) 4 (N) 5 (-)	16 (+) 4 (N) 7 (-)
89. A vehicle with exceptional traction and high ground clearance is needed to traverse flooded areas with relative safety. A vehicle like a "Hum-Vee" would work well. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is a part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)	+	+	+	-	-	-	+	+	+	+	+	+	-	+	-	N	N	N	N	+	+	+	+	14 (+) 4 (N) 5 (-)	16 (+) 4 (N) 7 (-)

6.4.3 PRIORITIZATION OF MITIGATION ACTIONS

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

FEMA mitigation planning requirements indicate that any prioritization system used shall include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects. Though the PA-STEEL values for each action are somewhat vague, all of the actions listed as having an economic impact indicated that that impact would be beneficial to the community. Whether the actions had associated costs or not, those mitigation actions could not be ruled out based on the benefit or cost values in the PA-STEEL evaluation. Implementation of any project will be based on a benefit-cost analysis as described in FEMA 386-5: Using Benefit Cost Review in Mitigation Planning (2007). The specific economic benefits and costs will be determined prior to application for funding of the mitigation project.

Those participating in the 2019 HMP update planning process provided comments that allowed for the prioritization of the mitigation actions listed in Table 6.4.3-1 using the seven PA-STEEL criteria. In order to evaluate and prioritize the mitigation actions, participants identified favorable and less favorable factors for each action. Table 6.4.3-1 summarizes the evaluation methodology and provides the results of this evaluation for all 89 mitigation actions in two columns. The first results column includes a summary of the feasibility factors, placing equal weight on all factors. The second results column reflects feasibility scores with benefits and costs weighted more heavily, and therefore, given greater priority. A weighting factor of three was used for each benefit and cost element. Therefore, a "+" benefit factor rating equals three pluses and a "-" benefit factor rating equals three minuses in the total prioritization score.

The results of the weighted PA-STEEL matrix were examined to prioritize the mitigation actions. The number of unfavorable ratings was subtracted from the number of favorable ratings to determine each action's score. Actions that received scores of 27 (the highest possible) were assigned high priority. Those that received scores of 20 (the average of the scores) to 26, inclusive, were assigned medium priority. All others were assigned low priority. The actions cited below are listed in order of priority, with the high-priority actions listed first. Any actions, including projects, to be implemented will have benefits outweighing their associated costs to the community(ies) (i.e., they will have a benefit-cost ratio greater than 1).

TABLE 6.4.3-1: PRIORITIZED MITIGATION ACTIONS

ACTION	SCORE	PRIORITY
4. Continue to participate in the Wyoming Valley Levee Raising project through Luzerne County and the USACE.	27	High
35. Bridge J-2 is undersized and has severe scour and undermining due to high-velocity stream flows. During a flood event, the failure probability of Bridge J-2 is high.	27	High
36. Bridge J-5 is undersized and has severe scour and undermining due to high-velocity stream flows. Bridge J-5 has already been closed due to failure of the foundation from severe footing undermining (a replacement is planned).	27	High
37. Bridge WP-2 is undersized and has severe scour and undermining due to high velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge openings will result in more severe flooding upstream.	27	High
38. Bridge WP-3 is undersized and has severe scour and undermining due to high-velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge.	27	High
39. Bridge WP-4 is undersized and has severe scour and undermining due to high-velocity stream flows. Flooding in this area not only presents a hazard to the bridges and local traffic network but also to adjacent property owners since blockage of the bridge.	27	High
40. Bridge S-4 is undersized and has severe scour and undermining due to high-velocity stream flows. Flooding in this area presents a hazard to the bridges and local traffic networks.	27	High
41. The dam was built as a flood control measure and a major component of that protection is the storage capacity of a lake. Over the years the lake lost some of that storage capacity due to sediment build-up.	27	High
44. Development along natural drainage ways of the Borough of Selinsgrove, occurring at a time before current day stormwater management requirements, has created streams with inadequate capacity for storm flows greater than those associated with a 25-year frequency. These streams pass through built-up neighborhoods of residential dwellings and businesses located relatively close to the stream banks. As a result, stream flows routinely overtop the primary bank and result in flooding of properties. The two primary streams within the Borough of Selinsgrove for which these mitigation measures would provide great benefits are Weiser Run (0.75 sq. mi. drainage area, 4800LF) and South Tributary (2.0 sq. mi. drainage area, 6000LF). (Selinsgrove Borough)	27	High

