



**MULTI-HAZARD MITIGATION  
PLAN UPDATE  
Adams County, Indiana**

Prepared for  
**Adams County, Indiana  
City of Berne, Indiana  
City of Decatur, Indiana  
Town of Geneva, Indiana  
Town of Monroe, Indiana  
Town of Preble, Indiana  
Maumee River Basin Commission**

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## CHAPTER 1 INTRODUCTION

### 1.1 DISASTER LIFE CYCLE

The Federal Emergency Management Agency (FEMA) defines the disaster life cycle as the process through which emergency managers respond to disasters when they occur; help people and institutions recover from them; reduce the risk of future losses; and prepare for emergencies and disasters. The disaster life cycle includes 4 phases:



- **Response** – the mobilization of the necessary emergency services and first responders to the disaster area (search and rescue; emergency relief)
- **Recovery** – to restore the affected area to its previous state (rebuilding destroyed property, re-employment, and the repair of other essential infrastructure)
- **Mitigation** – to prevent or to reduce the effects of disasters (building codes and zoning, vulnerability analyses, public education)
- **Preparedness** – planning, organizing, training, equipping, exercising, evaluation and improvement activities to ensure effective coordination and the enhancement of capabilities (preparedness plans, emergency exercises/training, warning systems)

The Adams County Multi-Hazard Mitigation Plan (MHMP) focuses on the mitigation phase of the disaster life cycle. According to FEMA, mitigation is most effective when it's based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs. The MHMP planning process identifies hazards, the extent that they affect the municipality, and formulates mitigation practices to ultimately reduce the social, physical, and economical impact of the hazards.

### 1.2 PROJECT SCOPE AND PURPOSE

#### REQUIREMENT §201.6(d)(3):

*A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding.*

A MHMP is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). According to DMA 2000, the purpose of mitigation planning is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources.

A FEMA-approved MHMP is required in order to apply for and/or receive project grants under the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), and Severe Repetitive Loss (SRL). FEMA may require a MHMP under the Repetitive Flood Claims (RFC) program. Although the Adams County MHMP meets the requirements of DMA 2000 and eligibility requirements of these grant programs, additional detailed studies may need to be completed prior to applying for these grants.

In order for National Flood Insurance Program (NFIP) communities to be eligible for future mitigation funds, they must adopt either their own MHMP or participate in the development of a multi-jurisdictional MHMP. The Indiana Department of Homeland Security (IDHS) and the United States Department of Homeland Security (DHS)/ FEMA Region V offices administer the MHMP program in Indiana. As noted above, it is required that local jurisdictions review, revise, and resubmit the MHMP every 5 years. . MHMP updates must demonstrate that progress has been made in the last 5 years to fulfill the commitments outlined in the previously approved MHMP. The updated MHMP may validate the information in the previously approved Plan, or may be a major plan rewrite. The updated MHMP is not intended to be an annex to the previously approved Plan; it stands on its own as a complete and current MHMP.

The Adams County MHMP Update is a multi-jurisdictional planning effort led by the Adams County Emergency Management Agency (EMA) in cooperation with the Maumee River Basin Commission (MRBC). This Plan was prepared in partnership with Adams County, the City of Berne, the City of Decatur, the Town of Geneva, and the Town of Monroe. Representatives from these communities attended Planning Committee meetings, provided valuable information about their community, reviewed and commented on the draft MHMP, and assisted with local adoption of the approved Plan. As each of the communities had an equal opportunity for participation and representation in the planning process, the process used to update the Adams County MHMP satisfies the requirements of DMA 2000 in which multi-jurisdictional plans may be accepted.



Throughout this Plan, activities that could count toward Community Rating System (CRS) points are identified with the NFIP/CRS logo. The CRS is a voluntary incentive program that recognizes and encourages community floodplain activities that exceed the minimum NFIP requirements. As a result, flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions that meet the 3 goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote education and awareness of flood insurance. Savings in flood insurance premiums are proportional to the points assigned to various activities. A minimum of 500 points are necessary to



enter the CRS program and receive a 5% flood insurance premium discount. This MHMP could contribute as many as 294 points toward participation in the CRS. At the time of this planning effort only the City of Decatur participates in the CRS program and is recognized as a Class 8 in the CRS program where flood insurance policyholders receive a 10% discount on their insurance premiums.

Funding to update the MHMP was made available through a FEMA/DHS PDM grant awarded to the Adams County Commissioners and administered by IDHS. The MRBC and Adams County provided the local 25% match required by the grant. Christopher B. Burke Engineering, Ltd. (CBBEL) was hired to facilitate the planning process and prepare the Adams County MHMP under the direction of an American Institute of Certified Planners (AICP) certified planner.

## 1.3 PLANNING PROCESS

### REQUIREMENT §201.6(c)(1):

*The plan shall document the planning process used to prepare the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

Preparation for the Adams County MHMP Update began in December 2008 when MRBC, in partnership with Adams County EMA, submitted a PDM grant application to IDHS. The grant request was approved by FEMA and grant funds were awarded in May 2010.

Once the grant was awarded, the planning process to update the 2005 MHMP took 15 months. This includes a 10 month planning process, followed by 3 months for IDHS and FEMA to review and conditionally approve the draft MHMP Update, and another 2 months for Adams County, the City of Berne, the City of Decatur, the Town of Geneva, and the Town of Monroe to adopt the final MHMP Update.

### 1.3.1 Planning Committee

In June 2010, the Adams County EMA compiled a list of Planning Committee members to guide the MHMP Update planning process. These individuals were specifically invited to serve on the Committee because they were knowledgeable of local hazards; have been involved in hazard mitigation; have the tools necessary to reduce the impact of future hazard events; and/or served as a representative on the original Planning Committee in 2005. **Table 1-1** lists the individuals that participated on the Planning Committee and the entity they represented.

**Table 1-1 MHMP Planning Committee**

Name	Title	Representing
Steve Andrus	Representative	Indiana Michigan Power
John August	Director	Adams County EMA
Tim Barkey	Engineer	Adams County Engineering Department
Doug Baumann	Commissioner	Adams County
Art Booth	Chairman	EMA Board
Louise Busse	Clinic Director	Adams County Health Department
Anne Butcher	Superintendent	Decatur Waste Water Department
Ed Coil	Commissioner	Adams County
Greg Cook	Deputy Chief	Decatur Police Department
Russell Cook	Chief	Monroe Fire Department
John Crider		Berne Water Department
Kurt Dailey	Superintendent	Berne Public Works
Billy Doss	Conservation Officer	State of Indiana
Joan Eichorn		Decatur Waste Water Department
Dan Elzey	Chief	Preble Fire Department
Ed Ford	Director	Adams Memorial Hospital-EMS
Kim Freuchte	Commissioner	Adams County
Jeremy Gilbert	Superintendent	Decatur Street Department
Steve Hampshire	Utilities Director	City of Geneva
Dio Hernandez	Town Marshal	Town of Monroe
Jim Inskeep	Superintendent	Decatur Water Department
Rob Johnson	Marshal	Geneva Police Department
Steve Krull	Director	Adams County & Decatur Parks
Steve Lederle	Area Plant Supervisor	Centurylink
Al Lehman	President	Monroe Town Council
Michael Lewis	Warning Coordinator	National Weather Service
Les Marckel	Chief	Decatur Fire Department
Jodi Mawhorr	Representative	Amish Community
John Minch	Mayor	City of Berne
Hank Mayer	Director	Adams County Solid Waste District
Mark Mitchel	Supervisor	Adams County Highway Department
Dwayne Muhlenkamp	Representative	Jay County REMC
Pat Norton	IT/GIS	Adams County
Art Nussbaum	Chief	Berne Fire Department
Neil Ogg	Building Inspector	Adams County Building & Planning
Charles Padgett	Sheriff	Adams County Sheriff Department
John Patch	Chief	Geneva Fire Department
Shane Rekeweg	Deputy Sheriff	Adams County Sheriff Department
Rodney Renkenberger	Executive Director	Maumee River Basin Commission

Name	Title	Representing
John Schultz	Mayor	City of Decatur
Luke Selking	Representative	NIPSCO
Lynn Selking	Council	Adams County
Marty Shaffer	Superintendent	Monroe Utilities
Terry Smith	Environmental Director	Adams County Health Department
Tim Taylor	Chief	Berne Police Department
Lee VonGuntzen	Representative	Craigville Telephone
Bill Warren	Clerk Treasurer	Town of Geneva

The Planning Committee met 4 times during the MHMP Update. Meetings were held at the Adams County Emergency Operations Center (EOC) in July 2010 and December 2010 and at the Geneva Town Hall in November 2010 and February 2011. During these meetings, the Planning Committee revisited existing (in the 2005 MHMP) and identified new critical facilities and local hazards; reviewed the State's mitigation goals and updated the local mitigation goals; reviewed the most recent local hazard data, vulnerability assessment, and maps; evaluated the effectiveness of existing mitigation measures and identified new mitigation projects; and reviewed materials for public participation. A sign-in sheet recorded those present at each meeting to document participation. Meeting agendas and summaries are included in **Appendix 2**. Members of the Planning Committee attended the public meeting in May 2011 and assisted with adoption of the Adams County MHMP Update.

### 1.3.2 Public Involvement

During the planning process, notices of Planning Committee meetings were posted in the local papers, sent directly to each of the Amish Bishops, and to the largest employers in the County.

Drafts of the Adams County MHMP Update were posted online and paper copies placed in the Decatur and Geneva branches of the Adams County Public Library as well as in the Adams County EMA office for public review and comment. A press release announcing the placement of the draft plan in these libraries and the public meeting was provided to local media, the Amish Bishops, and largest employers. Planning Committee members were also provided with an informational flyer to display in their respective offices.

Two public meetings were held on May 23, 2011 in Decatur and Geneva. Members of the Planning Committee were present to describe details of the plan as well as to answer questions presented by attendees. The media release, power point presentation, and summary of comments from the public meeting are located in **Appendix 3**.

### 1.3.3 Involvement of Other Interested Parties

Neighboring EMA Directors in Allen, Jay, and Wells County (Indiana), and Mercer and Van Wert County (Ohio), as well as interested agencies, businesses, academia, and nonprofits were invited to review and comment on the draft Adams County MHMP Update (Appendix 3). Information related to the planning process, the public meeting, and the availability of the draft Adams County MHMP was directly provided to such potentially interested parties via personal conversations, informational flyer, and press releases. Successful implementation and future updates of the Adams County MHMP Update will rely on the partnership and coordination of efforts between such groups.

## 1.4 EXISTING PLANS, STUDIES, REPORTS, AND TECHNICAL INFORMATION

### REQUIREMENT §201.6(c)(1):

*The plan shall include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

During the development of the Adams County MHMP Update, several relevant sources of information were reviewed either as a document, or through discussions with local personnel. This exercise was completed to gather updated information since the development of the original Adams County MHMP, and to assist the Planning Committee in developing potential mitigation measures to reduce the social, physical, and economic losses associated with hazards affecting Adams County.

For the purposes of this planning effort, the following materials were discussed and utilized:

- 2010 City of Decatur, Indiana Comprehensive Plan
- 2010 Adams County Flood Insurance Rate Maps (FIRMs)
- 2010 Adams County (Town of Monroe), City of Decatur, and Town of Geneva Flood Hazard Ordinances
- 2008 Maumee River Basin Commission Flood Mitigation Master Plan
- Decatur Daily Democrat (archived and current articles)
- Adams County Safe Schools Commission



The CRS program credits NFIP communities a maximum of 100 points for organizing a planning committee composed of staff from various departments; involving the public in the planning process; and coordinating among other agencies and departments to resolve common problems relating to flooding and other known natural hazards.

CHAPTER 2

COMMUNITY INFORMATION

Although much of the information within this Section is not required by DMA 2000, it is important background information about the physical, social, and economical composition of Adams County necessary to better understand the Risk Assessment discussed in **Chapter 3**

Adams County, organized in 1836, is located in northeast Indiana immediately west of Indiana-Ohio State Line and covers approximately 340 square miles. The largest community, Decatur, is located approximately 30 miles southeast of Fort Wayne. The location of Adams County within the State of Indiana is identified in **Figure 2-1**.

2.1 POPULATION AND DEMOGRAPHICS



The most recent census data for Adams County estimates that the 2009 population was 34,256, which ranks 46<sup>th</sup> in the State. Of that total, the Town of Decatur accounts for 9,639, or 28.1% of the county’s population while the City of Berne is the second largest community at 12.9% of the population, or 4,423.

In 2009, the median age of the population in the County was 34.0 years of age. Similar to the rest of Indiana, the largest demographic age groups in the County were older adults (45-64 years), with a population of 8,013, and young adults (25-44 years), with a population of 7,945. School aged individuals (5-17 years) are the next largest population, with 7,250 individuals living in the County. The approximate median household income in 2008 was reported to be \$43,304 while the poverty rate in the same year was reported at 12.7% county-wide and 23.7% among children under 18. In total, 30.1% of households are married with children, and 31.5% of households are married without children.

Nearly 80% of the adults older than 25 in the 2000 Census reportedly completed a High School education with 10.7% of those same adults have a Bachelor of Arts or higher degree. Of the 350 High School graduates in the 2006/2007 school year, 0.5% was going to receive a higher education either a 4 year, 2 year or a vocational/technical program.

2.2 EMPLOYMENT

US Census data indicates that of the Adams County work force, 22% are employed in manufacturing positions. Unspecified private employment and retail trade positions account for 17% and 11% respectively. The total resident labor force according to estimates in 2009 is 15,563 with 2,155 unemployed, resulting in an unemployment rate of 13.8% and a rank in state of 9<sup>th</sup> of 92 counties. **Table**

2-1 lists the major employers and approximate number of employees within Adams County as reported by the Adams County Economic Development Corporation.

**Table 2-1 List of Major Employers and Number of Employees**

Fleetwood RV (1,125)	Camryn Industries (272)
Adams Health Network (705)	Bunge North America (256)
Swiss Village (393)	Dean Foods of Decatur (196)
Red Gold (319)	Thunderbird Products (193)
Smith Brothers of Berne (295)	Dolco (192)

(Adams County Economic Development Corporation, 2010)

**2.3 TRANSPORTATION AND COMMUTING PATTERNS**



**Transportation Routes**

There are several moderate transportation routes passing through Adams County and the municipalities within. While no Interstates pass through the County, several Highways (27, 33, and 224) and State Roads (101, 116, 124, and 218) serve as main routes between the various municipalities. These transportation routes are identified in **Figure 2-2**.

According to the Indiana Business Research Center, more than 4,200 individuals commute into Adams County on a daily basis. Approximately 25% of these commuters travel from Jay County. Further, approximately 4,000 Adams County residents commute to other counties with the majority traveling to Allen County (57%). **Figure 2-3** indicates the number of workers 16 and older who do not live within Adams County but commute into Adams County for employment purposes. Similarly, **Figure 2-4** indicates the number of Adams County residents 16 and older that commute out of the County for employment.

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## 2.4 CRITICAL AND NON-CRITICAL FACILITIES

### REQUIREMENT §201.6(c)(2)(ii)(A):

*The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas...*

Critical facilities are those that are vital to the health, safety, and welfare of the population. These facilities are vital to the community's ability to provide essential services and protect life and property, are critical to the community's response and recovery activities, and/or are the facilities the loss of which would have a severe economic or catastrophic impact. The operation of these facilities becomes especially important following a hazard event.

There are 236 critical facilities identified for the Adams County MHMP Update:

- **8 Governmental Facilities** – (8 County, City, and Town facilities) – essential for the delivery of critical services and crisis management including data and communication centers and key government complexes.
- **64 Essential Facilities** – (5 medical facilities, 47 schools, 6 law enforcement facilities, 5 fire stations, 1 emergency operations center) – vital to health and welfare of entire population including hospitals and other medical facilities, police and fire, emergency operations centers, evacuation shelters, and schools.
- **4 Transportation Systems** – (4 airports, highways, railroads) – necessary for transport of people and resources including airports, highways, railways, and waterways.
- **76 Lifeline Utility Systems** – (13 potable water facilities, 2 natural gas stations, 7 electrical power stations, 42 wastewater treatment facilities or lift stations, 12 communication structures) – vital to public health and safety including potable water, wastewater, oil, natural gas, electric power, and communication systems.
- **0 High Potential Loss Facilities** – failure or mis-operation may have significant physical, social, and/or economic impact to neighboring community including nuclear power plants, high hazard dams, and military installations.
- **84 Hazardous Material Facilities** – (12 facilities have also been identified as a critical facility within the counts above; 32 extremely hazardous substance facilities, 64 non-extremely hazardous substance facilities) – involved in the production, storage, and/or transport of corrosives, explosives, flammable materials, radioactive materials, and toxins.

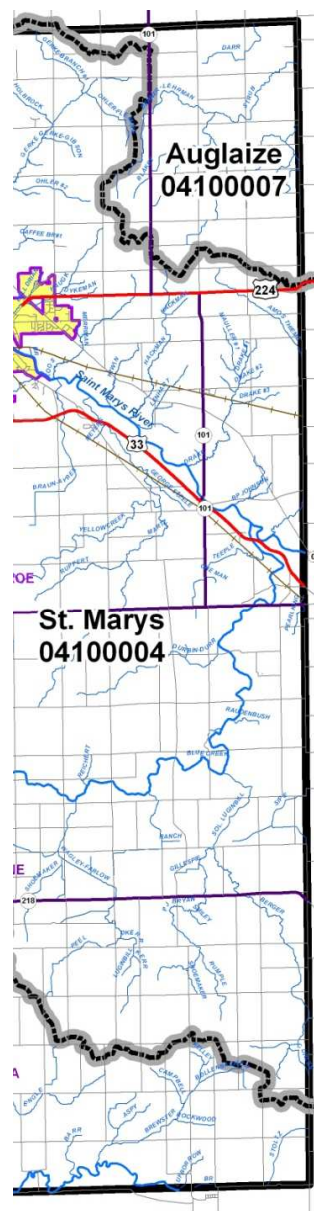
Information provided by the Adams County EMA, GIS Department, EMS, and the MHMP Planning Committee members was utilized to identify the types and locations of critical facilities throughout Adams County. Draft maps were



provided to Adams County EMA for their review and all comments were incorporated into the maps and associated databases.

**Exhibit 1** illustrates that critical facilities identified throughout Adams County. **Appendix 4** lists the critical facilities in Adams County by NFIP Community. Non-critical facilities include residential, industrial, commercial, and other structures not meeting the definition of a critical facility and are not required for a community to function. The development of this MHMP focused on critical facilities; thus, non-critical facilities are not mapped or listed.

## 2.5 MAJOR WATERWAYS AND WATERSHEDS



Adams County

According to the United States Geological Survey (USGS) there are 83 waterways in Adams County; they are listed in **Appendix 5**. The County's main waterways are the St. Marys River and the Wabash River. The St. Marys River flows into Adams County from Ohio and travels through the City of Decatur along the eastern and northern borders of the City, and then flows northwesterly into Allen County, Indiana. The Wabash River originates in Ohio, travels along the eastern perimeter of the Town of Geneva and then continues northwesterly into Wells County, Indiana. Within Adams County there are 2 active real-time USGS stream gages: along the St. Marys River in Decatur, and along the Wabash River in Linn Grove. The major waterways of Adams County are identified in Figure 2-5.