ACTION	SCORE	PRIORITY
45. This project involves implementation of good management and restoration practices to improve stream equilibrium for this 400-foot section of the Beaver Creek. Stabilizing the bank with 20 tons of Rip Rap and removal of debris from stream channel along this 400-foot section of the Beaver Creek. (Spring Township)	27	High
46. This project involves implementation of good management and restoration practices to improve stream bank stability and restore channel for this 2,000 feet upstream from Snyder Avenue. Removal of trees that have fallen into the stream causing a dam effect and placing 20 tons of Rip Rap to stabilize stream bank. (Spring Township)	27	High
47. This project involves implementation of good management and restoration practices to improve stream equilibrium for this 500-foot section of the Middle Creek placing 100-150 tons of Rip Rap along the stream banks and removal of debris within the channel. (Spring Township)	27	High
62. To provide a tone alert radio receiver system as part of the county emergency notification system for natural and man-made disasters of flooding. To warn all residents of potential or actual occurrences of flooding	27	High
66. Install in Snyder County Center an automatic call system to alert of Flood Event, using existing telephone lines. (Penn Township)	27	High
67. Establish warning system whereby expected river stages can be translated into property danger zones. Purchase computer and appropriate software to translate river stages to elevations, and map elevations to identify properties in danger. (Penn Township)	27	High
68. (1) Elevate house to regulatory flood elevation, or (2) construct small addition at regulatory flood elevation, move utilities, furnace, hot water heater, appliances into elevated addition. (Selinsgrove Borough)	27	High
69. Move furnace, water heater and softener, and electrical panel out of basement either to attic or addition to house. (Selinsgrove Borough)	27	High
70. Remove furnace and water heater from basement by adding small addition and rising above flood level. (Selinsgrove Borough)	27	High
71. Relocate heating system and water heater and central vacuum unit out of basement to a position above the 100-year floodplain. (Selinsgrove Borough)	27	High
72. Raise equipment from basement to second-floor addition. Install backflow valves. (Selinsgrove Borough)	27	High
74. Retrofit electric, hot water heater, and furnace with addition of room above flood elevation. (Selinsgrove Borough)	27	High
75. Double home located along Penns Creek in the 100-year floodplain. (Selinsgrove Borough)	27	High
11. Encourage the County's National Flood Program communities to participate in the NFIP Community Rating System (CRS) and attain discount opportunities on flood	26	Medium

ACTION	SCORE	PRIORITY
insurance premiums.		
12. Maintain the County's Hazard Mitigation Planning GIS datasets and disseminate the information to municipalities through ESRI's free ArcGIS Explorer software.	26	Medium
30. Stumps Run is a major contributor to the flooding of many homes and businesses in the north end of the borough. Each time there is a flood, the banks of the run are drastically eroded, which adds to the destruction during each consecutive flood. The proposed area of rehabilitation might be around 3,000 feet in length. East Market Street Bridge, crossing Stumps Run should be replaced by a much higher and wider structure to accommodate the flooding situation. (Middleburg Borough)	26	Medium
31. A culvert pipe running from the south side of Route 522 under the roadway, emptying on the north side of Route 522 (along North Creamery Avenue) needs to be enlarged and extended so it can safely dump into Middle Creek. Currently the pipe is too small creating a dangerous situation that generates excessive currents that could suck in a small child or animal. The flow then erodes the edge of the roadway, travels through a business parking lot into a field severely eroding everything in its path. (Middleburg Borough)	26	Medium
32. Stormwater travels down West Willow Avenue spreading into neighboring residents' yards as well as eroding farm land. (Middleburg Borough)	26	Medium
33. This project involves implementation of good management practices and restoration practices to improve stream bank stability, to restore channel equity, of a 70-foot section east of State Routes 235 and 250 west of State Route 235 of Swift Run. Placement of a Rip Rap, other materials and/or Gabion Baskets is proposed. (Spring Township)	26	Medium
34. This project involves implementation of sound management practices and restoration methods to improve stream bank stability to restore channel equilibrium within a 200-foot section of Beaver Creek. Placement of Rip Rap and/or Gabion Baskets is proposed. (Spring Township)	26	Medium
42. The HMP may consider this an evacuation route during a disaster. Some part of the trail would follow existing power line easements, which would also provide better access and protection for these facilities.	23	Medium
2. Strengthen the County's domestic animal health surveillance by familiarizing the Snyder County agricultural community with the list of reportable diseases and conditions related to animal health per the Office of International Epizootics (OIE) and the Pennsylvania Domestic Animal Act (Act 100 of 1996).	22	Medium
5. Continue to work with the County's agricultural community to develop and implement the County Animal Response Team (CART) to strengthen the County's comprehensive emergency management program.	22	Medium
15. Incorporate the County's Flood Warning and Response System (FWRS) procedures into ESF #2 (Communications and Warning) of the County's Regional EOP.	22	Medium

ACTION	SCORE	PRIORITY
48. Tie into existing inlet just off 522, replace existing 15" pipe with smooth bore ADS plastic, install 5 type M inlets, frame and grate, furnish and place 850 L.F. of plastic pipe, backfill pipe under roadway with 2A sub-base, backfill pipe through grass area, pave roadway with 4" of BCBC Flush surface. (Franklin Township)	21	Medium
49. To elevate existing road (furnace) above flood level to control flooding. (Franklin Township)	21	Medium
3. Develop and maintain a GIS dataset of all municipal TCPs and ACPs for evacuation route planning.	20	Medium
25. The existing 36" diameter galvanized steel pipe currently is inadequate for flood waters and overtops the township roadway and damages the culvert, roadway, and abutting private property during periods of flooding. The pipe is over Luphers Run access road to Beavertown Borough's water treatment system. (Beaver Township)	20	Medium
26. Construct reinforced concrete headwalls on the existing twin 48" diameter PE smooth bore plastic culvert pipes on inlet and outlet ends. Also provide a bituminous paving of the shoulders areas at each new headwall and wing walls. (Beaver Township)	19	Low
52. Elevate, acquire, and demolish homes within the floodplain that are subject to flooding.	19	Low
53. Remodel operations center and purchase new equipment. (Beavertown Borough)	19	Low
60. This project involves the implementation of traditional engineering best management practices and restoration methods to improve steam bank stability and restore channel equilibrium within a 200-foot reach of Chapman Creek. Placing large quarry rock/Rip Rap or installing Gabion Baskets is proposed. (Union Township)	19	Low
61. This project involves (1) acquisition, (2) elevation, or (3) flood-proofing of a residential structure located in the backwater base floodplain area of the Susquehanna River along Aqueduct Hollow Road. A specific flood mitigation recommendation will be made based on the USACE's elevation survey data. (Union Township)	19	Low
1. Create and maintain a web-based inventory of the County's access and functional needs population to strengthen emergency response and evacuation operations.	18	Low
54. Replace drainage pipes along Kern Street and Kern Run to prevent flood water back-up (Beavertown Borough)	18	Low
55. Replace existing steel water pipe and add an inlet box at Center St. and Chestnut St. intersection. (Beavertown Borough)	18	Low
56. Install drainage pipe along Parkay Avenue and 3 additional inlet boxes in the Old Orchard housing development. (Beavertown Borough)	18	Low
57. Install a large culvert pipe between 200 – 227 East Walnut Street. (Beavertown Borough)	18	Low
58. Install a large culvert pipe at the intersection of Hahn Street and Quarry Road and 500 – 579 Quarry Road. (Beavertown Borough)	18	Low

ACTION	SCORE	PRIORITY
59. Place inlet box at 420 East Market Street and drain pipe from 410 – 420 East Market Street. (Beavertown Borough)	18	Low
43. Cleaning out creek from bridge culvert west to West Perry Township line, also possibly lining the Mahantango Creek with large quarry rock or Rip Rap. (Perry Township)	17	Low
65. This project involves improving a farm road from Front Street (T-500) through Elden Heimback farm to the off-ramp of U.S. Route 11/15. This will provide access off the Isle of Que when the main road is flooded. (Penn Township)	17	Low
76. Raise sidewalks average of 6" to act as flood barrier. (Selinsgrove Borough)	17	Low
77. Design and construct a portable, watertight three-foot vertical wall extension for the top of the Borough's raw water pumping station. (Shamokin Dam Borough)	17	Low
84. Build on elevated room, upgrade and relocate has hot air furnace, gas water heater, possibly water softener, panel box. If big enough, deep freezer, too. Also build brackets and elevate air conditioner compressor. (Shamokin Dam Borough)	17	Low
85. (1) Sewer valve to prevent sewage from entering basement during flooding. (2) Storm drain – one-way valve to prevent river water from entering street and basement during low level flooding. (Shamokin Dam Borough)	17	Low
20. Increase awareness of extreme temperature risk and safety (Spring Township)	16	Low
27. Replacing the existing inadequate 5-foot diameter galvanized steel pipe with a 67" x 95" galvanized metal squash pipe (equivalent 7-foot diameter) 40 feet in length and construct new reinforced concrete headwalls and wing walls on the new culvert pipe on inlet and outlet ends. Also provide for bituminous paving of the shoulders areas at each new headwall and wing wall. (Beaver Township)	16	Low
28. Construct new reinforced concrete headwalls and wing walls on the existing twin 24" diameter PE smooth bore plastic pipes on the inlet and outlet ends. Also provide the bituminous paving of the shoulders areas at each new headwall and wing walls. (Beaver Township)	16	Low
7. Ensure County and municipal subdivision and land development ordinances are consistent with Chapter 102 Erosion and Sedimentation Control requirements.	15	Low
50. Site 1: remove existing damage/failed concrete wall and replace with new precast concrete block wall. Site 2: along the 45 reach of the north stream bank, remove 3-6 Rip Rap and replace 45 precast concrete modular block wall. Install a 4-foot-high chain link fence adjacent to the new concrete wall. (Franklin Township)	15	Low
73. Acquire property - 80x180 lot, 2-story frame house, and lower floor 0-2 feet below 200-year flood level. (Selinsgrove Borough)	15	Low
6. Integrate the 5-year maintenance cycle of the HMP with both the 10-year and biennial review and maintenance cycles of the County Comprehensive Plan and County Regional Emergency Operations Plan, respectively (see Section 7 on the Plan Maintenance Process Section).	14	Low