Adams County lies within 3 8-digit Hydrologic Unit Code (HUC) watersheds; the Auglaize River Watershed (04100007), the St. Marys River Watershed (04100004) and the Wabash River Watershed (05120101). These 8-digit HUCs are identified in Figure 2-5. The Indiana Department of Environmental Management (IDEM) also indicates that there are portions of 32 14-digit HUC watersheds in Adams County. The largest Adams County drainage area watershed is the Yellow Creek-Martz Creek watershed (17,325 acres) while the smallest within Adams County is the St. Marys River-Willshire watershed (1,408 acres). A complete listing of the 14-digit HUCs can also be found in Appendix 5.

## 2.6 NFIP PARTICIPATION

The NFIP is a FEMA program that enables property owners in participating communities to purchase insurance protection against losses from flooding. The City of Berne, the City of Decatur, the Town of Geneva, and Adams County are participants in the NFIP. The smaller communities within Adams County, such as the Town of Monroe and the Town of Linn Grove, will also be provided coverage by this MHMP through the County's program.

Since the development of the 2005 Adams County MHMP, Adams County, the City of Berne, the City of Decatur, and the Town of Geneva continue to participate in the NFIP. In 2010, the County, the City of Decatur, and the Town of Geneva adopted Flood Hazard Ordinances containing language regarding compensatory floodplain storage. While the City of Berne has not adopted language related to compensatory floodplain storage, the City does strongly recommend such actions to preserve the function of the floodplain and low-lying areas. Additionally, in 2010, new Flood Insurance Rate Maps (FIRMs) that had mostly been developed in 2007 were finalized, published, and adopted for Adams County. Additionally, the communities within Adams County and the MRBC have worked diligently to reduce the potential social, physical, and economic losses associated with flooding through the purchasing of several affected properties and by completing local flood studies and projects to retain floodwaters or to manage stormwater efficiently and effectively to reduce localized flooding issues.

At the time of preparing this MHMP, the only NFIP community in Adams County to participate in the CRS program is the City of Decatur (Class 8). The CRS program is a voluntary incentive program that recognizes and encourages community floodplain activities that exceed the minimum NFIP requirements. As a result, flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions that meet the 3 goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote education and awareness of flood insurance. For CRS participating communities, flood insurance premium rates are discounted in increments of 5% of each Class level achieved. **Table 2-2** lists the NFIP number, effective map date, and the date each community joined the program.

**Table 2-2 NFIP Participation**

NFIP Communities	NFIP Number	Effective Map Date	Join Date
Adams County	180424	09-29-2010	08-03-1981
City of Berne	180485	09-29-2010	10-09-1981
City of Decatur	180001	09-29-2010	07-02-1981
Town of Geneva	180002	09-29-2010	11-01-1984
Town of Monroe			

(FEMA, 2010)

## 2.7 TOPOGRAPHY

Adams County's topography consists of a nearly flat plain dissected by the St. Marys River and Wabash River in addition to many creeks and streams. Low relief and few abrupt changes in elevation characterize the physiographic conditions of the County, except for areas near the major rivers where erosion and entrenchment of the river valley is greatest. The highest elevation (895 feet, NAVD) in Adams County is located in the southeastern corner of the county near the border with Jay County. The lowest elevation (approx. 750 feet, NAVD) is in the floodplain of the St. Marys River at the northern border of the county. The range in local elevation is between 750 feet, NAVD, and 875 feet, NAVD.

## 2.8 CLIMATE

The Midwestern Regional Climate Center (MRCC) provided climate data that includes information retrieved from a weather station located in Decatur, identified as station 122096. The average annual precipitation is 34.77 inches a year, with the wettest month being June averaging 3.90 inches of precipitation, and the driest month being February, averaging 1.58 inches precipitation. The highest 1-day maximum precipitation was recorded in July of 1956 resulting in 4.2 inches of precipitation. On average, there are 124 days of rain greater than or equal to 0.1 inches, 22 days of rain greater than or equal to 0.5 inches, and 6 days of rain greater than or equal to 1.0 inches of depth. Mean snowfall is 25.5 inches per year. The highest monthly amount of snowfall recorded at this station is 27.3 inches for January 1982.

## CHAPTER 3

# RISK ASSESSMENT

### REQUIREMENT §201.6(c)(2):

*[The risk assessment shall provide the] factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessment must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

A risk assessment measures the potential loss from a hazard incident by assessing the vulnerability of buildings, infrastructure, and people in a community. It identifies the characteristics and potential consequences of hazards, how much of the community will be affected by a hazard, and the impact on community assets. The risk assessment conducted for Adams County and NFIP communities is based on the methodology described in the Local Multi-Hazard Mitigation Planning Guidance published by FEMA in 2008 and is incorporated into the following sections:

**Section 3.1: Hazard Identification** lists the natural, technological, and political hazards selected by the Planning Committee as having the greatest direct and indirect impact to the County as well as the system used to rank and prioritize the hazards.

**Section 3.2: Hazard Profile** for each hazard, discusses 1) historic data relevant to the County where available; 2) vulnerability in terms of number and type of structures, repetitive loss properties (flood only), estimation of potential losses, and impact based on an analysis of development trends; and 3) the relationship to other hazards identified by the Planning Committee.

**Section 3.3: Hazard Summary** provides an overview of the risk assessment process; a comparative hazard ranking with other methodologies used by the EMA; a table summarizing the relationship of the hazards; and a composite map to illustrate areas impacted by the hazards.

## 3.1 HAZARD IDENTIFICATION

### 3.1.1 Hazard Selection

The MHMP Planning Committee reviewed the list of natural, technological, and political hazards listed in the DRAFT Hazard Identification and Risk Assessment (HIRA) tool under development for the IDHS. The Committee identified those hazards that affected Adams County and NFIP communities and selected the hazards to study in detail as part of this planning effort. As shown in **Table 3-1** these include: drought, earthquake, flood, hailstorm, thunderstorm, tornado, windstorm, winter storm (and ice), chemical, biological, or radiological incident, hazardous material incident, and school or workplace violence. Animal health and infrastructure (utility) failure were considered however, the Committee

agreed that these hazards are the direct result of another hazard and should be discussed as such.

Dam failure was included in the 2005 MHMP but removed in this MHMP Update since the Committee felt that the dams in the County did not pose that great of a hazard to the downstream residents and communities. The other hazards on the HIRA/IDHS list, but not included in this update, were discussed but the Committee agreed that either these hazards are addressed in other documents or have little local impact and were therefore not studied in detail as a part of this planning effort.

**Table 3-1: Hazard Identification**

TYPE OF HAZARD	LIST OF HAZARDS	DETAILED STUDY	
		2005 MHMP	MHMP Update
Natural	Drought	No	Yes
	Earthquake	Yes	Yes
	Flood	Yes	Yes
	Hailstorm	No	Yes
	Thunderstorm	No	Yes
	Tornado	Yes	Yes
	Windstorm	No	Yes
	Winter Storm (and Ice)	Yes	Yes
Technological	Chemical, Biological, or Radiological Incident	No	Yes
	Dam Failure	Yes	No
	Fire	No	No
	Hazardous Material Incident	Yes	Yes
	Infrastructure (Utility) Failure	Yes	No
	Petroleum/Natural Gas Pipeline Accident	No	No
	Levee Failure	No	No
	Subsidence	No	No
	Transportation Accident	No	No
Political	Civil Disturbance	No	No
	Animal Health	No	No
	School/Workplace Violence	No	Yes
	Terrorist Attack	No	No

### 3.2 HAZARD RANKING

The Planning Committee ranked the selected hazards in terms of importance and potential for disruption to the community using a modified version of the Calculated Risk Priority Index (CPRI). The CPRI, adopted from MitigationPlan.com, is a tool by which individual hazards are evaluated and ranked according to an indexing system. The CPRI value can be obtained by assigning varying degrees of

risk to probability, magnitude/severity, warning time, and duration of incident for each hazard, and then calculating an index value based on a weighting scheme. For ease of communication, simple graphical scales are used.

**3.2.1 Probability**

Probability is defined as the likelihood of the hazard occurring over a given period. The probability can be specified in one of the following categories:



- Unlikely – incident is possible, but not probable, within the next 10 years
- Possible – incident is probable within the next 5 years
- Likely – incident is probable within the next 3 years
- Highly Likely – incident is probable within the calendar year

**3.2.2 Magnitude/Severity**

Magnitude/Severity is defined by the extent of injuries, shutdown of critical facilities, and the extent of property damage sustained. The magnitude can be specified in one of the following categories:

- Negligible – few injuries OR critical facilities shut down for 24 hours or less OR less than 10% property damaged
- Limited – few injuries OR critical facilities shut down for more than 1 week OR more than 10% property damaged
- Critical – multiple injuries OR critical facilities shut down for at least 2 weeks OR more than 25% property damaged
- Catastrophic – multiple deaths OR critical facilities shut down for 1 month or more OR, more than 50% property damaged

**3.2.3 Warning Time**

Warning Time is defined as the length of time before the event occurs and can be specified in one of the following categories:



- More than 24 hours
- 12 to 24 hours
- 6-12 hours
- Less than 6 hours

**3.2.4 Duration**

**Duration** is defined as the time that the actual event occurs. This does not include response or recovery efforts. The duration of the event can be specified in one of the following categories:



- Less than 6 hours
- Less than 1 day
- Less than 1 week
- Greater than 1 week

**3.2.5 Calculating the CPRI**

The following calculation illustrates how the index values are weighted and the CPRI value is calculated.  $CPRI = Probability \times 0.45 + Magnitude/Severity \times 0.30 + Warning\ Time \times 0.15 + Duration\ of\ Incident \times 0.10$ . For the purposes of this planning effort, the calculated risk is defined as:

- **Low** if the CPRI value is between 1 and 2
- **Elevated** if the CRPI value is between 2 and 3
- **Severe** if the CPRI value is between 3 and 4

The CPRI value provides a means to assess the impact of one hazard relative to other hazards within the community. A CPRI value for each hazard was determined for each NFIP community in Adams County, and then a weighted CPRI value was computed based on the population size of each community. **Table 3-2** presents each community, population, and the weight applied to individual CPRI values to arrive at a combined value for the entire County. Weight was calculated as each community’s population the total population of the County. Thus, the results reflect the relative population influence of each community on the overall priority rank. **Section 3.3** includes a profile of the individual hazards as well as a CPRI value for individual communities.

**Table 3-2 Determination of Weighted Value for NFIP Communities**

NFIP COMMUNITY	POPULATION 2009	% OF TOTAL POPULATION	WEIGHTED VALUE
Adams County (w/o other NFIP)	18,113	53.0%	0.53
City of Berne	4,423	12.9%	0.13
City of Decatur	9,639	28.1%	0.28
Town of Geneva	1,313	3.8%	0.04
Town of Monroe	768	2.2%	0.02
<b>TOTAL</b>	<b>34,256</b>	<b>100.0%</b>	<b>1.00</b>

**3.3 HAZARD PROFILES**

The hazards studied for this report are not equally threatening to all communities throughout Adams County. While it would be difficult to predict the probability of an earthquake, or thunderstorm affecting a specific community, it is much easier to predict where the most damage would occur in a known hazard area such as a floodplain or near a facility utilizing an Extremely Hazardous Substance (EHS). The magnitude and severity of the same hazard may cause varying levels of damages in different communities

This section describes each of the hazards that were identified by the by the Planning Committee for detailed study as part of this MHMP Update. The discussion is divided into the type of hazard: natural, technological, or political and the following subsections.

- **Hazard Overview** provides a general overview of the causes, effects, and characteristics that the hazard presents
- **Historic Data** presents the research gathered from local and national sources on the hazard extent and lists historic occurrences and probability of future incident occurrence.
- **Assessing Vulnerability** describes, in general terms, the current exposure, or risk, to the community regarding potential losses to critical facilities and infrastructure and the implications to future land use decisions and anticipated development trends.
- **Relationship to Other Hazards** explores the influence one hazard may have on another hazard.



## NATURAL HAZARDS

### 3.3.1 Drought

#### Drought: Hazard Overview

Drought, in general, means a moisture deficit extensive enough to have social, environmental, or economic effects. Drought is not a rare and random climate incident; rather, it is a normal, naturally recurring feature of climate. Drought may occur in virtually all climatic zones, but its characteristics vary significantly from one region to another. Drought is a temporary aberration and is different from aridity, which is restricted to low rainfall regions.

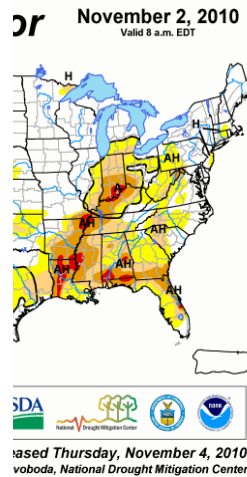


There are 4 academic approaches to examining droughts; these are meteorological, hydrological, agricultural, and socio-economic. Meteorological drought is based on the degree, or measure, of dryness compared to a normal, or average amount of dryness, and the duration of the dry period. Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply. Agricultural drought is related to agricultural impacts; focusing on precipitation shortages, differences between actual and potential evapo-transpiration, soil water deficits, reduced ground water or reservoir levels, and crop yields. Socioeconomic drought relates to the supply and demand of some economic good with elements of meteorological, hydrological, and agricultural drought. This last approach relates the lack of moisture to community functions in the full range of societal functions, including power generation, the local economy, and food sources.

#### Drought: Historic Data

Reports of droughts affecting Adams County were included in the Adams County CEMP and include information related to the 1988 and 1999 droughts affecting the State of Indiana and much of the Midwest. During the 1988 drought crop yields were 50%-86% less than in the previous year, as indicated in a study by the USGS. Additionally, the IDNR issued a 90-day water conservation decree for the northwest quadrant of Indiana. State surface water reservoirs approached, and some reached, record low water levels. Some power plants reduced, or shut down, operations temporarily where cooling reservoirs fell to a level that could not support the capacity to cool discharge waters from the plant. The 1999 drought affected the eastern and Midwestern portions of the United States, with Indiana facing hard-felt crop and other agricultural losses. Water shortages were felt in Adams County. The extreme conditions promoted the County

Commissioners to convene an emergency meeting with the Adams County Fire Chiefs, the County Public Health Officer, and Water Treatment Facilities to discuss options for what the community should do to ease the burden of water shortages.



Data gathered from the U.S. Drought Monitor indicated that between October 2009 and November 2010, there were 67 reported drought impacts within Indiana, with 6 of those relating to Adams County (4 reports of fire related impacts and 2 reported as other). In October 2010, Adams County was listed as “abnormally dry” and considered to be in a drought watch: where the area is either drying out or recovering from drought but not yet back to normal. Since then, the intensity has been lifted to “moderate drought” and it is anticipated that the drought condition is likely to improve through January 2011.

According to the Adams County dispatch, between August 1, 2010 and October 6, 2010 there were 11 calls received by the Adams County Fire Department specifically related to field fires and during the month of October 2010, open burning was prohibited in several Indiana counties, including Adams. This ban has since been lifted.

The USGS river gages equipped with the National Weather Service (NWS) Advanced Hydrologic Prediction Service (AHPS) capabilities are located along the St. Marys River at Decatur and the Wabash River at Linn Grove. On September 28, 2010 a record low water level of 3.28 feet was documented at the Wabash River gage and on October 1, 2010, a record low water level of 2.64 feet was recorded by the gage on the St. Marys River.

No losses have been documented in Adams County specific these documented droughts but the National Climatic Data Center (NCDC) has documented similar losses in southwestern Indiana Counties. For example, in August of 2002, a drought in the southwest area of the state resulted in crop losses estimated at \$70M, \$50M of which was corn crop loss.

The Planning Committee, utilizing the CPRI, determined that the overall risk of drought throughout Adams County is “low”. The impact of drought was determined to be the same for all of the communities in Adams County. The Committee agreed that a drought is possible (to occur in the next 5 years), and the magnitude of a drought is anticipated to be negligible (few injuries or critical facilities shut down for 24 hours or 10% property damaged). Further, the Planning Committee estimated that with the enhanced weather forecasting abilities, the warning time for a drought is greater than 24 hours and the duration of the event is typically a long lasting event and thus, the Planning Committee anticipates that this type of event will last greater than 1 week. A summary is shown in **Table 3-3**.

**Table 3-3 CPRI for Drought**

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Adams County	Possible	Negligible	>24 hours	>1 week	Low
City of Berne					
City of Decatur					
Town of Geneva					
Town of Monroe					

According to the National Drought Mitigation Center scientists have difficulty predicting droughts more than a month in advance due to the numerous variables such as precipitation, temperature, soil moisture, topography, and air-sea interactions. Further anomalies may also enter the equation and create more dramatic droughts, or lessen the severity of droughts. Based on the previous occurrences of droughts and drought related impacts felt within Adams County, the Planning Committee estimated that the probability of a drought occurring in the area is possible; or may occur within the next 5 years.

Drought: Assessing Vulnerability

This type of hazard will generally affect entire counties and even multi-county regions at one time. Within Adams County, direct and indirect effects from a long period of drought may include:

**Direct Effects:**

- Urban areas (Berne, Decatur, Geneva, and Monroe) may experience revenue losses from landscaping companies, golf courses, restrictions on industry cooling and processing demands, businesses dependent on crop yields; and increased potential for fires.
- Rural areas (County) may experience revenue losses from reductions in livestock and crop yields as well as field fires.

**Indirect Effects:**

- Loss of income of employees from businesses and industry affected; loss of revenue to support services (food service, suppliers, etc.)
- Lower yields from domestic gardens increasing the demand on purchasing produce and increased domestic water usage for landscaping
- Increased demand on emergency responders and fire fighting resources

*Estimating Potential Losses*

It is difficult to estimate the potential losses associated with a drought for Adams County because of the nature and complexity of this hazard and the limited data on past occurrences. However, for the purpose of this MHMP Update, a scenario was used to estimate the potential crop loss and associated revenue lost due to a drought similar to that experienced during the 1988 drought. In 2009, Adams County produced approximately 10.2M bushels of corn and 4.2M bushels of

soybeans, as reported by the National Agricultural Statistics Service (NASS). This ranked Adams County 43<sup>rd</sup> and 20<sup>th</sup> of 92 counties in Indiana regarding corn and soybean production respectively in 2009. In 2002, Adams County produced 5.6M bushels of corn and 3.6M bushels of soybeans and crop receipts for that year (2002) were approximately \$33.7M. Using the range of crop yield decrease reported in 1988 and 1989, just after the 1988 drought period, (50%-86%) and assuming a typical year, economic losses could range between \$16.9M-\$29M; depending on the crop produced and market demand.

#### *Future Considerations*

The urban centers in Adams County (Berne, Decatur, Geneva and Monroe) are not anticipating a significant growth in population, business, or industry and therefore do not expect the demand on their groundwater source to be affected. However, drought is a naturally occurring climate condition and long periods of sustained drought may impact a population like Adams County that is so heavily depending on livestock and crop yields.