ACTION	SCORE	PRIORITY
8. Develop a countywide greenway plan as an integral part of the County Comprehensive Plan update to manage development and its encroachment on floodplains, and impact on riparian buffers and stream corridors.	14	Low
9. Consider adopting a countywide post-disaster recovery and reconstruction ordinance using the model ordinance included in the APA/FEMA PAS Report No. 483/484.	14	Low
10. Maintain a countywide capital improvements plan to program, schedule, prioritize, and budget both County and municipal capital improvements.	14	Low
78. The two-story frame residential property at 100 E. 8th Avenue is located within the 100-year floodplain and is in poor condition. (Shamokin Dam Borough)	13	Low
79. Two-family, two-story frame residential dwelling. Located within 100-year floodplain. Structure is not for sale and is in poor condition. (Shamokin Dam Borough)	13	Low
80. Acquisition and demolition of two-story block house. This property is proposed for acquisition by the Selinsgrove Borough Hazard Mitigation Plan to facilitate access to the proposed emergency evacuation route. (Selinsgrove Borough)	13	Low
81. Build a room onto home above flood stage to house water heater and furnace. (Shamokin Dam Borough)	13	Low
82. Relocate breaker box with associated wiring interior chase way, water heater relocate with associated wiring and plumbing, relocate furnace and change over from updraft to downdraft associated exterior chase way for gas line and duct work. (Shamokin Dam Borough)	13	Low
83. Water heater relocate with associated plumbing and electrical. Furnace relocate and changeover from updraft to downdraft with associated exterior chase way for gas line and duct work. (Shamokin Dam Borough)	13	Low
14. Maintain and disseminate a list of PA DEP-certified radon testers, mitigators, and laboratories (current lists are available through PA DEP at http://www.dep.state.pa.us/dep/deputate/airwaste/rp/Radon_Division/Radon_Homepage.htm).	12	Low
63. Eight (8) residential properties on the Isle of Que have not been mapped in the USACE GIS. These properties are located on the southern end of the Isle of Que and have been flooded frequently. Elevated water heaters, furnaces, and electric panels along with anchoring fuel oil tanks so they will not float. (Penn Township)	11	Low
16. Purchase/install portable/fixed generators to be able to provide power to key facilities in the event of a widespread and prolonged loss of electric service to water supply wells, police department, borough office, and public works department. (Selinsgrove Borough)	10	Low
17. Purchase base and portable radios to keep in contact with 911 Center (1) Base (4) Mobile (4) portable (plus install). (Jackson Township)	9	Low
19. Storage trailer for disaster supplies with generator. (Jackson Township)	9	Low
21. Storage trailer for disaster equipment with generator (Beaver Township)	9	Low

ACTION	SCORE	PRIORITY
51. Snyder county has many “one street towns”, when traffic accident occurs it create increase risk because traffic volume increase, in some cases force hazardous material tractor-trailers through small communities	9	Low
86. Computer equipment for the township, EMA and Emergency Response Team is needed to enable Internet and cellular communications between EMA, township officials, PEMA, FEMA, and the County EOC. The combination of laptop computers with cellular capabilities with digital cameras would provide an effective means of recoding information, writing and filing reports and communicating in a secure environment. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)	9	Low
87. A boat, trailer, and motor with all necessary safety equipment must be purchased along with cold-water suits and rope guns. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is a part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)	9	Low
88. Radios with a common frequency would expedite response times during flooding situations. They would enable conversation between the EOC, EMA officials, township officials, township equipment and operators and the Fire Department. A coordinated response of the right equipment at the right time and place would be possible. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)	9	Low
89. A vehicle with exceptional traction and high ground clearance is needed to traverse flooded areas with relative safety. A vehicle like a "Hum-Vee" would work well. This project will serve areas within the 100-year floodplain of the Susquehanna River Basin and is a part of Monroe Township's Hazard Mitigation Plan. (Monroe Township)	9	Low
18. Install 3 phase standby generator with transfer switch. (Kratzerville Municipal Authority (Jackson Township)	8	Low
23. PTO generator to be used at the township shed (evacuation center) and as needed elsewhere in the county during emergencies. 27,500 Watt generator - trailer and driveshaft.(Washington Township)	8	Low
29. Pave ditch to ditch on Bowersox, Salem Church, Scholl, and Bickel Roads and head walls along Kerr Road. (Center Township)	8	Low
64. T-501 Clean Drains -- $400, T-389 Clean Ditches, Repair Shoulders -- $900, T-506 Clean out Drop boxes -- $1,800, T-389 Pipe Removal and Replacement --$2,760, T-443 Inlet Cleanout and Repair -- $800, T-486 Repair Shoulders -- $600. (Penn Township)	8	Low
24. Large snow blower to fit the front of our 6 wheel drive Motor Grader. (Washington Township)	7	Low
22. : Purchase base radio and portable radio to contact the 911 center (Beaver Township)	6	Low