#### Drought: Relationship to other Hazards

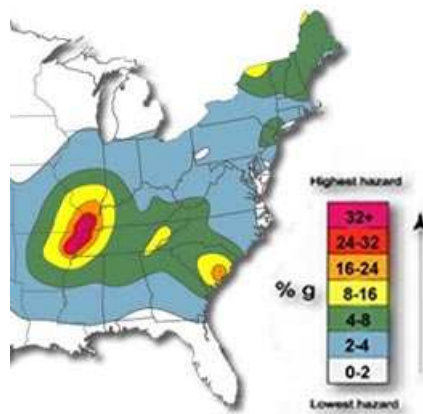
A drought will not be caused by other hazards studied during this planning effort. However, as a drought progresses, the effects of a drought may cause an animal health issue if livestock facilities have not prepared for such an event. Many livestock facilities utilize water for daily feeding and water of animals, cleaning after milking or production, and cleaning of the facilities in general. A drought may also exacerbate animal related issues on farms where crops and livestock are raised in close proximity to one another. Animal barns located next to crop fields during a drought may be at a higher risk for damages associated with field fires during unusually dry periods.

### 3.3.2 Earthquake

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the earth as the huge plates that form the earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free, causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates.



Ground shaking from earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill and other unstable soil, and trailers and homes not tied to their foundations are at risk because they can move off their mountings during an earthquake. When an earthquake occurs in a populated area, it may cause deaths, injuries, and extensive property damage.



Earthquakes strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night. On a yearly basis, 70 to 75 damaging earthquakes occur throughout the world. Estimates of losses from a future earthquake in the United States approach \$200B. Scientists are currently studying the New Madrid fault area and have predicted that the chances of an earthquake in the M8.0 range occurring within the next

50 years are approximately 7%-10%. However, the chances of an earthquake at 6.0 or greater are at 90% within the next 50 years.

There are 45 states and territories in the United States at moderate to very high risk from earthquakes, and they are located in every region of the country. California experiences the most frequent damaging earthquakes; however, Alaska experiences the greatest number of large earthquakes—most located in uninhabited areas. The largest earthquakes felt in the United States were along the New Madrid Fault in Missouri, where a three-month long series of quakes from 1811 to 1812 included three quakes larger than a M8.0 on the Richter scale. These earthquakes occurred over the entire Eastern United States, with Missouri, Tennessee, Kentucky, Indiana, Illinois, Ohio, Alabama, Arkansas, and Mississippi experiencing the strongest ground shaking.

Earthquake: Historic Data

Indiana, as well as several other Midwestern states, lies in the most seismically active region east of the Rocky Mountains. Adams County is located in close proximity to one of the most seismically active areas outside of the New Madrid Seismic Zone; the Ohio Seismic Zone, also referred to as the Anna Seismogenic Zone located near the Village of Anna in Shelby County, Ohio. Within this zone, approximately 40 felt earthquakes have occurred since 1875. While many of these events have not produced significant damages, cracked windows and plaster as well as damaged chimneys were reported following a M4.5 that occurred near Anna, Ohio in 1986. In 1937, earthquakes occurred on March 2<sup>nd</sup> and March 9<sup>th</sup>, causing damages as far away as Fort Wayne, Indiana. These quakes, an M4.9 and an M5.4 respectively, toppled chimneys, twisted organ pipes, disturbed water wells, and destroyed several grave markers. The March 9<sup>th</sup> event was felt throughout an area approximately 150,000 square miles.

On December 30, 2010, central Indiana experienced an earthquake with a magnitude of 3.8; rare for this area in Indiana as it is only the 3<sup>rd</sup> earthquake of notable size to occur north of Indianapolis. Even rarer is the fact that scientists believe that the quake was centered in Greentown, Indiana, approximately 13 miles southeast of Kokomo, Indiana. Delaware County 911 received several phone call related to the earthquake but no reports of injury or damages were provided.

Based on historical earthquake data, local knowledge of previous earthquakes, and the results of the HAZUS-MH scenario conducted as a part of this planning effort, the Planning Committee determined that the probability of an earthquake occurring in Adams County or any of the communities is possible and that the impacts would be limited in all communities. However, the Planning Committee felt that the impacts throughout the unincorporated areas of the County would be negligible. As with all earthquakes, it was determined that the residents of Adams County would have little to no warning time (less than 6 hours) and that the duration of the event would be expected to be less than 6 hours. A summary is shown in **Table 3-4**.

**Table 3-4 CPRI for Earthquake**

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Adams County	Possible	Negligible	< 6 hours	< 6 hours	Low
City of Berne		Limited			Elevated
City of Decatur					
Town of Geneva					
Town of Monroe					



According to the Ohio Department of Natural Resources Division of Geological Survey, "... it is difficult to predict the maximum-size earthquake that could occur in the state and certainly impossible to predict when such an event would occur. In part, the size of an earthquake is a function of the area of a fault available for rupture. However, because all known earthquake-generating faults in Ohio are concealed beneath several thousand feet of Paleozoic sedimentary rock, it is difficult to directly determine the size of these faults." Further according to the Indiana Geological Survey, "...no one can say with any certainty when or if an earthquake strong enough to cause significant property damage, injury, or loss of life in Indiana will occur...we do indeed face the possibility of experiencing the potentially devastating effects of a major earthquake at some point in the future". The Planning Committee felt that an earthquake occurring within or near to Adams County is possible within the next 5 years.

#### Earthquake: Assessing Vulnerability

Earthquakes generally affect broad areas and potentially many counties at one time. Within Adams County, direct and indirect effects from an earthquake may include:

##### **Direct Effects:**

- Urban areas (Berne, Decatur, Geneva, Monroe) may experience more damages due to the number of structures and critical infrastructure located in these areas
- Rural areas (County) may experience losses associated with agricultural structures such as barns and silos
- Bridges, buried utilities, and other infrastructure may be affected throughout the County and municipalities

##### **Indirect Effects:**

- Provide emergency response personnel to assist in areas with more damage
- Provide shelter for residents of areas with more damage
- Delays in delivery of goods or services originating from areas more affected by the earthquake

Types of loss caused by an earthquake could be physical, economic, or social in nature. Due to the unpredictability and broad impact regions associated with an earthquake, all critical and non-critical facilities are at risk of experiencing earthquake related damages. However, as there are differences in the number of buildings, critical facilities, and businesses within each NFIP community in Adams County, it can be anticipated that an earthquake impacting this area would affect communities differently. For example, the City of Decatur has the highest number of critical facilities and the highest number of non-critical facilities. Therefore it can be expected that an earthquake would potentially cause the most damages within the City of Decatur. Damages to structures, infrastructure, and even business interruptions can be expected following an earthquake.

### *Estimating Potential Losses*

In order to determine the losses associated with an earthquake, the HAZUS-MH software was utilized to determine the impact anticipated from a M5.1 earthquake with an epicenter approximately 7.5 miles south of Adams County. An earthquake actually occurred in this location in 1990 with a magnitude of 3.0; however, the largest earthquake recorded in the State of Indiana had a magnitude of 5.1. To be conservative in the anticipated damages, the M5.1 was utilized for the HAZUS-MH model.

According to the HAZUS-MH scenario, total economic loss associated with this earthquake scenario is anticipated to be near \$120K. The HAZUS-MH model computes anticipated annualized economic losses for the hypothetical earthquake due to direct building losses and business interruption losses. Direct building losses are the costs to repair or to replace the damage caused to the building and contents, while the interruption losses are associated with the inability to operate a business due to the damage sustained. Business interruption losses also include the temporary living expenses for those people displaced from their homes. Total building related losses are anticipated to be \$20K, of which 7% of the estimated business losses are related to business interruption. Further, transportation and utility lifeline systems are anticipated to experience approximately \$100K in damages primarily associated with railway systems. Much of the damage is anticipated to be experienced within the western portion of the City of Decatur as indicated on **Exhibit 2**.



The HAZUS-MH Earthquake Module allows local building data to be imported into the analysis. However, these local data are imported as “general building stock”, meaning that the points are assigned to a census tract rather than given a specific XY coordinate. HAZUS performs the damage analysis as a county wide analysis, and reports losses by census tract. In addition to importing local building data, the Adams County model was further enhanced by adding localized parameters (i.e., shake maps, liquefaction, soils). While the results of the annualized run appear plausible, care should be taken when interpreting these results. Based on damages estimated through the HAZUS-MH model, it is anticipated that this type of hazard would produce the least amount of monetary damages in Adams County.



### *Future Considerations*

While the occurrence of an earthquake in or near to Adams County may not be the highest priority hazard studied for the development of this Plan, it is possible that residents, business owners, and visitors may be affected should an earthquake occur. For that reason, Adams County should continue to provide education and outreach regarding earthquakes and even earthquake insurance along with education and outreach efforts for other hazards. As Adams County and the communities within the County continue to grow and develop, the proper considerations for the potential of an earthquake to occur may help to mitigate against social, physical, or economic losses in the future.

### Earthquake: Relationship to Other Hazards

Hazardous materials incidents may occur as a result of damage to material storage containers or transportation vehicles involved in road crashes or train derailments. Further, utility failures may occur following an earthquake or associated aftershocks. These types of related hazards may have greater impacts on Adams County communities than the earthquake itself. It is not expected that earthquakes will be caused by other hazards studied in this plan.

### 3.3.3 Flood

Floods are the most common and widespread of all natural disasters. Most communities in the United States have experienced some kind of flooding, after spring rains, heavy thunderstorms, or winter snow melts. A flood, as defined by the NFIP, is a general and temporary condition of partial or complete inundation



of 2 or more acres of normally dry land area or of 2 or more properties from overflow of inland or tidal waters and unusual and rapid accumulation or runoff of surface waters from any source, or a mudflow. Floods can be slow or fast rising but generally develop over a period of days.



Flooding and associated flood damage is most likely to occur during the spring because of heavy rains combined with melting snow. However, provided the right saturated conditions, intense rainfall of short duration during summer rainstorms are capable of producing damaging flash flood conditions.

The standard for flooding is a 1% annual chance of flooding, or the 100-year flood. This is a benchmark used by the FEMA to establish a standard of flood protection in communities throughout the country. The 1% annual chance flood is referred to as the “regulatory” or “base” flood. Another term commonly used “100-year flood”, is often incorrectly used and can be misleading. It does not mean that only 1 flood of that size will occur every 100 years. What it actually means is that there is a 1% chance of a flood of that intensity and elevation happening in any given year. In other words, the regulatory flood elevation has a 1% chance of being equaled, or exceeded, in any given year and it could occur more than once in a relatively short time period.

#### Flood: Historic Data

Flooding is a common occurrence in Adams County. The NCDC reports that between April 1994 and February 2008, there were 17 floods events that resulted in 4 deaths, 0 injuries and approximately \$19M in property and crop damages. Only 1 of these reported events occurred following the development of the April 2005 Adams County MHMP; a flood event on February 7, 2008. During this event, as reported by the NCDC, the City of Decatur received the most impact as the St. Marys River reached the bottom of several bridges. Floodwaters forced the closure of several roads throughout the county from Berne to Geneva and throughout the northern portion of the county. Appendix 6 provides the NCDC information regarding flood events that have resulted in injuries, deaths, or monetary damages to property and/or crops.

The *Decatur Daily Democrat* has provided additional information on several other flooding events not reported by the NCDC. For example, on February 6, 2008 the St Marys River surpassed the 20-foot mark (flood stage in this area is set at 15 feet but reportedly doesn't become problematic until reaching the 20-foot crest). Due to heavy rains, the river rose nearly 16 feet in 48 hours. During this event, a Berne resident needed to be rescued from her vehicle after she became trapped by the high water.

The St. Marys River crested at 22 feet on February 13, 2009 and during the event, several streets were closed throughout Decatur as well as several rural county



roads. One highlight of this event, as noted in the *Decatur Daily Democrat* is that while Ogg St. near Belmont High School was flooded and closed to traffic, no homes were damaged in this area as they "were torn down after having been flooded periodically for many years". Between 1998 and 2006, the Maumee River Basin Commission (MRBC) has assisted the City of Decatur obtain grant funding utilized for the purchase of over 60 homes routinely damaged by flood waters.

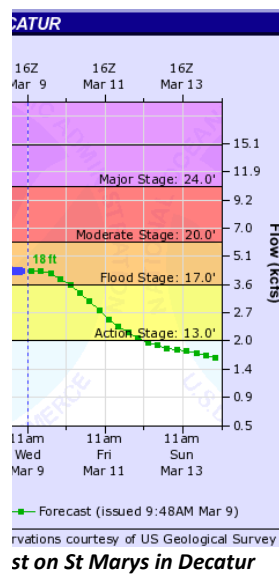
USGS river gages equipped with the NWS' AHPs capabilities are located along the St. Marys River at Decatur and the Wabash River at Linn Grove. For the gage located on the St. Marys River, flood categories are identified as Major Flood Stage-24 feet; Moderate Flood Stage-20 feet; Flood Stage-17 feet; and Action Stage-13 feet. Since 1933, there have been 7 Major, 58 Moderate, and 117 Flood events recorded. On January 14, 2005, the St. Marys River experienced the 5<sup>th</sup> highest historical crest at 24.24 feet. The NWS indicates the following impacts are experienced during flood stages:

- 30.6 ft: Flood waters begin to hit the bottom of the bridge at gage site
- 27.5 ft: Flood waters reaches the 100-year flood level
- 26.5 ft: Evacuations are necessary in Decatur, Indiana and Willshire, Ohio. Serious flooding can be expected at the Central Soya Plant along with widespread flooding and disruption of land transportation.
- 24.5 ft: Extensive flooding of the east side of Decatur along with Belmont High School occurs.
- 23.5 ft: US 224 east of Decatur is closed by floodwaters. Evacuation of residents near Belmont High School becomes necessary.
- 22.5 ft: US 224 is closed to all traffic except large trucks.
- 21.5 ft: East side Decatur streets are affected by high water.
- 20.5 ft: Indiana 101 north of Pleasant Mills is closed by flood water. Extensive agricultural flooding is in progress.
- 18.5 ft: County Road 225 North, north of Pleasant Mills is closed by flood water.

- 17.0 ft: Agricultural flooding occurs along the river in northern, central, and eastern Adams County.

The gage located along the Wabash River at Linn Grove flood categories are identified as Major Flood Stage-17 feet; Moderate Flood Stage-14 feet; Flood Stage-11 feet; and Acton Stage-9 feet. Since 1993, there have been 0 Major, 2 Moderate, and 31 Flood events recorded. The 4<sup>th</sup> highest historical crest occurred on January 13, 2005 at 13.73 feet. The NWS indicates the following impacts are experienced during flood stages:

- 17.0 ft: Extensive inundation and damage with many primary roads and bridges closed. Many people need to be evacuated.
- 15.0 ft: The 100-year flood level is exceeded. Highway 1050 S east of Geneva begins to flood.
- 14.0 ft: Secondary roads are blocked. Roads near the east side of Geneva begin to flood. Some evacuations are needed and property needs to be transferred to higher ground.
- 12.0 ft: County roads begin to flood.
- 11.0 ft: Agricultural flooding begins. Low lands east of Geneva begin to flood.



In February 2011, the snowmelt from the several large winter storms caused flood warnings along the St Marys and Wabash River. Saturated ground and swollen rivers from the snowmelt combined with heavy rainfall in early March 2011 resulted in the St Marys cresting at 22 feet (moderate stage flood) shown in **Figure 3-1** and the Wabash at 13 feet (flood stage). Flooding caused numerous traffic problems and multiple road closures countywide including portions of US 224, US 33 and 14 county roads. The Berne Fire Department rescued a man stranded on top of his car deep in floodwaters on CR 300 W and the Geneva Fire Department rescued two men and their horse from a flooded area near the Wabash River in neighboring Jay County.

Within the Adams County CEMP, it is noted that “often times, flooding may not be directly attributable to a river, stream, or lake overflowing its banks. Rather, it may simply be that an excessive rainfall, a heavily saturated ground, and inadequate drainage may make the conditions right for a severe flooding event. With no place to go, the water will find the lowest points to drain to-areas that are often not in the floodplain”.

Any property having received 2 insurance claim payments for flood damages totaling at least \$1,000, paid by the NFIP within any 10-year period since 1978 is defined as a repetitive loss property. These properties are important to the NFIP

because they account for 1/3 of the country’s flood insurance payments. As a part of the City of Decatur’s and the MRBC’s mitigation efforts, HMGP funds were obtained in 2006 which allowed the City and the MRBC to assist with purchasing over 60 residential properties in the southeastern portion of the City. These properties were purchased at a pre-disaster fair market value, the structures were demolished, and the land area will perpetually remain as open space.

According to the IDNR, Division of Water, there are 2 properties in the City of Decatur designated as a repetitive loss property. While there are not a large number of repetitive loss properties remaining within Adams County, there have been numerous claims made for damages associate with flooding. Within the



unincorporated areas of Adams County, there have been 14 claims and more than \$100K in payments. In addition, there have been 74 claims within the City of Decatur that have resulted in approximately \$900K in payments. **Table 3-5** identifies the number of claims per NFIP community as well as the payments made.

**Table 3-5 Repetitive Loss Claims and Payments**

NFIP Community	# of Repetitive Loss	Claims since 1978	\$\$ Paid
Adams County (w/o other NFIP)	0	14	\$116.3K
City of Berne	0	6	\$200.9K
City of Decatur	1	74	\$929.4K
Town of Geneva	0	3	\$5.9K
Town of Monroe*			
<b>TOTAL</b>	<b>2</b>	<b>97</b>	<b>\$1.3M</b>

(IDNR,2011)

\* - Data for the Town of Monroe is included within that reported for Adams County

Currently in Adams County, the flood insurance coverage required for structures located in the 1% annual chance floodplain and the unnumbered Zone A is approximately \$10M. The Unnumbered Zone A is the area subjected to a 1% annual chance of flooding and is determined in the Flood Insurance Study (FIS) by approximate methods of analysis. Because of the absence of detailed studies, no Base Flood Elevations (BFEs) are shown. BFEs are the elevations to which floodwater is anticipated to rise during the base flood. Within Adams County, Bluhm Ditch, Holtshouse Ditch, Martz Ditch, and Yellow Creek are represented as Unnumbered Zone A streams. Additionally, portions of the Wabash River upstream of Linn Grove, between Linn Grove and the Town of Geneva, and

downstream of Geneva are also unstudied. **Exhibit 3** identifies the floodplain boundaries for streams and rivers in Adams County.

Mandatory flood insurance purchase requirements apply to structures in these delineated areas. Of that total, \$5.2M is flood insurance coverage for areas within Adams County outside of the other NFIP communities. Total flood insurance premiums for Adams County and the NFIP communities is approximately \$10.2M. **Table 3-6** further indicates the premiums and coverage totals for individual NFIP communities and Adams County.