ACTION	SCORE	PRIORITY
13. Collaborate with the PA DEP Bureau of Radiation Protection to ensure the state's Radon Awareness Campaign and public service announcements are disseminated throughout Snyder County.	4	Low

A blank Mitigation Strategy Action Plan template is found in Appendix H. Project Opportunity Forms for structural projects are provided in Appendix B.

Given that floods, flash floods, and ice jams are the highest-risk hazard in the County, the vast majority of the mitigation actions identified, evaluated, and prioritized in this HMP relate to decreasing the County's risk from floods, flash floods, and ice jams, and dam failures. Some actions, such as disseminating informational pamphlets or mailings on hazard mitigation for property owners in the 1 percent chance floodplain or owners of repetitive-loss structures (Action 5), developing informational workshops on hazard risks and hazard mitigation for property owners in high-risk areas (Action 6), and disseminating informational brochures for organizations involved in emergency response, services, relief, or hazard mitigation (Action 43) will reduce the County's vulnerability to all natural and human-made hazards. Actions designed to increase public awareness of hazards and measures that individuals can take to mitigate against them are split between those actions that mitigate against all hazards and those that mitigate against a single or several specific hazards.

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

TABLE 6.4.3-2: MITIGATION ACTIONS AND THE HAZARDS THEY ADDRESS

ACTION	FLOOD, FLASH FLOOD, AND ICE JAMS	UTILITY INTERR.	WINTER STORMS	TORNADOES AND WINDSTORMS	ENV. HAZARDS	WILDFIRES	DAM FAILURE	DROUGHT	LANDSLIDES	TRANSPORTATION ACCIDENTS	EARTHQUAKES	SUBSIDENCE AND SINKHOLES
1	X	X	X	X	X	X	X	X	X	X	X	X
2					X							
3	X	X	X	X	X	X	X	X	X	X	X	X
4	X	X	X		X		X		X		X	X
5	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X
7	X				X				X			X
8	X				X				X			
9	X	X	X	X	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X	X	X	X	X
11	X						X					
12	X	X	X	X	X	X	X	X	X	X	X	X
13					X							
14					X							
15	X						X					
16	X	X	X	X	X		X		X	X	X	X
17	X	X	X	X	X	X	X	X	X	X	X	X
18		X										
19	X	X	X	X	X	X	X	X	X	X	X	X
20		X	X		X			X				
21	X	X	X	X	X	X	X	X	X	X	X	X
22	X	X	X	X	X	X	X	X	X	X	X	X

ACTION	FLOOD, FLASH FLOOD, AND ICE JAMS	UTILITY INTERR.	WINTER STORMS	TORNADOES AND WINDSTORMS	ENV. HAZARDS	WILDFIRES	DAM FAILURE	DROUGHT	LANDSLIDES	TRANSPORTATION ACCIDENTS	EARTHQUAKES	SUBSIDENCE AND SINKHOLES
23	X	X	X		X		X					
24			X									
25	X		X				X					
26	X		X		X		X					
27	X		X		X		X					
28	X		X		X		X					
29	X		X		X		X					
30	X		X		X		X		X			
31	X		X		X		X					
32	X		X		X		X					
33	X		X				X					
34	X		X				X					
35	X						X					
36	X						X					
37	X						X					
38	X						X					
39	X						X					
40	X						X					
41	X		X				X					
42	X	X	X	X	X	X	X	X	X	X	X	X
43	X		X				X					
44	X						X					
45	X		X				X		X			

ACTION	FLOOD, FLASH FLOOD, AND ICE JAMS	UTILITY INTERR.	WINTER STORMS	TORNADOES AND WINDSTORMS	ENV. HAZARDS	WILDFIRES	DAM FAILURE	DROUGHT	LANDSLIDES	TRANSPORTATION ACCIDENTS	EARTHQUAKES	SUBSIDENCE AND SINKHOLES
46	X				X		X		X			
47	X		X				X		X			
48	X		X				X					X
49	X		X				X					
50	X						X					
51					X					X		
52	X						X					
53	X	X	X	X	X	X	X	X	X	X	X	X
54	X		X				X					
55	X		X				X					
56	X		X				X					
57	X		X				X					
58	X		X				X					
59	X		X				X					
60	X		X		X		X		X		X	X
61	X						X					
62	X	X	X	X	X	X	X	X	X	X	X	X
63	X						X					
64	X						X		X			X
65	X						X					
66	X						X					
67	X						X					
68	X						X					

ACTION	FLOOD, FLASH FLOOD, AND ICE JAMS	UTILITY INTERR.	WINTER STORMS	TORNADOES AND WINDSTORMS	ENV. HAZARDS	WILDFIRES	DAM FAILURE	DROUGHT	LANDSLIDES	TRANSPORTATION ACCIDENTS	EARTHQUAKES	SUBSIDENCE AND SINKHOLES
69	X						X					
70	X						X					
71	X						X					
72	X						X					
73	X						X					
74	X						X					
75	X						X					
76	X						X					
77	X						X					
78	X						X					
79	X						X					
80	X		X	X	X	X	X			X		
81	X						X					
82	X						X					
83	X						X					
84	X						X					
85	X						X					
86	X	X	X	X	X	X	X	X	X	X	X	X
87	X						X					
88	X		X	X	X	X	X			X	X	
89	X		X	X	X	X	X		X		X	X

6.4.4 IMPLEMENTATION OF MITIGATION ACTIONS

After the Planning Team selected the mitigation actions that are most appropriate for the communities in Snyder County, the team formulated a strategy to implement those actions.

7. PLAN MAINTENANCE

7.1 DEVELOPMENT PROCESS SUMMARY

This update of Snyder County's FEMA-approved 2014 HMP update was a comprehensive effort that utilized a variety of sources and data for trend analysis, reviewed a vulnerability and risk assessment for local hazards, created a fluid process to streamline future updates to the HMP, and identified the hazard mitigation measures needed to limit the effects of local hazards.

The 2014 HMP states that it will be updated every five years. The HMP will actually be reviewed and evaluated more frequently, as it will be consulted in the creation and/or update of other County planning documents (see Section 7.3). Any potential modifications to the HMP that would impact those other documents were noted by County planning staff.

The Plan Maintenance section was created based on discussions with the Planning Team regarding how the HMP would be monitored, evaluated, and updated over the next five years. The HMP's relationship with the County Comprehensive Plan and EOP was discussed and documented in Section 7.3. The Planning Team, municipal representatives, and other stakeholders were offered the opportunity to review and comment on this section along with the rest of the HMP during the public comment period.

7.2 MONITORING, EVALUATING, AND UPDATING THE PLAN

Hazard mitigation planning in Snyder County is the responsibility of all levels of government (i.e., county and local), as well as the citizens of the County. As listed in FEMA 386-4, the Snyder County Planning Team must continuously monitor and document the progress of the HMP's recommended actions. The Planning Team (listed in Section 3.2), under the direction of the Snyder County Office of Emergency Management, will be responsible for maintaining this HMP. The Planning Team will meet annually and following each emergency declaration, with the purpose of reviewing the Plan. The Director of the Snyder County Office of Emergency Management will lead the Planning Team for annual reviews of the HMP. Each year, the County will solicit new projects from the municipalities by sending Project Opportunity Forms and informing the municipalities of the opportunity to update their mitigation measures.

Each review process will ensure that the Risk Assessment reflects current conditions in the County and the municipalities, the Capability Assessment accurately reflects local circumstances, and the hazard mitigation strategy is updated based on the County's damage assessment reports and local mitigation project priorities. The Planning Team will complete a Progress Report to evaluate the status and accuracy of the HMP and record the Planning Team's findings. The Snyder County Office of Emergency Management will maintain a copy of these records. The Progress Report template is found in Appendix H.

As directed by FEMA 386-4, the Progress Report will include the following information: the hazard mitigation action's objectives; who the lead and supporting agencies responsible for implementation are; how long the project should take, including a delineation of the various stages of work along with timelines (milestones should be included); whether the resources needed for implementation, funding, staff time, and technical assistance are available, or if other arrangements must be made to obtain them; the types of permits or approvals necessary to implement the action; details on the ways the actions will be accomplished within the organization, and whether the duties will be assigned to agency staff or contracted out; and the current status of the project, identifying any issues that may hinder implementation.

The HMP must be updated on a five-year cycle. This HMP will be updated and resubmitted to FEMA for approval within the five-year period. The monitoring, evaluating, and updating of the Plan every five years will rely heavily on the outcomes of the annual Planning Team meetings.