**Table 3-6 Insurance Premiums and Coverage**

NFIP Community	Flood Insurance Premiums	Flood Insurance Coverage
Adams County (w/o other NFIP)	\$18.4K	\$5.2M
City of Berne	\$395	\$36.6K
City of Decatur	\$30.1K	\$4.8M
Town of Geneva	\$610	\$165.0K
Town of Monroe*		
<b>TOTAL</b>	<b>\$49.5K</b>	<b>\$12.5M</b>

(IDNR, 2011)

\* - Data for the Town of Monroe is included within that reported for Adams County

As determined by the Planning Committee, the probability of a flood occurring throughout Adams County is likely (probable within the next 3 years) for all NFIP communities. Within the unincorporated areas of Adams County, the City of Berne, and the Town of Monroe, the magnitude of a flood event is anticipated to be limited, while the magnitude of such an event occurring in the Town of Geneva or the City of Decatur is anticipated to be critical. The Planning Committee also determined that the warning time for Adams County, the City of Decatur, and the Town of Geneva is greater than 24 hours while the duration of flooding events are expected to last greater than 1 week. For the Town of Berne and the Town of Monroe, warning time is expected to be less than 6 hours and flooding is expected to last less than 1 week. A summary is shown in **Table 3-7**.

**Table 3-7 CPRI for Flood**

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Adams County	Likely	Limited	>24 hours	> 1 week	Elevated
City of Berne			< 6 hours	< 1 week	
City of Decatur		Critical	>24 hours	> 1 week	
Town of Geneva			Limited	< 6 hours	
Town of Monroe					

As mentioned within this section, there is a 1% chance each year that the regulatory flood elevation will be equaled or exceeded and these types of events may occur more than once throughout each year. Further, based on information provided through the USGS/NWS stream gages, the NCDC, and previous

experience, the Planning Committee determined that flooding will likely (within the next 3 years) occur again in Adams County.

#### Flood: Assessing Vulnerability

Flood events may affect large portions of Adams County at one time as large river systems and areas with poor drainage cover much of the County and several communities. Within Adams County, direct and indirect effects from a flood event may include:

##### **Direct Effects:**

- Structural and content damages and/or loss of revenue for properties affected by increased water
- Increased costs associated with additional response personnel, evacuations, and sheltering needs

##### **Indirect Effects:**

- Increased response times for emergency personnel if roads are impassable
- Increased risk of explosions and other hazards associated with floating propane tanks or other debris
- Losses associated with missed work or school due to closures or recovery activities

#### *Estimating Potential Losses*

Critical and non-critical facilities located in regulated floodplains, poorly drained areas, or low lying areas are most at risk for damages associated with flooding. For this planning effort, 2 separate scenarios were utilized to determine areas and structures at risk for riverine flooding along with anticipated damages from such flood events.

The first analysis utilized the HAZUS Enhanced Quick Look Analysis which allows the user to provide a local digital elevation model (DEM) and a flood boundary. Using these two inputs, a 10-meter DEM and the effective digital flood insurance rate maps (DFIRMs) for Adams County, HAZUS then creates a depth grid to estimate damages. . The number of buildings as well as the value in damages is inclusive throughout **Table 3-8** and **Table 3-9**.



**Table 3-8 HAZUS-Enhanced Quick Look for the St. Marys River Watershed**

River	# Bldg Damaged		Total Loss (\$)	
	100-yr	500-yr	100-yr	500-yr
Blair Ditch	8	8	0.6M	0.6M
Blue Creek	12	12	1.6M	1.6M
Borum Run	13	13	1.4M	1.4M
Gates Ditch	3	3	0.2M	0.2M
Gerke Ditch	2	2	0.1M	0.1M
Holthouse Ditch	4	4	0.6M	0.6M
Kohne Ditch #1	23	24	1.0M	1.0M
Koos Ditch	13	39	1.0M	2.6M
St. Marys River	139	269	37.2M	46.0M
Weber Ditch	1	1	0.08M	0.08M
Yellow Creek	1	1	0.04M	0.04M
<b>Total</b>	<b>219</b>	<b>379</b>	<b>43.82M</b>	<b>54.22M</b>

**Table 3-9 HAZUS-Enhanced Quick Look for the Wabash River Watershed**

River	Occupancy Class	# Bldg Damaged		Total Loss (\$)	
		100-yr	500-yr	100-yr	500-yr
Engle Ditch		3	6	0.2M	0.6M
Loblolly/Limberlost Creek		13	15	9.5M	11.0M
Wabash River		8	16	0.6M	1.0M
<b>Total</b>		<b>24</b>	<b>37</b>	<b>10.3M</b>	<b>12.6M</b>

Secondly, an analysis was completed utilizing the effective DFIRMs overlaid upon the building inventory provided by Adams County and structures located within each flood zone were tallied. In order to estimate anticipated damages associated with each flood in Adams County and NFIP communities, it was estimated that 25% of structures in the floodway and 100-year floodplain would be destroyed, 35% of structures would be 50% damaged, and 40% of structures would be 25% damaged. **Table 3-10** below identifies the estimated losses associated with structures in the floodway, the 100-year floodplain, and the 500-year floodplain areas by NFIP community within the St. Marys River Watershed.

**Table 3-11** below identifies the estimated losses associated with structures in the floodway, the 100-year floodplain, and the 500-year floodplain areas by NFIP community within the Wabash River Watershed.



**Table 3-10 Manual GIS Analysis for the St. Marys River Watershed**

	Floodway		100-year Floodplain		500-year Floodplain	
	#	\$	#	\$	#	\$
<b>Blue Creek</b>						
Adams County	3	0.5M	12	2.1M	0	2.1M
	<b>3</b>	<b>0.5M</b>	<b>12</b>	<b>2.1M</b>	<b>12</b>	<b>2.1M</b>
<b>Borum Run</b>						
Adams County	1	0.7M	2	0.8M	2	0.8M
City of Decatur	0	0	1	0.1M	1	0.1M
	<b>1</b>	<b>0.7M</b>	<b>3</b>	<b>0.9M</b>	<b>3</b>	<b>0.9M</b>
<b>Holthouse Ditch</b>						
City of Decatur	4	0.6M	6	1.0M	6	1.0M
	<b>4</b>	<b>0.6M</b>	<b>6</b>	<b>1.0M</b>	<b>6</b>	<b>1.0M</b>
<b>Kohne Ditch</b>						
City of Decatur	0	0	1	0.3M	1	0.3M
	<b>0</b>	<b>0</b>	<b>1</b>	<b>0.3M</b>	<b>1</b>	<b>0.3M</b>
<b>Koos Ditch</b>						
Adams County	0	0	1	0.1M	3	0.3M
City of Decatur	0	0	8	3.8M	33	6.7M
	<b>0</b>	<b>0</b>	<b>9</b>	<b>3.9M</b>	<b>36</b>	<b>7.0M</b>
<b>St Marys River</b>						
Adams County	4	3.3M	27	7.1M	29	7.5M
City of Decatur	7	7.5M	104	32.5M	232	47.4M
	<b>11</b>	<b>10.8M</b>	<b>131</b>	<b>39.6M</b>	<b>241</b>	<b>54.9M</b>
<b>Total</b>	<b>19</b>	<b>12.6M</b>	<b>162</b>	<b>47.8M</b>	<b>299</b>	<b>66.2M</b>

**Table 3-11 Manual GIS Analysis for the Wabash River Watershed**

	Floodway		100-year Floodplain		500-year Floodplain	
	#	\$	#	\$	#	\$
<b>Limberlost / Loblolly Creek</b>						
Adams County	1	2.6M	3	3.0M	3	3.0
Town of Geneva	0	0	6	8.5M	8	8.8M
	<b>0</b>	<b>2.6M</b>	<b>9</b>	<b>11.5M</b>	<b>11</b>	<b>11.8M</b>
<b>Wabash River</b>						
Adams County	2	0.3M	13	2.4M	20	6.3M
Town of Geneva	0	0	0	0	2	0.2M
	<b>2</b>	<b>0.3M</b>	<b>13</b>	<b>2.4M</b>	<b>22</b>	<b>6.5M</b>
<b>Total</b>	<b>2</b>	<b>2.9M</b>	<b>22</b>	<b>13.9M</b>	<b>33</b>	<b>18.3M</b>

The loss values within these 2 scenarios may seem significantly different, as when comparing the estimated losses for flood events along the St. Marys River; for 500-year floodplain, \$46M with the HAZUS-Enhanced Quick Look and \$54.9M with the manual GIS Analysis. However, because of the analysis methods utilized (depth grid estimations and building inventory values compared with manual analysis and estimated values), these anticipated damages are comparable. The

same reasoning would apply to the difference in the anticipated losses along the Wabash River. Regardless of the individual values, it is noted that in either scenario, losses are anticipated to be high, therefore indicating the need to properly plan for and mitigate against future flood events.

A third scenario was completed utilizing the HAZUS delineated flood boundaries along with the Adams County building inventory. As the flood boundaries were not the most recently developed and there were significant discrepancies between this analysis and the other 2 scenarios, this data was determined to be unreliable.

Critical facilities located in the City of Decatur within the floodway along the St. Marys River include Woodcrest/Evergreen Nursing Home, Decatur Sewage Treatment Plant, a Lift Station, and the Decatur Wastewater Treatment Plant. Within the 1% annual chance floodplain are Eric Haven and the Decatur Water Plant, and the Best One Tire Service and Riverside Center are within the 500-year floodplain. Within the County area along the St. Marys River, there is 1 confined feeding operation located within the 100-year floodplain. There are no other critical facilities located in other flood zones along the St. Marys River within Adams County. There are no critical facilities located in any flood hazard zone along the Wabash River within the Town of Geneva or the unincorporated areas of Adams County.

The NDC data reports nearly \$19M in property and crop damages as a result of flooding in Adams County. The vulnerability analyses completed by CBEL estimates potential property damages from a 500-year flood ranging from \$46M to \$55M along the St. Marys River and ranging from \$1M to 6.5M along Wabash River.

#### *Future Considerations*

As the City of Berne, the City of Decatur, the Town of Geneva, the Town of Monroe, and Adams County continue to grow in population, it can be anticipated that the number of critical and non-critical facilities will also increase accordingly.

Location of these new facilities should be carefully considered and precautions should be taken to ensure that schools, medical facilities, community centers, municipal buildings, and other critical facilities are located beyond the 500-year floodplain to reduce the risk of damages caused by flooding.

The City of Decatur Comprehensive Plan of 2010 includes many instances where additions or enhancements could be made within the development standards or zoning ordinances to provide interaction with the St. Marys River while also



allowing the floodplain to remain functional as the City of Decatur grows. For example, within the Future Land Use section of the Comprehensive Plan, a Flood land use describes the ability to reduce the possible loss of life and property, and to reduce the potential for extraordinary public expenditures for flood protection and relief. Further, a Floodplain Overlay District is proposed to supplement existing regulations and ordinances with language designed to protect the significant ecosystem.

It is also important to ensure that owners and occupants of residences and businesses within the known hazard areas, such as delineated or approximated flood zones, are well informed about the potential impacts from flooding incidents as well as proper methods to protect themselves and their property. As new FIRMs have been developed throughout Adams County, residents within these areas are being notified that they may be subject to an increased risk of damages associated with flooding. These new FIRMs became effective in September 29, 2010.

Indirect effects of flooding may include increased emergency response times due to flooded or redirected streets, the danger or dislodged and floating propane tanks causing explosions, and the need for additional personnel to carry out the necessary evacuations. Additional effects may include sheltering needs for those evacuated, and the loss of income or revenue related to business interruptions

#### Flood: Relationship to Other Hazards

While flooding creates social, physical, and economic losses, it may also cause other hazards to occur. For example flooding may increase the potential for a hazardous materials incident to occur. Above ground storage facilities may be toppled or become loosened and actually migrate from the original location. In less severe situations, the materials commonly stored in homes and garages such as oils, cleaners, and de-greasers, may be mobilized by flood waters. Should access roads to hazardous materials handlers become flooded, or if bridges are damaged by flood waters, response times to more significant incidents may be increased, potentially increasing the damages associated with the release.

Flooding may also cause issues related with animal health if livestock operations are not properly sited and large numbers of livestock are located within high risk flood zones. During a flood event, if access routes are closed, food shortages, power outages, and even mass drowning may occur for prolonged periods of time.

In a similar fashion, a winter storm or ice storm can also lead to flooding on either a localized or regional scale. When a large amount of snow or ice accumulates, the potential for a flood is increased. As the snow or ice melts, and the ground becomes saturated or remains frozen, downstream flooding may occur. Ice jams near bridges and culverts may also result in flooding of localized areas and potentially damage the bridge or culvert itself.

### 3.3.4 Hailstorm, Thunderstorm, and Windstorm

Hail occurs when frozen water droplets form inside a thunderstorm cloud, and then grow into ice formations held aloft by powerful thunderstorm updrafts, and



when the weight of the ice formations becomes too heavy, they fall to the ground as hail. Hail size ranges from smaller than a pea to as large as a softball, and can be very destructive to buildings, vehicles, and crops. Even small hail can cause significant damage to young and tender plants. Residents should take cover immediately in a hailstorm, and protect pets and livestock, which are particularly vulnerable to hail, and should be under shelter as well.

Thunderstorms are defined as strong storm systems produced by a cumulonimbus cloud, usually accompanied by thunder, lightening, gusty winds, and heavy rains. All thunderstorms are considered dangerous as lightening is one of the by-products of the initial storm. In the United States, on average, 300 people are injured and 80 people are killed each year by lightening. Although most lightening victims survive, people struck by lightning often report a variety of long-term, debilitating symptoms. Other associated dangers of thunderstorms included tornados, strong winds, hail, and flash flooding.

Windstorms or high winds can result from thunderstorm inflow and outflow, or downburst winds when the storm cloud collapses, and can result from strong frontal systems, or gradient winds (high or low pressure systems). High winds are speeds reaching 50 mph or greater, either sustained or gusting.

#### Hailstorm, Thunderstorm, and Windstorm: Historic Data

In Adams County, the NCDC has recorded 48 hailstorms and 77 thunder and/or windstorms since May 1956. The largest recorded hailstone was 2 inches in diameter and occurred in June of 1970. The average diameter hailstone in Adams County is 0.75 inch and has occurred throughout the area on numerous occasions. Significant windstorms are characterized by the top wind speeds achieved during the incident, characteristically occur in conjunction with

thunderstorms, and have historically occurred year round with the greatest frequency and damage occurring in May, June, and July. Within Adams County, NCDC reports 22 instances between 1980 and 2008 where top wind speeds were greater than 58 mph.

Total NCDC recorded damages for hailstorms, thunderstorms, and windstorms throughout Adams County between July 1956 and June 2010 is \$898K. The NCDC indicates \$50K in related crop damages in Adams County as a result of a hailstorm, thunderstorm, or a windstorm, and no injuries or deaths were reported. Hailstorm reports provided by the NCDC did not include descriptive information on the social, physical, or economic losses resulting from individual hailstorms specific to Adams County. Appendix 6 provides the NCDC information regarding hailstorms, thunderstorms, and windstorms that have resulted in injuries, deaths, or monetary damages to property and/or crops.

On May 30, 2008, a thunderstorm and windstorm was reported by the NCDC to have resulted in approximately \$226K in property damages as straight line winds damaged 3 barns and completely destroyed another 2 barns. In addition, 2 homes received roof and siding damages from the estimated 70 mph winds. In June of 2008, an additional \$15K in property damages was attributed to a windstorm. Between these 2 events, over 35 homeowner's insurance claims were processed totaling over \$100K in payments. Several other smaller hailstorms, thunderstorms, and windstorms have affected the Adams County area. However, the majority of the reports do not go into more detail than describing downed power lines and trees with no indication of estimated monetary damages or associated injuries. It is possible that additional damages to structures, vehicles, or crops and additional injuries were experienced but not reported to local officials, insurance companies, or the NCDC.

According to the Institute for Business and Home Safety, northeastern Indiana can expect to experience damaging hailstorms 3-4 times over 20 years; the average life of a residential roof. Further, thunderstorms and windstorms are considered a high frequency hazard and may occur numerous times per year.

The Planning Committee determine the probability of a hailstorm, thunderstorm, or windstorm occurring in Adams County or any of the NFIP communities is highly likely and will typically affect broad portions of the County at one time resulting in limited damages. As advancements in technologies such as weather radar systems and broadcast alerts are continually made, the warning time for such incidents may increase. Currently, the Planning Committee feels that the warning time and duration associated with these hazards is estimated at less than 6 hours.

Indicative of a regional hazard, the probability, magnitude, warning time, and duration of a hailstorm, thunderstorm, or windstorm are expected to be the same for all communities within Adams County. Hailstorms, thunderstorms, and windstorms are highly unpredictable and the occurrences are distributed through the county. Therefore, the CPRI values reflect the equally distributed risk and associated priority for a hailstorm, thunderstorm, or windstorm. A summary is shown in **Table 3-12**.

**Table 3-12 CPRI for Hailstorm, Thunderstorm & Windstorm**

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Adams County	<b>Highly Likely</b>	<b>Limited</b>	<b>&lt; 6 hours</b>	<b>&lt; 6 hours</b>	<b>Severe</b>
City of Berne					
City of Decatur					
Town of Geneva					
Town of Monroe					

Specific locations and frequency of hailstorms, thunderstorms, and windstorms are difficult to predict as many of these individual events are without significant warning time and may have impacts to very limited areas, or may affect broader areas. However, based on NCDC data and personal experiences of the Planning Committee, it was determined that Adams County and all communities within are anticipated to experience a hailstorm, thunderstorm, or windstorm within the calendar year. More likely, Adams County communities will be impacted by several of these hazard events each year.

Hailstorm, Thunderstorm, and Windstorm: Assessing Vulnerability

The effects of a hailstorm, thunderstorm, or windstorm may be minimal to extensive in nature and may affect small or broad ranges of land area. Within Adams County, direct and indirect effects from a hailstorm, thunderstorm, or windstorm may include:

**Direct Effects:**

- Damages to infrastructure (power lines)
- Damages to individual properties (homes, cars)

**Indirect Effects:**

- Downed power lines due to falling tree limbs
- Losses associated with power outages
- Damages sustained from blowing debris

*Estimating Potential Losses*

Due to the unpredictability of this hazard, all 228 critical facilities and approximately 12,000 non-critical facilities in Adams County are at risk of damage including temporary or permanent loss of function. For hailstorms, thunderstorms, and windstorms, it is not possible to isolate specific critical or non-critical facilities that would be more or less vulnerable to damages. However, areas where utility lines are above ground and areas where dead or dying trees have not been removed may be at a higher risk of property damages or power outages during hailstorms, thunderstorms, and windstorms. The City of Decatur may experience increased damages due to the number of structures and vehicles within the community. Additionally, mobile homes and accessory buildings such as pole barns and sheds may also be at a higher risk of damages from hailstorms, thunderstorms, and windstorms if not properly anchored to the ground.

### *Future Considerations*

As the population of Adams County and the individual municipalities continue to grow, it can be anticipated that the number of critical and non-critical structures will also increase. In order to reduce the vulnerability for damages resulting from a hailstorm, thunderstorm, or windstorm, measures such as proper anchoring, enforcement of the International Building Codes, and burial of power lines should be completed. While measures can be taken to remove existing structures or prevent future structures from being built in known hazard areas such as floodplains and hazardous materials facility buffers, such measures are not applicable to hailstorms, thunderstorms, and windstorms due to the diffuse nature and regional impacts of this hazard.

Indirect effects resulting from a hailstorm, thunderstorm, or windstorm can power outages caused by downed tree limbs, damages resulting from prolonged power outages, and damages to structures or property as a result of debris.



When comparing historical losses regarding hailstorms, thunderstorms, and windstorms, this hazard should be anticipated to result in one of the least amounts of damages to Adams County.

### Hailstorm, Thunderstorm, and Windstorm: Relationship to Other Hazards

Hailstorms, thunderstorms, and windstorms may be the precursor for other hazards. For example, hazardous materials incidents can be the result of a hailstorm, thunderstorm, or a windstorm. Material storage containers can become damaged by high winds, debris, or even lightning, and can result in a spill or release of materials. With wind speeds greater than 58 mph, tankers and other transportation vehicles carrying hazardous materials are also at risk while on the road. High winds may also cause gaseous substances to travel farther distances at a much faster rate, increasing the evacuation area necessary to protect residents and visitors of Adams County.

Additionally, rainfall typically occurs with a thunderstorm and this additional precipitation may lead to localized flooding or riverine flooding depending on the amount of rain during the event. Debris from a windstorm may also lead to localized flooding if debris is deposited over drains or if obstructions are created by downed limbs, trees, or other storm related debris.

Power outages may affect individual homeowners or entire businesses. However, if a power outage occurs at a livestock facility, the resulting damages may be as severe as an entire loss of animals within hours due to loss of cooling or air circulation capabilities.

The risk of social losses also increases during a hailstorm, thunderstorm, or windstorm as many times, these hazards result in downed power lines, utility poles, and trees. Debris such as this may impede traffic patterns and make it difficult for emergency vehicles (Fire, EMS, and Police) to pass through affected areas or people may be directly injured as a result of falling debris.



**3.3.5 Tornado**

Tornados are defined as violently rotating columns of air extending from thunderstorms to the ground. Funnel clouds are rotating columns of air not in contact with the ground. However, the funnel cloud may reach the ground very quickly – becoming a tornado. If there is debris lifted and blown around by the “funnel cloud”, then it has reached the ground and is a tornado.



A tornado is generated when conditions in a strong cell are produced that exhibit a mass of cool air that overrides a layer of warm air. The underlying layer of warm air rapidly rises, while the layer of cool air drops –sparking the swirling action. The damage from a tornado is a result of the high wind velocity and wind-blown debris.



Tornado season is generally April through June in Indiana, although tornados can occur at any time of year. Tornados tend to occur in the afternoons and evenings: over 80 percent of all tornados strike between 3:00 pm and 9:00 pm, but can occur at any time of day or night. Tornados occur most frequently in the United States east of the Rocky Mountains. Tornados in Indiana generally come from the south through the west and move to the north through the east. In Adams County, the predominant tornado path seems to be from the southwest to the northeast.

While most tornados (69%) have winds of less than 100 mph, they can be much stronger. Although violent tornados (winds greater than 205 mph) account for only 2% of all tornados, they cause 70% of all tornado deaths. In 1931, a tornado in Minnesota lifted an 83-ton rail car with 117 passengers and carried it more than 80 feet. In another instance, a tornado in Oklahoma carried a motel sign 30 miles and dropped it in Arkansas. In 1975, a Mississippi tornado carried a home freezer more than a mile.

Tornado: Historic Data

The classification of tornados utilizes the Fujita Scale of tornado intensity, described in **Table 3-13**. Tornado intensity ranges from low intensity (F0) tornados with effective wind speeds of 40-70 mph to high intensity (F5+) tornados with effective wind speeds of 261 to over 318 mph. According to the NCDC, Adams County has experienced 3 tornados between 2005 and 2010. Tornados recorded for Adams County include 1 - F0 and 2 - F1 tornados. Exhibit 4 illustrates these tornado touchdowns and paths in Adams County.

**Table 3-13 Fujita Scale of Tornado Intensity**

F-Scale	Winds	Character of Damage	Relative Freq.
F0 (weak)	40-72 mph	light damage	29%
F1 (weak)	73-112 mph	moderate damage	40%
F2 (strong)	113-157 mph	considerable damage	24%
F3 (strong)	158-206 mph	severe damage	6%
F4 (violent)	207-260 mph	devastating damage	2%
F5 (violent)	261-318 mph	incredible damage	< 1%

(NWS, 2007)

Tornados appear to be widespread throughout the County and may cause varying amounts of damage to property and injuries to residents and visitors to Adams County. Nearly \$176K in property and crop damages was reported by the NCDC for recent tornado events in Adams County. Historical values are approximately \$29.6M in property and crop damages with reports of 1 death and 42 injuries. Appendix 6 provides the NCDC information regarding tornados that have resulted in injuries, deaths, or monetary damages to property and/or crops.

In August 2006 a tornado touched down 2 miles east of Decatur at the intersection of US 224 and CR 200. Roof damage occurred and a garage door was ripped off a residence in this area. Several trees, a small patch of soy beans, and a barn door were damaged as the tornado traveled across CR 200. This F1 tornado, as reported by the NCDC resulted in approximately \$125K in property damages and an additional \$5K in crop damages.

Not indicated by the NCDC but included in reports by the *Decatur Daily Democrat*, a series of “gustnadoes” (short lived tornados with low wind speeds) in June of 2008 resulted in an approximate \$1M in property damages as over 100 individual addresses received damages. It is also reported that nearly every street in the City of Decatur experienced damages to trees as numerous trees and power lines were knocked down during the event. Nearly 3,600 locations experienced power outages and crews from several states were called in to assist with tree removal and power line repair.

The Adams County Planning Committee estimated the probability of a tornado touching down in any of the NFIP communities is likely, while it is anticipated that the magnitude and severity of such an incident would be critical throughout the County. The Planning Committee determined that less than 6 hours of warning time may be provided for residents and visitors to take caution and seek proper shelter. In most cases, tornados are short-lived hazards and may progress to other locations relatively quickly. A summary is shown in **Table 3-14**.

**Table 3-14 CPRI for Tornadoes**

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Adams County	Likely	Critical	< 6 hours	< 6 hours	Elevated
City of Berne					
City of Decatur					
Town of Geneva					
Town of Monroe					

The Indiana State Climate Office estimates that throughout Indiana, there are an average of 20 tornado touchdowns per year. Based on the number of tornado touchdowns previously reported by the NCDC and local weather agencies, the Planning Committee determined that the probability of a future tornado occurring in Adams County is likely (within the next 3 years).

Tornado: Assessing Vulnerability

As a path of a tornado is not pre-defined, it is difficult to isolate specific critical and non-critical facilities, or areas of Adams County, that would be more or less vulnerable to a tornado. Within Adams County, direct and indirect effects from a tornado may include:

**Direct Effects:**

- Damages to older structures, mobile homes, and accessory structures (pole barns, sheds, etc.)
- Damages to above ground utility lines and structures

**Indirect Effects:**

- Expenses related to debris clean-up and/or reconstruction
- Loss of revenue for affected businesses
- Loss of work if employers are affected

*Estimating Potential Losses*

Due to the unpredictability of this hazard, all 228 critical and approximately 12,000 non-critical facilities in Adams County are at risk of future damage or loss of function. Estimates of potential physical losses were determined through a hypothetical exercise where F1 intensity tornadoes traveled through the City of Berne and the City of Decatur. This is intended to present a “what if” scenario of a tornado incident and associated damages. Damage estimates were derived by assuming that 25% of all critical and non-critical facilities in the path of the tornado would be completely destroyed, 35% would be 50% damaged, and 40% would have only 25% damage. **Table 3-15** provides summary data for the hypothetical tornadoes.

**Table 3-15 Summary Hypothetical Tornado Damages**

	Number of Structures Damaged	Estimated Damages (\$)
<b>City of Berne</b>		
Critical Facilities	1	1.0M
Non-Critical Facilities	127	21.3M
<b>Total</b>	<b>128</b>	<b>22.3M</b>
<b>City of Decatur</b>		
Critical Facilities	3	2.7M
Non-Critical Facilities	119	26.0M
<b>Total</b>	<b>122</b>	<b>28.7M</b>

*Future Considerations*

As the communities within Adams County continue to grow in land size as well as population, it will be important to provide as much advance tornado warning as possible. While it is only one method of warning residents and visitors of impending severe weather, outdoor warning sirens may prove beneficial to those outside and within 1 mile of a siren. Therefore, as land is annexed into communities, or new subdivisions are proposed, considerations of outdoor warning siren coverage.

Outdoor warning sirens can serve as a valuable tool in reducing social, physical, and economic losses associated with tornados. Within the City of Decatur, 5 outdoor warning sirens provide near complete coverage for the areas within the municipal boundaries. Areas not covered by the existing outdoor warning sirens include the extreme northwestern and western portions.



The Towns of Berne, Geneva, and Monroe are completely covered by 3, 2, and 1 outdoor warning sirens, respectively. In addition to those covering the City of Decatur, a siren has been placed north of the City on W 850N covering Monmouth. The Linn Grove area is not covered by an outdoor warning siren. The existing siren locations and coverage areas are located on Exhibit 4.

There may be many indirect effects of a tornado event. For example, post-event clean-up may result in high expenses or inability to work for property owners that have experienced damages from either the tornado directly or by debris from high winds. Affected businesses may experience loss of revenue if unable to continue operations following the event. Similarly, if a business is affected and unable to operate, employees may experience a loss of wages during the period their employer is closed.

### Tornado: Relationship to Other Hazards

Tornados may result in a hazardous materials incident. Material storage containers can become damaged by high winds and debris and can result in a spill or release of materials. As wind speeds increase, the potential for damages to above ground storage containers also increases. Tankers and other transportation vehicles carrying hazardous materials are also at an increased risk while on the road or rail.

Tornados may also result in animal health issues as the tornado itself may damage livestock barns and may injure or kill animals in the pathway. Further, the associated power outages or downed trees may delay access to the barns, feeding the livestock, or other important operations.

As with many other hazards, tornados may result in power outages or other infrastructure failures throughout the County. Numerous downed power lines and poles, as well as damages to cell towers, electrical substations, and other aboveground facilities can be anticipated following a tornado.

### 3.3.6 Winter Storm and Ice

A winter storm can range from moderate snow over a few hours to blizzard conditions with high winds, ice storms, freezing rain or sleet, heavy snowfall with blinding wind-driven snow, and extremely cold temperatures that can last for several days. Some winter storms may be large enough to affect several states while others may affect only a single community. All winter storms are accompanied by cold temperatures and blowing snow, which can severely reduce visibility. A winter storm is one that drops 4 or more inches of snow during a 12-hour period, or 6 or more inches during a 24-hour span. An ice storm occurs when freezing rain falls from clouds and freezes immediately on impact. All winter storms make driving and walking extremely hazardous. The aftermath of a winter storm can affect a community or region for days, weeks, and even months.



Storm effects such as extreme cold, flooding, and snow accumulation can cause hazardous conditions and hidden problems for people in the affected area. People can become stranded on the road or trapped at home, without utilities or other services, including food, water, and fuel supplies.

The conditions may overwhelm the capabilities of a local jurisdiction. Winter storms are considered deceptive killers as they may indirectly cause transportation accidents, and injury and death resulting from exhaustion/overexertion, hypothermia and frostbite from wind chill, and asphyxiation; and house fires occur more frequently in the winter due to lack of proper safety precautions.

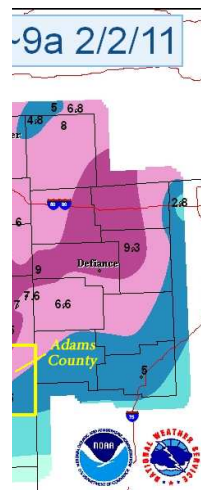
Wind chill is a calculation of how cold it feels outside when the effects of temperature and wind speed are combined. On November 1, 2001, the NWS implemented a replacement Wind Chill Temperature (WCT) index for the 2001/2002 winter season. The reason for the change was to improve upon the current WCT Index, which was based on the 1945 Siple and Passel Index.

A winter storm watch indicates that severe winter weather may affect your area. A winter storm warning indicates that severe winter weather conditions are definitely on the way. A blizzard warning means that large amounts of falling or blowing snow and sustained winds of at least 35 mph are expected for several hours. Winter storms are common in Adams County. Such conditions can result in substantial personal and property damage, even death.

### Winter Storm and Ice: Historic Data

Since the completion of the April 2005 Adams County MHMP, the NCDL has recorded 5 winter storms, 2 heavy snow events, and 5 ice storms in Adams County between January 2005 and February 2010. Damage estimates were only provided for 1 ice storm during this time period, the incident occurring on February 24, 2007. During this storm, Adams County, along with 4 other northeast Indiana counties, experienced 0.2-0.4 inches of ice covering roads and power lines. This created not only dangerous driving conditions, but also power outages as lines were snapped either from the weight of the ice or by the damages tree limbs. Also during this event, 10-20 mph winds were reported which exacerbated the number of downed limbs and power lines and increased the road closures due to fallen trees. During this event, County officials issued a Code Black; a snow emergency indicating that County offices are closed and roads have been drifted shut.

In February 2011, northern Indiana was hit hard by multiple snow storms. The month started with a 2 day blizzard that dropped between 4 and 10 inches of snow in Adams County (**Figure 3-2**). The County Commissioners declared a “Code Black” situation, schools and businesses closed, snow removal crews worked



around the clock, and the EOC was activated. The Indiana State Police issued a “Level 1 Emergency” which restricts travel to emergency personnel only due to impassable road conditions. Three days later on February 5<sup>th</sup>, another 4 to 6 inches of heavy snow fell resulting in snow accumulations of 12 to 18 inches of snow. Another snowstorm hit the area on February 23<sup>rd</sup> adding another 5 inches.

Appendix 6 provides the NCDL information regarding winter storms, and ice storms that have resulted in injuries, deaths, or monetary damages to property and/or crops.

The probability, magnitude, warning time, and duration of a winter storm or ice storm causing disruption to residents and businesses in Adams County, as determined by the Planning Committee, is expected to be consistent throughout the County and NFIP communities. It is highly likely that this type of hazard will occur in this area and will typically affect the entire County, and possibly several surrounding counties, at one time, resulting in critical severity. The warning time for severe temperatures or several inches of snow associated with a winter storm is usually 12-24 hours while the duration of the incident is anticipated to last less than 1 week. A summary is shown in **Table 3-16**.



**Table 3-16 CPRI for Winter Storm & Ice**

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Adams County	Highly Likely	Critical	12-24 hours	< 1 week	Severe
City of Berne					
City of Decatur					
Town of Geneva					
Town of Monroe					

The Planning Committee determined that the probability for a winter storm or ice storm to occur in Adams County or any of the communities within is highly likely, or will occur within the calendar year. Based on historical data and the experience of the Planning Committee, winter storms and ice storms are common within Adams County and will continue to be an annual occurrence.

Winter Storm and Ice: Assessing Vulnerability

A winter storm typically affects a large regional area with potential for physical, economic, and/or social losses. Direct and indirect effects of a winter storm or ice storm within Adams County may include:

**Direct Effects:**

- More urban area (Decatur) employers may experience loss of production as employees may not be able to get to work
- Rural (County) roads may impassable
- Expenses related to snow removal or brine/sand applications

**Indirect Effects:**

- Loss of revenue as businesses are closed
- Increased emergency response times based on safety of roads
- Loss of income if unable to get to place of employment

*Estimating Potential Losses*

Given the nature and complexity of a regional hazard such as a winter storm, it is difficult to quantify potential losses to property and infrastructure. As a result, all critical and non-critical facilities and infrastructure are at risk from winter storm and ice incidents.

For planning purposes, information collected on winter storms impacting other communities around the nation is also useful in assessing the potential social, physical, and economic impact that a winter storm could have on the Adams County communities. For





example, a March 2003 snowstorm in Denver, Colorado dropped approximately 31 inches of snow and caused an estimated \$34M in total damages. In addition, a February 2003 winter storm dropped an estimated 15 - 20 inches of snow in parts of Ohio. The Federal and Ohio Emergency Management Agencies and U.S. Small Business Administration surveyed damaged areas and issued a preliminary assessment of \$17M in disaster related costs. These costs included snow and debris removal, emergency loss prevention measures, and public utilities repair. The agencies found over 300 homes and businesses either damaged or destroyed in 6 counties.

The Denver, Colorado area snowstorms from December 2006 through January 2007 surpassed the expenses and damages of the 2003 winter storms. In snow removal costs alone, it is estimated that over \$19M was spent throughout the area, with approximately \$6.4M of that allocated to clearing Denver International Airport. Additional economic expenses are realized when such a large storm closes local businesses and Denver International Airport for nearly 48 hours.

While the above examples indicate the wide-ranging and large-scale impact that winter storms can have on a community or region, in general, winter storms tend to result in less direct economic impacts than many other natural hazards. According to the Workshop on the Social and Economic Impacts of Weather, which was sponsored by the U.S. Weather Research Program, the American Meteorological Society, the White House Subcommittee on Natural Disaster Relief, and others, winter storms resulted in an average of 47 deaths and more than \$1B in economic losses per year between 1988 and 1995. However, these totals account for only 3% of the total weather-related economic loss and only 9% of fatalities associated with all weather related hazards over the same period.

#### *Future Considerations*

As populations increase and communities continue to grow in size, the need to respond to winter storms or ice storms will remain an important municipal effort. As new construction or re-development occurs, especially new or existing critical facilities,



it is important to ensure that these new structures are equipped to deal with the potential risks associated with this hazard. Those may include lengthy power outages and potentially impassable transportation routes, making it difficult to obtain supplies or for passage of response vehicles.

Winter storms can also result in substantial indirect costs. Increased emergency response times, loss of work or the inability to get to work, as well as business

interruption, are possible indirect effects of a winter storm. According to a report by the National Center for Environmental Predictions, the cold and snowy winter in late 1977 and early 1978, which impacted several heavily populated regions of the country, was partially responsible for reducing the nation's Gross Domestic Product (GDP) from an estimated growth rate of between 6% and 7% during the first 3 quarters of 1977 to approximately -1% in the last quarter of 1977 and 3% during the first quarter of 1978.

#### Winter Storm and Ice: Relationship to Other Hazards

Winter storms and ice storms can lead to flooding as the precipitation melts and enters local receiving water bodies. This increased volume of water on already saturated, or still frozen ground can quickly result in flooding related damages to structures and properties, as well as within the stream or river channel.

Winter storms and ice storms may also result in animal health issues as the associated power outages or downed trees may delay access to the barns, feeding the livestock, or other important operations. The accumulation of snow and ice may also prohibited access to livestock barns.

Hazardous materials incidents may be caused by poor road conditions during winter storms or ice storms. Many hazardous materials are transported by rail or by tanker over highways and interstates. In the more rural areas of Adams County, or where open areas are more susceptible to drifted roads, the possibility of a traffic related hazardous materials incident may increase.