7.3 INCORPORATION INTO OTHER PLANNING MECHANISMS

7.3.1 SNYDER COUNTY COMPREHENSIVE PLAN

METHOD

The Snyder County Planning Commission is responsible for maintaining and updating the County Comprehensive Plan, and provides a model subdivision and land use ordinance for use by the municipalities. The Planning Commission meets regularly to review, discuss, and comment on municipal subdivision and land development plans, municipal floodplain ordinances, municipal stormwater management plans and ordinances, and other community planning and development matters. After the adoption of the existing HMP, these reviews will include informal cross-referencing of the planned development or regulatory activity with the provisions of the HMP. It uses this information to identify necessary revisions and to amend the Comprehensive Plan. The Planning Commission's meetings are open to the public and are advertised according to the Pennsylvania Sunshine Act (65 PA C.S.A.). All 21 municipalities are covered by the County Comprehensive Plan. These practices will continue using the information in the HMP.

MAINTENANCE SCHEDULE

Article III of the Pennsylvania Municipalities Planning Code (Act 247 of 1968, as reenacted and amended) requires all Pennsylvania counties (except Philadelphia) to adopt a comprehensive plan and update it at least every 10 years. Coupling this requirement with the Disaster Mitigation Act of 2000 (DMA 2000)-required five-year update cycle for HMPs, when possible, will allow the County to better integrate the County Comprehensive Plan and HMP planning processes and strengthen public participation for both efforts.

Snyder County's current Comprehensive Plan was adopted on May 29, 2001. This plan provides general direction and a blueprint for the future of Snyder County and constituent communities. Recommendations from the HMP can be incorporated into the document.

7.3.2 SNYDER COUNTY EMERGENCY OPERATIONS PLAN

METHOD

The Pennsylvania Emergency Management Services Code (35 PA C.S. Sections 7701-7707, as amended) requires each county and municipality to prepare, maintain, and keep current an EOP. The Snyder County Office of Emergency Management is responsible for preparing and maintaining the County EOP. The risk assessment information presented in the HMP can be used to update the hazard vulnerability assessment section of the County EOP. The risk assessment information will affect subsequent updates to the EOP.

MAINTENANCE SCHEDULE

The EOP is reviewed at least biennially. Whenever portions of the plan are implemented in an emergency event or training exercise, a review is performed and changes are made where necessary. These changes are then distributed to the County's 21 municipal EMCs.

The Snyder County Office of Emergency Management should consider the County's HMP during its biennial review of the County EOP. Recommended changes to the HMP, based on changes to the EOP, will then be coordinated with the Planning Team.

7.3.3 ACT 167 STORMWATER MANAGEMENT PLANS

METHOD

Act 167 requires that all stormwater management plans include an analysis of present and projected land development in flood hazard areas and its sensitivity to damages from future flooding or increased runoff. In drafting Act 167 Stormwater Management Plans, the HMP's hazard profile on floods was consulted to identify the location and extent of flooding, range of magnitude, past occurrences, likelihood of future occurrences, and vulnerability assessment due to flooding events. The floodplain maps included in this HMP can be used as a reference to meet Act 167 requirements.

MAINTENANCE SCHEDULE

Like the HMP, stormwater management plans must be reviewed (and revised, if necessary) every five years.

As these plans are reviewed by the Snyder County Planning Commission, information gathered in the revision of these plans will be incorporated into the revision of the HMP, and vice versa.

7.3.4 PLAN INTERRELATIONSHIPS

Figure 7.3.4-1 illustrates the interrelationships between the HMP, County Comprehensive Plan, County EOP, and other community planning mechanisms. Ensuring consistency between these planning mechanisms is critical. Section 301 (4.1) of the Pennsylvania Municipalities Planning Code requires that comprehensive plans include a discussion of the interrelationships among their various plan components, "which may include an estimate of the environmental, energy conservation, fiscal, economic development, and social consequences on the environment."

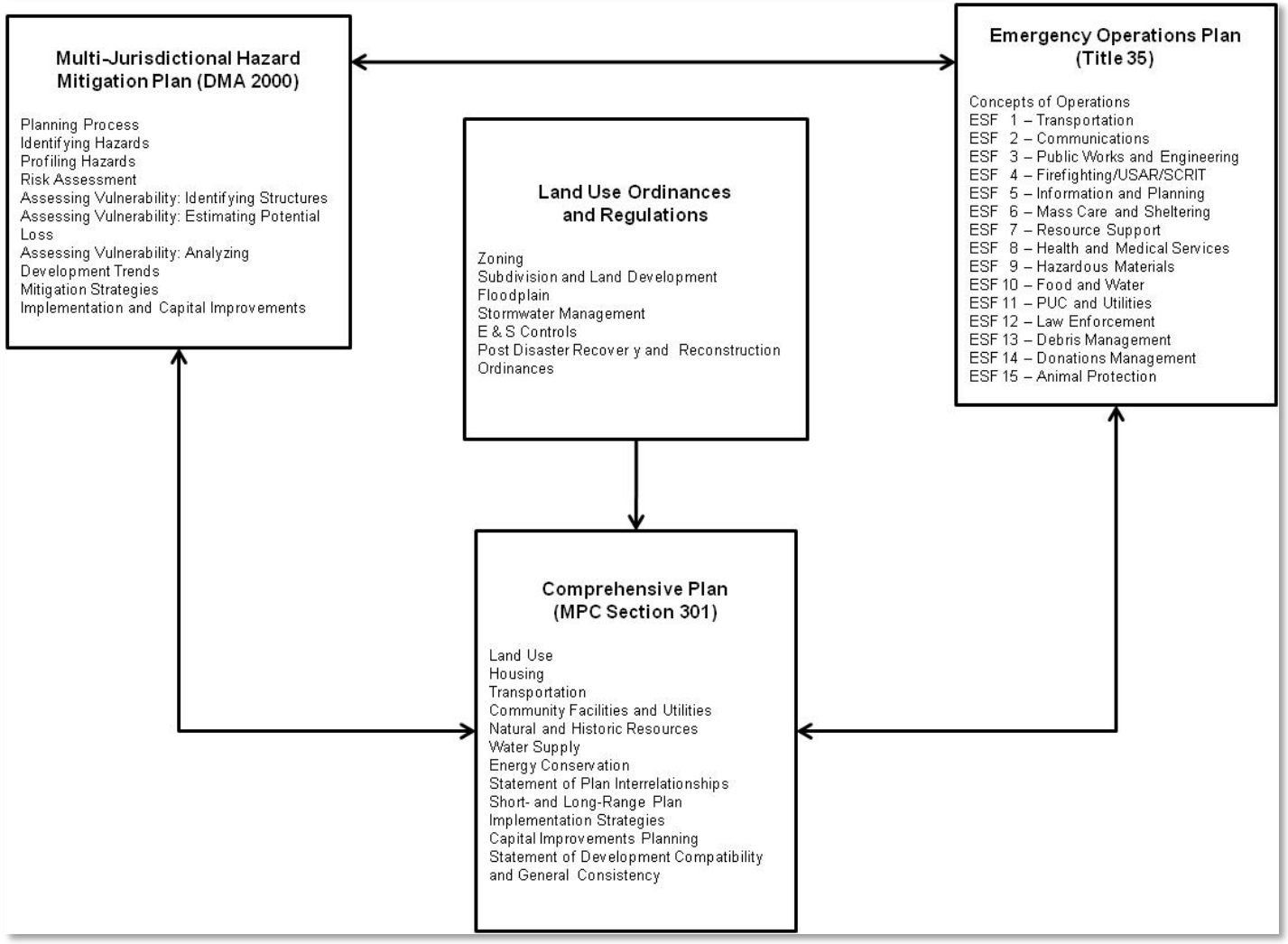
When developing the HMP, certain sections of the County Comprehensive Plan, EOP, and various land use ordinances and regulations provided key information. Moving forward, each of these documents

should not be treated as unrelated and updated separately. The County and each participating municipality are responsible for incorporating the specific mitigation actions recommended in this Plan into the necessary planning documents, including the appropriate comprehensive plan, the County EOP, and any land use ordinances and regulations.

For example, zoning and other land use regulations will be amended to reflect the newly identified hazard areas, to ensure that development in those areas is minimized or at least conducted in a way that otherwise mitigates against the effects of hazards (e.g., requiring structures built in the floodplain to be elevated). As proposed changes to building codes are presented, their potential for mitigating damage due to hazards will be examined, and the changes will only be adopted if they are shown to lower risk. Changes to stormwater management plans will incorporate identified mitigation actions and will encourage increased participation in the NFIP.

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

FIGURE 7.3.4-1: PLAN INTERRELATIONSHIPS



7.4 CONTINUED PUBLIC INVOLVEMENT

The Snyder County Office of Emergency Management will ensure that the updated HMP is posted and maintained on the County website (www.snydercounty.org/), and will continue to encourage public review and comment on the Plan through information posted to the website and public notices in local newspapers.

The citizens of Snyder County are encouraged to submit their comments to elected officials and/or members of the Planning Team. To promote public participation, Snyder County welcomed comments on sections of the HMP for a 30-day period. This offered the public the opportunity to share their comments and observations. All comments received will be maintained and considered by the Planning Team when updating the HMP.

Snyder County will continue to contact municipalities via telephone, mail, and e-mail regarding mitigation projects, especially those municipalities that did not submit projects for inclusion in this HMP. Any additional Hazard Mitigation Project Opportunity Forms received during the life of this five-year HMP will be incorporated into the Plan as an interim, updated and included in the next five-year Plan update.

8. PLAN ADOPTION

Resolutions reflecting formal adoption of this HMP by the County and participating municipalities can be found in Appendix A. The template resolutions used by the County and municipalities are shown on the following pages.