Power outages and other infrastructure failures may also occur during a winter storm. Weight from snow and ice accumulations can directly or indirectly cause power lines to fail. During extreme cold temperatures, power outages may prove deadly for certain populations such as the elderly or ill.

**TECHNOLOGICAL HAZARDS**

**3.3.7 Chemical, Biological, and Radiological Incidents**

In recent years, the issues of chemical, biological, and radiological releases have become a more common topic when discussing and planning for hazardous events. These threats have become commonplace for both the foreign and domestic risk considerations.



Chemical weapons generally contain compounds that even in small amounts will cause strong effects on humans. Types of chemicals used include those that cause tissue to blister and/or burn on contact (vesicants), result in lung damage leading to long term effects or death (choking agents), or that damage the function of the nervous system (nerve agents). These effects may be immediate or may take hours to realize the damages.

Biological agents are utilized to cause illness or disease in humans or animals. Small amounts of biological agents can be very effective as the pathogens, once inside the victim, will multiply. Pathogens utilized in such weapons are also generally contagious, such as small pox, and will further the effects by infecting numerous other victims. Symptoms from a biological release may take several days to become recognizable.

Radiological, or nuclear, releases can range from a blast accompanied by intense light and heat, as well as a pressure wave that can be damaging to nearby structures. Further, materials are dispersed across a wide area and may lethally contaminate the air, water, and soils for many decades. These agents may be delivered through highly technological missiles or through small portable devices carried by individuals.

**Chemical, Biological, and Radiological Incidents: Historic Data**

There have been recent events within the United States and throughout the world that continue to cause concern regarding these types of hazards. For example, in 1995 sarin gas was released on a subway train in Tokyo and due to the impurity of the gas, 12 people died while thousands of others were injured. Had the purity of the nerve agent been greater, the number dead would have been much larger.

United States government offices have also been the target of such attacks. In 2001, anthrax powder was mailed to the



offices of Sen. Tom Daschle and Sen. Pat Leahy. Nearly 30 people experienced symptoms following their exposure to the anthrax and 5 people were killed. Additional mailings were sent to the offices of several media outlets and the office of Tom Brokaw. Similarly, in 2004, Sen. Bill Frist received mail laced with the chemical ricin, a highly toxic poison. These attacks lead to several changes in the operations of the US Postal Service as well as the operations of mail rooms throughout the world.

In July 2005, a private attorney in the City of Berne felt nauseous and had a bitter taste in his mouth after handling a letter sent to him which had a sticky substance on the outer envelope. After contacting local and state officials, the attorney and a visitor in his office were isolated until the substance contained in the letter was identified. An Indiana State Hazardous Materials Specialist was contacted and several tests were conducted on the substance. It was ultimately determined that it was penicillin.

The Planning Committee determined that the probability of a chemical, biological, or radiological incident occurring in Adams County is possible and that the magnitude of such an event is anticipated to be significant. Further, there will be less than 6 hours of warning time and the effects of the hazard are anticipated to last less than one week. A summary is shown in **Table 3-17**.

**Table 3-17 CPRI for Chemical, Biological, and Radiological Hazards**

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Adams County	Possible	Significant	< 6 hours	< 1 week	Elevated
City of Berne					
City of Decatur					
Town of Geneva					
Town of Monroe					

While a chemical, biological, or radiological incident has not occurred within Adams County, the Planning Committee did determine that the possibility does exist that this type of hazardous event may occur within the next 5 years. Throughout the United States, and the world, it seems as though deliberate releases of chemical, biological, or radiological substances are occurring more frequently, warranting a need for Adams County and the communities within to prepare mitigation measures and provide education and outreach for their residents.

Chemical, Biological, and Radiological Incidents: Assessing Vulnerability

Chemical, biological, and radiological releases in the form of vapors, aerosols, liquids, or solids may have various effects on humans, animals, or plants.

**Direct Effects:**

- Typically associated with populations and not structures or properties

- Lost revenue for businesses involved in such incidents (even if suspected incidents)

**Indirect Effects:**

- Expenses due to response, testing, cleaning of all affected or potentially affected areas
- Anxiety or stress related health issues for those populations involved, directly, or indirectly

It is anticipated that releases of these types will be directed toward large crowds or high profile targets; however, due to the broad nature of this hazard, all critical and non-critical facilities are considered to be at risk.

*Estimating Potential Losses*

A hypothetical situation to highlight the potential risk associated with this type of hazard is to consider the Adams County Courthouse as a high profile target. Approximately 25 people are employed within the Courthouse, and an additional large number of people visit the Courthouse each day for business. If a chemical or biological agent were released within the Courthouse, those 25 employees would need to be quarantined under the substance and its effects were identified, the Courthouse would effectively be shut down for business, and response agents and specialists would need to be involved in the situation.

*Future Considerations*

As the threat of these types of hazards are becoming more prevalent throughout the United States and the world, it is important that Adams County residents and visitors have at least a basic knowledge of how to react and/or respond to a local or regional threat of this nature. Adams County, at this time, may not be considered a high profile target for a large chemical, biological, or radiological threat. However, its geographic proximity to larger areas such as Fort Wayne or Indianapolis creates the need for planning and education in the future.



Indirect effects associated with a chemical, biological, or radiological incident may range from anxiety and stress over the potential incident to loss of revenue or production while testing occurs or the area is quarantined. Additional expenses related to the potential incident involve those related to testing of substances in question, medical evaluations, and cleaning of the area once a determination has been made.

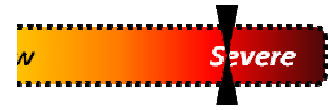
Chemical, Biological, and Radiological Incidents: Relationship to Other Hazards

Depending on the nature of the incident and the delivery method, a chemical, biological, or radiological may lead to additional hazards or concerns related to hazardous materials incidents. If the hazardous materials facility is the primary target or if an explosive is detonated within close proximity to a hazardous materials facility, additional toxic releases or evacuations may occur.

In a similar fashion, infrastructural components such as power lines or substations, communication towers, water towers, or water treatment systems may also be a target or may be included in the indirect damages if an explosion were to occur.

### 3.3.8 Hazardous Material Incident

Hazardous materials are substances that pose a potential threat to life, health, property, and the environment if they are released. Examples of hazardous materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers, and dangerous gases. Despite precautions taken to ensure careful handling during manufacture, transport, storage, use, and disposal, accidental releases are bound to occur. These releases create a serious hazard for workers, neighbors, and emergency response personnel. Emergency response may require fire, safety/law enforcement, search and rescue, and hazardous materials response units.



As materials are mobilized for treatment, disposal, or transport to another facility, all infrastructure, facilities, and residences in close proximity to the transportation routes are at an elevated risk of being affected by a hazardous materials release.



Often these releases can cause serious harm to Adams County and its residents if proper and immediate actions are not taken. Most releases are the result of human error, and corrective actions to stabilize these incidents may not always be feasible or practical in nature.

Railways often transport materials that are classified as hazardous and preparations need to be made and exercised for situations such as derailments, train/vehicle crashes, and/or general leaks and spills from transport cars.

#### Hazardous Materials Incident: Historic Data

As indicated by the Adams County CEMP, no additional hazardous material incidents have occurred since the development of the April 2005 Adams County MHMP. However, during conversations with Planning Committee members and through information provided by the Adams County EMA, it was noted that several incidents, primarily agriculturally related have occurred in the area.

In June 2010 approximately 1,800 pounds of liquid nitrogen spilled into Flat Rock Creek and flowed through portions of Adams and Allen Counties in Indiana, while also affecting Van Wert County in Ohio. Responders dammed the creek, stopping the spread of the substance and were then able to remediate the situation by pumping and removing the polluted water. No monetary damages were provided for the incident.

According to the Planning Committee, the probability of a hazardous materials release or incident is likely throughout all of Adams County with all areas



expected to have significant damages should a hazardous materials incident occur. This is in part due to profuse nature of the transportation routes. The warning time for a hazardous materials incident can be significantly less than 6 hours while containment procedures and evacuations may occur up to 1 week. A summary is shown in **Table 3-18**.

**Table 3-18 CPRI for Hazardous Materials Incident**

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Adams County	Likely	Significant	< 6 hours	< 6 hours	Severe
City of Berne					
City of Decatur					
Town of Geneva					
Town of Monroe					

Relatively small hazardous materials incidents have occurred within Adams County and communities in the past and are likely, according to the Planning Committee, to occur again. As the number of hazardous materials producers, users, and transporters increase within or surrounding Adams County, it can be anticipated that the likelihood of a future incident will also increase.

Hazardous Materials Incident: Assessing Vulnerability

Within Adams County, direct and indirect effects from a hazardous materials incident may include:

**Direct Effects:**

- More densely populated areas (Decatur) with a larger number of structures, railroad crossings, and heavily traveled routes are more vulnerable
- Expense of re-construction of affected structures

**Indirect Effects:**

- Loss of revenue or production while recovery and/or reconstruction occurs
- Anxiety or stress related to event
- Potential evacuation of neighboring structures or facilities

While the possibility of an incident occurring may be likely, the vulnerability of Adams County has been lowered due to the enactment of Superfund Amendments and Reauthorization Act (SARA) Title III national, state and local requirements. SARA Title III, also known as the Emergency Planning and Community Right to Know Act (EPCRA), establishes requirements for planning and training at all levels of government and industry. EPCRA also establishes provisions for citizens to have access to information related to the type and quantity of hazardous materials





being utilized, stored, transported or released within their communities.

One local result of SARA Title III is the formation of the Local Emergency Planning Commission (LEPC). This commission has the responsibility for preparing and implementing emergency response plans, cataloging Material Safety Data Sheets (MSDS), chemical inventories of local industries and businesses, and reporting materials necessary for compliance.

The Adams County LEPC is the local entity responsible for planning, training and implementing exercise activities within the county. In Adams County, 96 facilities are subject to SARA Title III provisions due to the presence of listed hazardous materials in quantities at or above the minimum threshold established by the Act. These facilities are also required to create and distribute emergency plans and facility maps to local emergency responders such as the LEPC, fire departments, and police departments. With this knowledge on hand, emergency responders and other local government officials can be better prepared to plan for an emergency, the response it would require, and prevent serious affects to the community involved. These hazardous materials facilities, along with major transportation routes and rail lines are identified on **Exhibit 5**.

#### *Estimating Potential Losses*

To estimate the potential social and/or indirect impacts associated with a hazardous materials incident at any of the fixed site hazardous materials handlers, a 500-yard radius buffer zone was imposed surrounding each of the 32 Extremely Hazardous Substance (EHS) fixed sites in Adams County. The number of critical and non-critical facilities within each of the buffers was determined by CBBEL utilizing digital aerial photography and GIS data analysis. These facilities may receive damages from the release, need to evacuate, or experience business interruption as a result of the incident. **Table 3-19** indicates the number of critical facilities located in those buffer zones, within each of the NFIP communities.

**Table 3-19 Hazardous Materials EHS Fixed Site Estimated Impact Area**

Community	EHS Facilities	EHS Facilities	Critical Facilities*
City of Berne	13	5	23
City of Decatur	30	11	65
Town of Geneva	6	4	19
Town of Monroe	6	3	27
Adams County (unincorporated)	41	9	26
<b>Total</b>	<b>96</b>	<b>32</b>	<b>160</b>

\*: Critical facilities located within the 500-yard radius buffer

Utilizing the Aerial Locations of Hazardous Atmospheres (ALOHA) model a release of ammonia from a tank at the Harvest Land Co-op Decatur Ag Center was simulated. Wind speeds of 10 mph from the southwest were estimated at the time of the hypothetical release. The ALOHA model determines zones of concern based on acute exposure guideline levels (AEGs) used to predict the area where a toxic gas concentration might be high enough to harm people. These guidelines define 3-tiered AEGs:

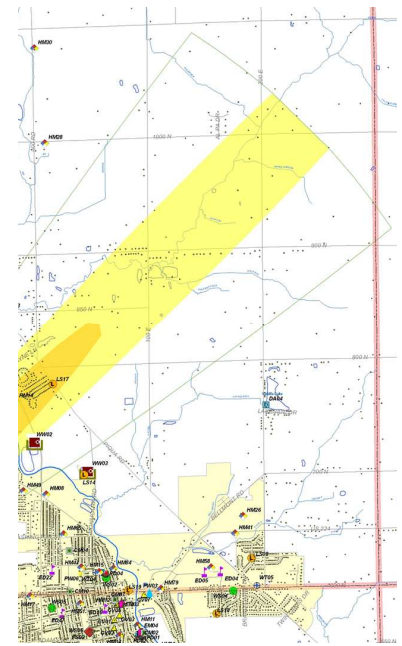
- AEGL-1: The concentration where the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain non-sensory effects. Effects are not anticipated to be disabling and are reversible upon cessation of exposure.
- AEGL-2: The concentration where the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
- AEGL-3: The concentration where the general population, including susceptible individuals, could experience life-threatening health effects or death.

A summary of these results is shown in **Table 3-20**.

**Table 3-20 Facilities Located in ALOHA Plume**

AEGL	Affected Facilities (Total)	Affected Critical Facilities*
AEGL-1	125	7
AEGL-2	151	(7)
AEGL-3	3	(Facility of Origin)
<b>Total</b>	<b>279</b>	<b>7</b>

These AEGLs serve to indicate potential areas of concern based on specific location conditions related to tank size, material, wind direction, and weather conditions. This exercise, which can be completed for a fixed site or transportation tank, is a valuable tool to determine evacuation zones in the event there is a hazardous materials release. The plumes associated with this hypothetical exercise are shown on **Figure 3-3**.



*Future Considerations*

Additional facilities, both critical and non-critical in nature may be affected if a hazardous materials release were to occur along a transportation route. Several routes including railways, US Hwy 27, 33, and 224, and State Routes 101, 116, 124, and 218 are routes traveled by carriers of hazardous materials.



By restricting development within the known hazardous materials facility buffer zones, future losses associated with a hazardous materials release can be reduced. Critical facilities especially should be discouraged from being located within these areas. Further, by restricting construction in these zones, the

number of potentially impacted residents may also be greatly reduced, lowering the risk for social losses, injuries, and potential deaths. Future construction of hazardous materials facilities should be located away from critical facilities such as schools, medical facilities, municipal buildings, and daycares, reducing the risk to highly populated buildings and potentially populations with special needs or considerations such as children, elderly, and medically unfit.

#### Hazardous Materials Incident: Relationship to Other Hazards

Dependent on the nature of the release, conditions may exist where an ignition source such as a fire or spark is in close proximity to a flammable or explosive substance. As the fire spreads throughout the facility or the area, structural and/or property damages will increase. Response times to a hazardous materials incident may be prolonged until all necessary information is collected detailing the type and amount of chemicals potentially involved in the incident. While this may increase structural losses, it may actually decrease the social losses such as injuries or even deaths.

**POLITICAL HAZARD****3.3.9 School / Workplace Violence**

Violent incidents in schools or in the workplace have ranged from acts of bullying to armed intruders with multiple casualties, injuries, and mass chaos. While all acts of school or workplace violence do not have the same cause, many factors leading up to the event are similar. Some stressors in school related violence, according to the Adams County CEMP are:



- Rejection from peers or family members
- Bouts of significant depression
- Mental illness
- Physical, mental, or sexual abuse
- Changes in policies regarding punishment and disciplinary actions

In addition, factors leading to workplace violence may include:

- Prolonged work hours or occupations with a high risk of injury
- Little or no recognition of job performance
- Bouts of significant depression
- Mental illness
- Drug or alcohol abuse
- Poor social, interpersonal, or communication skills

**School / Workplace Violence: Historic Data**

While several incidents of school or workplace violence have occurred throughout the United States, no such events have occurred within Adams County. However, in 2009 a Bellmont High School student was suspected of having a shotgun at school. Response efforts were conducted and it was later determined that it was actually a pellet gun. In February 2011 an Adams County High School student was charged with possession of a handgun and drugs on school property. School officials and the on duty resource officer were able to successfully intervene without an incident occurring.



One of the most notable incidents of school violence happened on April 20, 1999 in Littleton Colorado at Columbine High School. Two heavily armed students opened fire and set off explosives resulting in the deaths of 25 students and teachers and injuries to several more.

Workplace violence has also become more prevalent as numerous instances of disgruntled employees or former employees have sought revenge of some sort by targeting co-workers or employers. In February 2010, 3 University of Alabama

Huntsville professors were shot and killed by a University colleague. In August 2010, a Connecticut warehouse driver shot and killed 8 co-workers before killing himself. As with school violence, Adams County has not experienced such acts of violence in the workplace. **Table 3-21** shows the CPRI for School/Workplace Violence.

**Table 3-21 CPRI for School/Workplace Violence**

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Adams County	Possible	Significant	< 6 hours	< 6 hours	Elevated
City of Berne					
City of Decatur	Likely				Severe
Town of Geneva	Possible				Elevated
Town of Monroe					

As determined by the Planning Committee, the probability of an act of school or workplace violence is possible (within the next 5 years) throughout Adams County with the exception of the City of Decatur where the probability is likely (within the next 3 years). This is due to the increased number of residents, employers, and schools within the City as compared to the other communities and the unincorporated areas of the county. As mentioned above, thus far, an incident such as this has not occurred within Adams County.

School / Workplace Violence: Assessing Vulnerability

Schools and major employers within Adams County and the individual communities may be the most at risk as a target due to the number of students and/or personnel present at each facility. Direct and indirect effects of an incident of school or workplace violence may include:

**Direct Effects:**

- Students, staff, workers, or other populations experiencing injury or death
- Inability for those involved to return to school or work

**Indirect Effects:**

- Revenue or production loss for businesses involved in or near to incident scene
- Expense of increased social needs following incident

Estimating Potential Losses

This hazard, however, is not typically as damaging to structures as it is to populations so monetary damages associate with the direct effects of the violent acts are not possible to estimate. Indirect effects of such an event include anxiety and stress related to experiencing the event or having a family member involved in such an event, the need for additional counselors to assist people affected by such a hazard, and the potential loss of revenue due to business shut down during or immediately following an event. In addition to the business or facility directly

involved, additional businesses nearby may need to be shut down or evacuated for the safety of their personnel.

#### *Future Considerations*



Sensing the risk to students, the Adams County School Safety Commission was formed and grant funds were acquired to help achieve a more ready school system. For example, all Adams County teachers have undergone bully prevention training as it is felt that bullying is the underlying cause to a majority of the violent situations in the schools. Grant funds are utilized to provide each high school with armed police officers, to install and monitor live camera feeds, and to produce crisis prevention plans for violent situations and all hazards that require special actions or protection of staff and students.

In the summer of 2010, the Adams County emergency response agencies (Sheriff Departments, State Police, Emergency Medical Services, etc.) conducted a “live shooter” training at North Adams High School. This training allowed the responders to work through a field exercise while utilizing the monitoring systems set up in the school.

#### School / Workplace Violence: Relationship to Other Hazards








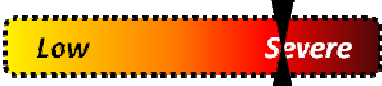

School or workplace violence will not cause other hazards to occur. It is also not likely that other hazards will directly lead to an incident of school or workplace violence.

### 3.4 HAZARD SUMMARY

For the development of this MHMP, the Planning Committee utilized the CPRI method to prioritize the hazards they felt affected Adams County. Hazards were assigned values based on the probability or likelihood of occurrence, the magnitude or severity of the incident, as well as warning time and duration of the incident itself. A weighted CPRI was calculated based on the percent of the County’s population present in the individual NFIP communities.

**Table 3-22** summarizes the CPRI values for the various hazards studied within this MHMP. The hazards that ranked as “severe” risk were hailstorm, thunderstorm and windstorm; winter storm and ice storm; and hazardous material. Hazards with “elevated” risk include: earthquake; flood; tornado; chemical, biological, and radiological; and school and workplace violence. Drought was the only “low” risk hazard.

**Table 3-22 Combined Calculated Priority Risk Index (CPRI)**

TYPE OF HAZARD	LIST OF HAZARDS	WEIGHTED AVERAGE CPRI
Natural	Drought	
	Earthquake	
	Flood	
	Hailstorm Thunderstorm Windstorm	
	Tornado	
	Winter Storm Ice Storm	
Technological	Chemical Biological Radiological	
	Hazardous Material	
Political	School and Workplace Violence	

It can be important to understand the cause and effect relationship between the hazards selected by the Planning Committee. **Table 3-23** can be utilized to identify those relationships. For example, a winter storm (along the side of the table) can result in a flood (along the top of the table). In a similar fashion, a hazardous materials incident (along the top of the table) can be caused by an earthquake; flood; hailstorm, thunderstorm, or windstorm; tornado; winter storm or ice storm; or a chemical, biological, or radiological incident (along the side of the table).

**Table 3-23 Relationships of Hazards**

EFFECT →	Drought	Earthquake	Flood	Hailstorm, Thunderstorm, Windstorm	Tornado	Winter Storm and Ice	Chemical, Biological, Radiological	Hazardous Materials	School & Workplace Violence
CAUSE ↓									
Drought									
Earthquake								X	
Flood								X	
Hailstorm, Thunderstorm, Windstorm			X					X	
Tornado								X	
Winter Storm and Ice			X					X	
Chemical, Biological, Radiological								X	
Hazardous Materials									
School/Workplace Violence									

As a method of better identifying the potential relationships between hazards, Exhibit 3 can be referenced to indicate the proximity of one or more known hazard areas such as the delineated floodplains and the locations of EHS facilities. For this reason, the City of Decatur may be impacted by more than 1 hazard at one time, depending on certain conditions. It can be anticipated that if a flood were to occur within these areas, there would be a potentially increased risk of this facility experiencing a hazardous materials incident.

Future development in areas where multiple known hazard areas (floodplains and surrounding hazardous materials facilities) overlap should undergo careful design, review, and construction protocol to reduce the risk of social, physical, and economic losses due to a hazard incident. While it may certainly be difficult, critical facilities should be constructed within these regions.



## CHAPTER 4

# MITIGATION GOALS AND PRACTICES

This Section identifies the overall goal for the development and implementation of the Adams County MHMP. A summary of existing and proposed mitigation practices discussed by the Planning Committee is also provided.

### 4.1 MITIGATION GOAL

#### **REQUIREMENT §201.6(c)(3)(i):**

*[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

The Planning Committee reviewed the mitigation goals as outlined within the 2005 Adams County MHMP and determined each of these to remain valid and effective. In summary, the overall goal of the Adams County MHMP is to reduce the social, physical, and economic losses associated with hazard incidents through emergency services, natural resource protection, prevention, property protection, public information, and structural control mitigation practices.

### 4.2 MITIGATION PRACTICES

#### **REQUIREMENT §201.6(c)(3)(ii):**

*[The mitigation strategy shall include a] section that identifies and analyzed a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

#### **REQUIREMENT §201.6(c)(3)(iii):**

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

In 2005, the Multi-Hazard Mitigation Council conducted a study about the benefits of hazard mitigation. This study examined grants over a 10-year period (1993-2003) aimed at reducing future damages from earthquake, wind, and flood. It found that mitigation efforts were cost-effective at reducing future losses; resulted in significant benefits to society; and represented significant potential savings to the federal treasury in terms of reduced hazard-related expenditures. This study found that every \$1 spent on mitigation efforts resulted in an average of \$4 savings for the community. The study also found that FEMA mitigation grants are cost-effective since they often lead to additional non-federally funded mitigation activities, and have the greatest benefits in communities that have institutionalized hazard mitigation programs. Six primary mitigation practices defined by FEMA are:

- **Emergency Services** - measures that protect people during and after a hazard.
- **Natural Resource Protection** - opportunities to preserve and restore natural areas and their function to reduce the impact of hazards.
- **Prevention** – measures that are designed to keep the problem from occurring or getting worse.
- **Property Protection** – measures that are used to modify buildings subject to hazard damage rather than to keep the hazard away.
- **Public Information** – those activities that advise property owners, potential property owners, and visitors about the hazards, ways to protect themselves and their property from the hazards.
- **Structural Control** - physical measures used to prevent hazards from reaching a property.

#### 4.2.1 Existing Mitigation Practices

As part of this planning process, the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements, as well as suggested new practices. The following is a summary of existing hazard mitigation practices within Adams County. Mitigation measures that were included in the 2005 Adams County MHMP are noted as such.

##### Emergency Services

- The Adams County EMA utilizes a dedicated EOC located within the County Building. A trailer is also available to serve as a mobile EOC when needed.
- Adams County has a mutual aid agreement with the Allen County Hazardous Materials Response Team.
- Many critical facilities, including schools, several governmental offices, and numerous industries within Adams County own and operate weather alert radios that continuously broadcast NWS forecasts, warnings, and other crucial weather information. *(2005 Measures)*
- There are 13 outdoor warning sirens that provide near complete coverage to the communities of Berne, Decatur, Geneva, and Monroe, and other smaller communities within Adams County. Testing of these sirens is conducted at 11:00 am each Friday by the Adams County Communication Center. *(2005 Measure)*
- There are 2 active real-time USGS stream gages located in Adams County; one on the Wabash River at Linn Grove and one on the St. Marys River in Decatur. A third stream gage, located in Ohio along the St. Marys River in Rockford, Ohio, also provides Decatur with advanced warning time. *(2005 Measure)*
- Adams County EMA and the American Red Cross local chapter utilizes trained weather spotters, amateur radio operators, and other volunteers that assist with providing County residents with timely severe weather warnings.

- The Adams County Chapter of the American Red Cross continuously works within the County and individual communities to provide assistance as needed in response to a disaster, including the set up of temporary shelters. Plans and agreements are also in place to provide temporary shelter for domestic animals as needed. *(2005 Measure)*
- The Adams County LEPC utilizes realistic hazardous materials related training and exercises that simulate response conditions and scenarios for emergency responders, decision makers, and the general public. This group also ensures that up-to-date facility maps and hazardous materials information are available for all Tier II facilities. The County is also working to create potential hazard plumes for each Tier II facility. *(2005 Measure)*
- The Adams County Schools completed a training exercise related to a school shooting involving local sheriff, police, EMS, and EMA.
- The Adams County EMA is working to complete a Continuation of Operations Plan to ensure that governmental operations could continue during and immediately following a hazard event.
- Hazard communications and notifications are coordinated throughout the County and municipalities as all response agencies have the ability to utilize the same radio frequency.

#### Natural Resource Protection

- The City of Berne, the City of Decatur, the Town of Geneva, and Adams County are in good standing with the NFIP Program and have flood protection ordinances that meet minimum requirements.
- The Adams County Drainage Board oversees inspections and maintenance procedures on all County regulated drains in order to provide proper drainage and aid in the reduction of flooding in Adams County. *(2005 Measure)*
- The City of Decatur Planning Department employs a Certified Floodplain Manager (CFM). *(2005 Measure)*
- The City of Decatur and the City of Berne have participated in the Indiana Association of Floodplain and Stormwater Managers (INAFSM). *(2005 Measure)*

#### Prevention

- The City of Decatur has recently updated their Comprehensive Plan which helps direct the location and type of developments that occur throughout the City. *(2005 Measure)*
- The City of Berne, the City of Decatur, and Adams County have recently updated their Zoning Ordinances to highlight the importance of preserving the floodplain and restricting development in those areas. No Adverse Impact, or Compensatory Storage, provisions are also included in these Ordinances. *(2005 Measure)*

- Adams County has an active GIS Department with a well developed GIS inventory of essential facilities and localized building information that can be utilized by municipal offices and agencies to aid in land use planning and decision making efforts. *(2005 Measure)*
- The City of Decatur participates in the NFIP's CRS program at a Class 8. Currently the City is awaiting resolution of issues related to Building Code Evaluation Grading System (BCEGS) before they can advance within the CRS program. *(2005 Measure)*
- Indiana Michigan Power, major electric provider in Adams County, routinely complete tree maintenance throughout their service areas to prevent dead and dying trees and limbs from falling and damaging property and power lines, or injuring people during severe weather incidents. *(2005 Measure)*
- NIPSCO, natural gas utility in Adams County, routinely completes leak surveys, inspections and maintenance of facilities as required by Federal and State code providing for safe operations *(2005 measure)*.
- Many local developers are choosing to bury power lines in new developments although there is no requirement to do so within Adams County. *(2005 Measure)*
- The City of Decatur has designated snow removal routes to ensure safe and clear travel throughout the area. Throughout the County, a tiered snow emergency warning/advisory system continues to be utilized.
- All teachers employed by Adams County School Systems have been trained through a bully prevention program designed to provide intervention before school violence incidents occur.
- Adams County High Schools employ Police Officers to be present during school hours to provide added security and awareness. Many schools also have live feed cameras that are monitored by the County Dispatch Center.

#### Property Protection

- Adams County communities are following the International Building Code, which includes requirements to minimize damages from natural disasters. *(2005 Measure)*
- The City of Decatur and the MRBC have purchased over 60 residential structures that were subject to repetitive flooding. *(2005 Measure)*
- The Town of Monroe has begun the process of increasing the size of the existing stormwater retention ponds which will alleviate numerous flooding issues in the area. *(2005 Measure)*
- The City of Berne completed over \$2.5M in stormwater infrastructure enhancements which will reduce flooding impacts on the north edge of Berne as well as throughout the community. *(2005 Measure)*

### Public Information

- The Adams County EMA is currently working to develop a partnership with local businesses utilizing dynamic message boards. This partnership will allow hazard or emergency information to be broadcast quickly to a large percentage of the population.
- Each spring, Adams County, along with IDHS, the Indiana State Police, and the NWS sponsor a Severe Weather Awareness Week. This annual public information campaign focuses on severe weather hazards and informational materials are distributed to the public. *(2005 Measure)*
- The Adams County EMA has had success through participating in local events such as the Adams County 4H Fair where hazard information has been supplied to the public. *(2005 Measure)*
- The Adams County Emergency Operations Center has been designated the County Primary Warning Point for civil disturbances and severe weather situations. This warning point monitors the Law Enforcement Network, the NOAA and NWS websites, and will warn the public when information is received to save lives and minimize risk to public and private property.
- Hazard related information is provided to owners of recreational vehicles utilizing the extended stay parking area at Fleetwood RV. In the event of hazardous weather, the Fleetwood RV maintenance area can be utilized as a shelter.
- Property owners within known flood hazard areas are encouraged to purchase flood insurance to protect their property and assets from potential damages. *(2005 Measure)*
- Adams County EMA maintains a direct link with IDHS during times of potential flooding and other significant weather events. The EMA also monitors the Emergency Management Weather Information Network, which is a web-based program that gives up-to-date and timely weather information that can be useful in preparing resources, briefing volunteers, and warning the public.
- Each spring, the City of Decatur and Adams County join the MRBC in proclaiming a Flood Safety Awareness Week including airing of various Public Service Announcements (PSAs) as part of a coordinated education/outreach effort to promote flood safety awareness.

### Structural Control

- The Red Gold facility on the south edge of Geneva has constructed a small berm to protect structures on their property from the impacts of flooding.

#### **4.2.2 Proposed Mitigation Practices**

After reviewing existing mitigation practices, the Adams County Planning Committee reviewed the list of mitigation ideas for each of the hazards studied as

part of this planning effort and identified which of these they felt best met their needs as a community according to selected social, technical, administrative, political, and legal criteria. The following identifies the key considerations for each evaluation criteria:

- **Social** – the proposed mitigation projects will have community acceptance, they are compatible with present and future community values, and do not adversely affect one segment of the population.
- **Technical** – the proposed mitigation project will be technically feasible, reduce losses in the long-term, and will not create more problems than they solve.
- **Administrative** – the proposed mitigation projects may require additional staff time, alternative sources of funding, and have some maintenance requirements.
- **Political** – the proposed mitigation projects will have political and public support.
- **Legal** – the proposed mitigation projects will be implemented through the laws, ordinances, and resolutions that are in place.
- **Economic** – the proposed mitigation projects can be funded in current or upcoming budget cycles.
- **Environmental** – the proposed mitigation projects may have negative consequences on environmental assets such as wetlands, threatened or endangered species, or other protected natural resources.

**Table 4-1** lists a summary of all proposed mitigation practices identified for all hazards, as well as information on the local status, local priority, benefit-cost ratio, project location, responsible entity, and potential funding source, associated with each proposed practice. The proposed mitigation practices are listed in order of importance to Adams County for implementation. Projects identified by the Planning Committee to be of “high” local priority may be implemented within 5 years from final Plan adoption. Projects identified to be of “moderate” local priority may be implemented within 5-10 years from final Plan adoption, and projects identified by the Planning Committee to be of “low” local priority may be implemented within 10+ years from final Plan adoptions. However, depending on availability of funding, some proposed mitigation projects may take longer to implement.

The benefit derived from each mitigation practice along with the estimated cost of that practice was utilized to identify the mitigation practices having a high, moderate, or low benefit cost ratio. Preparing detailed benefit cost ratios was beyond the scope of this planning effort and the intent of the MHMP.

The update of this MHMP is a necessary step of a multi-step process to implement programs, policies, and projects to mitigate the effect of hazards in Adams County. The intent of this planning effort was to identify the hazards and the extent to which they affect Adams County and to determine what type of mitigation strategies or practices may be undertaken to mitigate for these hazards. A FEMA-approved MHMP is required in order to apply for and/or

receive project grants under the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), and Severe Repetitive Loss (SRL). FEMA may require a MHMP under the Repetitive Flood Claims (RFC) program. Although this MHMP meets the requirements of DMA 2000 and eligibility requirements of these grant programs additional detailed studies may need to be completed prior to applying for these grants. **Section 5.0** of this plan includes an implementation plan for all high priority mitigation practices identified by the Planning Committee.



The CRS program credits NFIP communities a maximum of 72 points for setting goals to reduce the impact of flooding and other known natural hazards; identifying mitigation projects that include activities for prevention, property protection, natural resource protection, emergency services, structural control projects, and public information.



Table 4-1 Proposed Mitigation Practices

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
<p><b>Emergency Response &amp; Recovery</b></p> <ol style="list-style-type: none"> <li>1. Add integrated and real-time mobile data terminals to all emergency response vehicles</li> <li>2. Establish procedures to evacuate the population in known hazard areas</li> <li>3. Develop and implement an immunization program for all emergency responders, inspection staff, and families</li> <li>4. Maintain a database of accurate and community specific information following each hazard event including extent, magnitude, cost, and response and recovery efforts</li> <li>5. Establish post hazard assessment protocols and reciprocal agreements for building inspectors to inspect structures in neighboring municipalities</li> <li>6. Investigate most efficient and protected method for electronic back up of County and municipal records</li> <li>7. Establish standard procedure for issuing a burning ban during dry periods</li> <li>8. Purchase a mobile sand bagging machine and generator</li> <li>9. Complete annual chemical, biological, radiological informational exercise with the 53<sup>rd</sup> Civil Support Team in Indianapolis to update resources available and needs of Adams County</li> </ol>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Emergency Services</li> <li><input checked="" type="checkbox"/> Nat. Res. Protection</li> <li><input checked="" type="checkbox"/> Prevention</li> <li><input checked="" type="checkbox"/> Property Protection</li> <li><input checked="" type="checkbox"/> Public Information</li> <li><input type="checkbox"/> Structural Control</li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Drought</li> <li><input checked="" type="checkbox"/> Earthquake</li> <li><input checked="" type="checkbox"/> Flood</li> <li><input checked="" type="checkbox"/> Hail/Thunder/Wind</li> <li><input checked="" type="checkbox"/> Tornado</li> <li><input checked="" type="checkbox"/> Winter Storm (Ice)</li> <li><input checked="" type="checkbox"/> Chemical Biological, Radiological</li> <li><input checked="" type="checkbox"/> HazMat Incident</li> <li><input checked="" type="checkbox"/> School/Workplace Violence</li> </ul>	<p><b>Ongoing –</b></p> <ol style="list-style-type: none"> <li>1. Mobile terminals in response vehicles with limited capabilities (<i>Berne, Geneva</i>)</li> <li>2. A general emergency plan has been developed for Adams County but not inclusive of evacuation procedures</li> <li>4. Some database entries following incidents</li> <li>5. Fire Departments have sample Mutual Aid agreements</li> <li>6. Adams County has begun back up of records</li> <li>7. Burn bans have been issued but no standard protocol developed (<i>County</i>)</li> </ol> <p><b>Proposed Enhancement –</b></p> <ol style="list-style-type: none"> <li>1. Expand functionality of existing and add terminals in response vehicles (<i>County, Decatur</i>)</li> <li>2. Establish evacuation routes for known hazard areas and educate residents within those areas (<i>floodplains and hazmat facilities</i>)</li> <li>3. Begin immunization program (<i>Countywide</i>)</li> <li>4. Better maintain hazard incident database following each incident (<i>Countywide</i>)</li> <li>5. Work with the Indiana Building Commission and local building inspectors to develop procedures (<i>Countywide and between municipalities</i>)</li> <li>6. Municipalities begin electronic back up of records (<i>All municipalities</i>)</li> <li>7. Develop protocol and enforcement policies for burn bans (<i>Countywide</i>)</li> <li>8. Purchase mobile sand bagging machine and generator</li> <li>9. Annual exercise with Civil Support Team (<i>County and all municipalities</i>)</li> </ol>	<p>High</p>	<p>High</p>	<p>Planning Departments (<i>All</i>)</p> <p>Floodplain Administrators (<i>All</i>)</p> <p>EMA</p> <p>Information Technology (<i>All</i>)</p> <p>Law Enforcement (<i>All</i>)</p> <p>Fire Departments (<i>All</i>)</p> <p>53<sup>rd</sup> Civil Support Team</p> <p>Health Department</p> <p>MRBC</p>	<p>Existing budget</p> <p>Grant</p> <p>Municipal Bond</p>
<p><b>Hazardous Materials Transportation</b></p> <ol style="list-style-type: none"> <li>1. Evaluate types and impact of typical chemicals and quantities of chemicals being transported throughout Adams County</li> </ol>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Emergency Services</li> <li><input type="checkbox"/> Nat. Res. Protection</li> <li><input checked="" type="checkbox"/> Prevention</li> <li><input type="checkbox"/> Property Protection</li> <li><input checked="" type="checkbox"/> Public Information</li> <li><input type="checkbox"/> Structural Control</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Drought</li> <li><input type="checkbox"/> Earthquake</li> <li><input type="checkbox"/> Flood</li> <li><input type="checkbox"/> Hail/Thunder/Wind</li> <li><input type="checkbox"/> Tornado</li> <li><input type="checkbox"/> Winter Storm (Ice)</li> <li><input type="checkbox"/> Chemical Biological, Radiological</li> <li><input checked="" type="checkbox"/> HazMat Incident</li> <li><input type="checkbox"/> School/Workplace Violence</li> </ul>	<p><b>Ongoing –</b></p> <ol style="list-style-type: none"> <li>1. Transportation survey completed by LEPC</li> </ol> <p><b>Proposed Enhancement –</b></p> <ol style="list-style-type: none"> <li>1. Survey chemicals, quantities, and transportation routes (<i>County and all municipalities</i>)</li> </ol>	<p>High</p>	<p>High</p>	<p>LEPC</p> <p>EMA</p>	<p>Existing budget</p> <p>Grant</p>



MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
<p><b>Land Use Planning &amp; Zoning</b>                      1. Incorporate hazard information into the Comprehensive Land Use Plan and Zoning Ordinance to better guide future growth and development <i>(2005 Measure)</i></p>	<input checked="" type="checkbox"/> Emergency Services <input checked="" type="checkbox"/> Nat. Res. Protection <input checked="" type="checkbox"/> Prevention <input checked="" type="checkbox"/> Property Protection <input checked="" type="checkbox"/> Public Information <input checked="" type="checkbox"/> Structural Control	<input checked="" type="checkbox"/> Drought <input checked="" type="checkbox"/> Earthquake <input checked="" type="checkbox"/> Flood <input type="checkbox"/> Hail/Thunder/Wind <input checked="" type="checkbox"/> Tornado <input checked="" type="checkbox"/> Winter Storm (Ice) <input type="checkbox"/> Chemical Biological, Radiological <input checked="" type="checkbox"/> HazMat Incident <input type="checkbox"/> School/Workplace Violence	<p><b>Ongoing –</b>                      1. Decatur updated the Comprehensive Land Use Plan in 2010 and included information related to flood hazard areas</p> <p><b>Proposed Enhancement –</b>                      1. Update other Comprehensive Land Use Plans and include hazard related information <i>(Adams County and Berne)</i></p>	High	High	Planning Department <i>(Adams County, City of Berne)</i>  EMA	Existing budget
<p><b>Water Conservation Ordinance</b>                      1. Establish and adopt local water conservation ordinances and contingency plans to impose during water shortages or other water related emergencies</p>	<input checked="" type="checkbox"/> Emergency Services <input checked="" type="checkbox"/> Nat. Res. Protection <input checked="" type="checkbox"/> Prevention <input checked="" type="checkbox"/> Property Protection <input checked="" type="checkbox"/> Public Information <input type="checkbox"/> Structural Control	<input checked="" type="checkbox"/> Drought <input checked="" type="checkbox"/> Earthquake <input type="checkbox"/> Flood <input type="checkbox"/> Hail/Thunder/Wind <input checked="" type="checkbox"/> Tornado <input checked="" type="checkbox"/> Winter Storm (Ice) <input checked="" type="checkbox"/> Chemical Biological, Radiological <input checked="" type="checkbox"/> HazMat Incident <input type="checkbox"/> School/Workplace Violence	<p><b>Ongoing –</b>                      1. State of Indiana has a Statewide Water Conservation Plan</p> <p><b>Proposed Enhancement –</b>                      1. Develop ordinances and contingency plans <i>(County and all municipalities)</i></p>	High	High	EMA  Planning Departments <i>(All)</i>  Drinking Water Suppliers <i>(All)</i>	Existing budget
<p><b>Building Protection</b>                      1. Protect existing critical facilities in floodplains <i>(2005 Measure)</i>                      2. Prohibit development of new critical facilities in 100 and 500-year floodplains <i>(2005 Measure)</i></p>	<input type="checkbox"/> Emergency Services <input checked="" type="checkbox"/> Nat. Res. Protection <input checked="" type="checkbox"/> Prevention <input checked="" type="checkbox"/> Property Protection <input checked="" type="checkbox"/> Public Information <input checked="" type="checkbox"/> Structural Control	<input type="checkbox"/> Drought <input type="checkbox"/> Earthquake <input checked="" type="checkbox"/> Flood <input type="checkbox"/> Hail/Thunder/Wind <input type="checkbox"/> Tornado <input type="checkbox"/> Winter Storm (Ice) <input type="checkbox"/> Chemical Biological, Radiological <input type="checkbox"/> HazMat Incident <input type="checkbox"/> School/Workplace Violence	<p><b>Ongoing –</b>                      1. Residential properties have been purchased and removed <i>(Decatur)</i></p> <p><b>Proposed Enhancement –</b>                      1. Prioritize critical facilities located in floodplains or other known hazard areas and work with facility owners to relocate, buyout, or floodproof these structures <i>(County and all municipalities)</i>                      2. Develop ordinances to prohibit development of new critical facilities <i>(County and all municipalities)</i></p>	High	Moderate	Building owners  EMA  Floodplain Administrators <i>(All)</i>  Planning Departments <i>(All)</i>	Grant  Existing budget  Municipal Bond

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
<p><b>Community Ratings System</b>                      1. Reduce flood insurance premiums through participation in CRS program (2005 Measure)                       (Will assist with NFIP compliance)</p>	<p><input type="checkbox"/> Emergency Services  <input checked="" type="checkbox"/> Nat. Res. Protection  <input checked="" type="checkbox"/> Prevention  <input checked="" type="checkbox"/> Property Protection  <input checked="" type="checkbox"/> Public Information  <input type="checkbox"/> Structural Control</p>	<p><input type="checkbox"/> Drought  <input type="checkbox"/> Earthquake  <input checked="" type="checkbox"/> Flood  <input type="checkbox"/> Hail/Thunder/Wind  <input type="checkbox"/> Tornado  <input type="checkbox"/> Winter Storm (Ice)  <input type="checkbox"/> Chemical Biological, Radiological  <input type="checkbox"/> HazMat Incident  <input type="checkbox"/> School/Workplace Violence</p>	<p><b>Ongoing –</b>                      1. City of Decatur participates at a Class 8</p> <p><b>Proposed Enhancement –</b>                      1. Prepare enhancements for the City of Decatur to advance when BCEGS issue has been resolved. Other communities’ participation may not be practical due to the few repetitive loss properties and limited reported flood losses</p>	<p>High</p>	<p>Moderate</p>	<p>Planning Department (City of Decatur)                       Floodplain Administrator (City of Decatur)</p>	<p>Existing budget                       Grant</p>
<p><b>Floodplain Management</b>                      1. Conduct detailed flood protection studies for focused flooding problem areas and/or areas with repetitive flooding problems (2005 Measure)                      2. Evaluate and implement recommendation of MRBC flood protection studies; update studies as needed                      3. Develop floodplain overlay district to further protect area from development while allowing passive uses (2005 Measure)                      4. Complete flood depth mapping on St Marys and Wabash Rivers to better understand the flood potential risk                       (will assist with NFIP compliance)</p>	<p><input type="checkbox"/> Emergency Services  <input checked="" type="checkbox"/> Nat. Res. Protection  <input checked="" type="checkbox"/> Prevention  <input checked="" type="checkbox"/> Property Protection  <input checked="" type="checkbox"/> Public Information  <input type="checkbox"/> Structural Control</p>	<p><input type="checkbox"/> Drought  <input type="checkbox"/> Earthquake  <input checked="" type="checkbox"/> Flood  <input type="checkbox"/> Hail/Thunder/Wind  <input type="checkbox"/> Tornado  <input type="checkbox"/> Winter Storm (Ice)  <input type="checkbox"/> Chemical Biological, Radiological  <input type="checkbox"/> HazMat Incident  <input type="checkbox"/> School/Workplace Violence</p>	<p><b>Ongoing –</b>                      1. FIRMs adopted in 2010                      2. MRBC in the process of updating the Floodplain Management Master Plan</p> <p><b>Proposed Enhancement –</b>                      1. Additional measures have been taken in the Town of Monroe and the City of Berne which may warrant additional localized studies address additional unstudied streams                      3. Adopt floodplain overlay district (Decatur)                      4. Complete flood depth mapping (County, Decatur, Geneva)</p>	<p>High (detailed flood protection studies; implement completed studies; overlay district)                       Moderate (depth mapping)</p>	<p>High</p>	<p>Surveyor’s Office                       Floodplain Administrators (All)                       Planning Departments (All)                       MRBC</p>	<p>Existing Budget</p>
<p><b>Public Education &amp; Outreach</b>                      1. Provide hazardous preparedness literature (warning sirens, radio stations, go-kits, insurance protection, etc.) at public facilities (2005 Measure)                       (will assist with NFIP compliance)                       2. Provide education on the proper grounding of lightning rods</p>	<p><input checked="" type="checkbox"/> Emergency Services  <input checked="" type="checkbox"/> Nat. Res. Protection  <input checked="" type="checkbox"/> Prevention  <input checked="" type="checkbox"/> Property Protection  <input checked="" type="checkbox"/> Public Information  <input checked="" type="checkbox"/> Structural Control</p>	<p><input checked="" type="checkbox"/> Drought  <input checked="" type="checkbox"/> Earthquake  <input checked="" type="checkbox"/> Flood  <input checked="" type="checkbox"/> Hail/Thunder/Wind  <input checked="" type="checkbox"/> Tornado  <input checked="" type="checkbox"/> Winter Storm (Ice)  <input checked="" type="checkbox"/> Chemical Biological, Radiological  <input checked="" type="checkbox"/> HazMat Incident  <input checked="" type="checkbox"/> School/Workplace Violence</p>	<p><b>Ongoing –</b>                      1. Hazard literature is provided through community events, and through media outlets</p> <p><b>Proposed Enhancement –</b>                      1. Outreach campaigns to schools, Safety Town, placement of materials in offices and libraries (Countywide)                      2. Develop information regarding lightning rods (Countywide)</p>	<p>High (preparedness literature)                       Moderate (lightning rods)</p>	<p>High</p>	<p>EMA                       Red Cross                       Planning Departments (All)</p>	<p>Existing budget                       Grant                       IDNR</p>

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
<p><b>Power Back-Up Generators</b></p> <ol style="list-style-type: none"> <li>1. Retrofit critical facilities with appropriate wiring and electrical capabilities or transfer switches for utilizing a large generator for power back-up</li> <li>2. Require power back-up generators in all critical facilities (existing and new) <i>(2005 Measure)</i></li> <li>3. Investigate the potential to utilize wind or solar generators</li> </ol>	<input checked="" type="checkbox"/> Emergency Services <input type="checkbox"/> Nat. Res. Protection <input checked="" type="checkbox"/> Prevention <input checked="" type="checkbox"/> Property Protection <input checked="" type="checkbox"/> Public Information <input type="checkbox"/> Structural Control	<input checked="" type="checkbox"/> Drought <input checked="" type="checkbox"/> Earthquake <input checked="" type="checkbox"/> Flood <input checked="" type="checkbox"/> Hail/Thunder/Wind <input checked="" type="checkbox"/> Tornado <input checked="" type="checkbox"/> Winter Storm (Ice) <input checked="" type="checkbox"/> Chemical Biological, Radiological <input checked="" type="checkbox"/> HazMat Incident <input checked="" type="checkbox"/> School/Workplace Violence	<p><b>Ongoing –</b></p> <ol style="list-style-type: none"> <li>1. Belmont HS is only critical facility or Red Cross Shelter with a generator. Adams Central School is currently installing a transfer switch. County Annex has a generator but not wired for entire building.</li> </ol> <p><b>Proposed Enhancement –</b></p> <ol style="list-style-type: none"> <li>1. Retrofit additional critical facilities with generator capabilities <i>(Countywide)</i></li> <li>2. Develop ordinance language requiring generator capabilities <i>(Countywide)</i></li> <li>3. Determine feasibility of alternate power generators <i>(Countywide)</i></li> </ol>	<p>High <i>(retrofit)</i></p> <p>Moderate <i>(require generators)</i></p> <p>Low <i>(solar/wind power)</i></p>	<p>High</p>	<p>EMA</p> <p>Building owners</p>	<p>Existing budget</p> <p>Grant</p> <p>Safe Schools Funding</p> <p>Municipal Bond</p>
<p><b>Emergency Preparedness and Warning Systems</b></p> <ol style="list-style-type: none"> <li>1. Improve local disaster preparedness and emergency response through CERT</li> <li>2. Become certified by the NWS as a StormReady Community</li> <li>3. Encourage the development of a long-term in-place sheltering plan and exercise drill</li> <li>4. Evaluate and utilize flood forecasting capabilities including stream gages, flood forecast maps, and flood alerts along the Wabash River</li> <li>5. Prepare a detailed Flood Response Plan to improve response and reduce losses from a flood event</li> <li>6. Improve outdoor warning siren coverage to alert population of severe weather conditions</li> <li>7. Utilize a hazard broadcast system to distribute mass telephone or electronic announcements to every phone number or email in the system</li> <li>8. Create bilingual notifications and hazard preparedness materials</li> <li>9. Purchase public announcement system for the fairgrounds</li> <li>10. Install metal detectors at County Courthouse and other potentially vulnerable and public critical facilities</li> <li>11. Install additional cameras or police officers at elementary and private schools</li> <li>12. Secure funding and hire an additional dispatcher to monitor school video and radio feeds</li> </ol>	<input checked="" type="checkbox"/> Emergency Services <input checked="" type="checkbox"/> Nat. Res. Protection <input checked="" type="checkbox"/> Prevention <input type="checkbox"/> Property Protection <input checked="" type="checkbox"/> Public Information <input type="checkbox"/> Structural Control	<input checked="" type="checkbox"/> Drought <input checked="" type="checkbox"/> Earthquake <input checked="" type="checkbox"/> Flood <input checked="" type="checkbox"/> Hail/Thunder/Wind <input checked="" type="checkbox"/> Tornado <input checked="" type="checkbox"/> Winter Storm (Ice) <input checked="" type="checkbox"/> Chemical Biological, Radiological <input checked="" type="checkbox"/> HazMat Incident <input checked="" type="checkbox"/> School/Workplace Violence	<p><b>Ongoing –</b></p> <ol style="list-style-type: none"> <li>1. 15 trained CERT members trained</li> <li>4. 3 stream gages provide advanced flood warning</li> <li>5. EMA has an EOC call out plan including flood information</li> <li>6. 13 outdoor warning sirens in place</li> </ol> <p><b>Proposed Enhancement –</b></p> <ol style="list-style-type: none"> <li>1. Purchase additional materials for CERT members response kits</li> <li>2. Become StormReady Certified <i>(County)</i></li> <li>3. Develop and conduct an in-place sheltering drill and training exercise for EMA to assist critical facilities or large private employers <i>(Countywide)</i></li> <li>4. Evaluate flood forecasting capabilities <i>(Countywide)</i></li> <li>5. Prepare flood specific action plan <i>(County, Decatur, Geneva)</i></li> <li>6. Install additional outdoor warning sirens <i>(County, Linn Grove, Pleasant Mills, Preble)</i></li> <li>7. Determine most appropriate mass notification system <i>(Countywide)</i></li> <li>8. Create bilingual notifications and materials <i>(Countywide)</i></li> <li>9. Public announcement system purchased or developed <i>(Fairgrounds and locations of other large gatherings)</i></li> <li>10. Metal detectors installed <i>(County Court House)</i></li> <li>11. Install cameras and security <i>(Countywide)</i></li> <li>12. Additional dispatcher <i>(County)</i></li> </ol>	<p>High <i>(CERT enhancements, StormReady Certification, sheltering drill, flood forecasting, flood response plan; warning sirens)</i></p> <p>Moderate <i>(mass broadcast system)</i></p> <p>Low <i>(bilingual materials, announcement system; metal detectors; police at schools; additional dispatcher)</i></p>	<p>High</p>	<p>EMA</p> <p>Red Cross</p> <p>Planning Departments <i>(All)</i></p> <p>53<sup>rd</sup> Civil Support Team</p> <p>MRBC</p>	<p>Existing budget</p> <p>Grant</p> <p>Municipal Bond</p>

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
<p><b>Safe Rooms &amp; Community Shelters</b></p> <p>1. Clearly advertise location of safe rooms and community shelters during large gatherings of people</p> <p>2. Provide incentives for buildings with approved safe rooms</p>	<p><input checked="" type="checkbox"/> Emergency Services</p> <p><input type="checkbox"/> Nat. Res. Protection</p> <p><input checked="" type="checkbox"/> Prevention</p> <p><input type="checkbox"/> Property Protection</p> <p><input checked="" type="checkbox"/> Public Information</p> <p><input type="checkbox"/> Structural Control</p>	<p><input type="checkbox"/> Drought</p> <p><input checked="" type="checkbox"/> Earthquake</p> <p><input checked="" type="checkbox"/> Flood</p> <p><input checked="" type="checkbox"/> Hail/Thunder/Wind</p> <p><input checked="" type="checkbox"/> Tornado</p> <p><input checked="" type="checkbox"/> Winter Storm (Ice)</p> <p><input checked="" type="checkbox"/> Chemical Biological, Radiological</p> <p><input checked="" type="checkbox"/> HazMat Incident</p> <p><input type="checkbox"/> School/Workplace Violence</p>	<p><b>Ongoing –</b></p> <p>1.</p> <p><b>Proposed Enhancement</b></p> <p>1. Provide public announcements or print materials indicating where people should go in case of inclement weather during large gatherings (<i>Countywide</i>)</p> <p>2. Research potential incentives for buildings with approved safe rooms (<i>Countywide</i>)</p>	<p>High <i>(advertise locations)</i></p> <p>Low <i>(incentives for safe rooms)</i></p>	<p>High</p>	<p>Red Cross</p> <p>EMA</p> <p>Planning Departments <i>(All)</i></p>	<p>Existing budgets</p> <p>Grant</p>
<p><b>Geographic Information Systems</b></p> <p>1. Train GIS staff in HAZUS-MH to quantitatively estimate losses in “what if scenarios” and continue to use the most recent GIS data in land use planning efforts (<i>2005 Measure</i>)</p>	<p><input checked="" type="checkbox"/> Emergency Services</p> <p><input checked="" type="checkbox"/> Nat. Res. Protection</p> <p><input checked="" type="checkbox"/> Prevention</p> <p><input checked="" type="checkbox"/> Property Protection</p> <p><input checked="" type="checkbox"/> Public Information</p> <p><input checked="" type="checkbox"/> Structural Control</p>	<p><input checked="" type="checkbox"/> Drought</p> <p><input checked="" type="checkbox"/> Earthquake</p> <p><input checked="" type="checkbox"/> Flood</p> <p><input checked="" type="checkbox"/> Hail/Thunder/Wind</p> <p><input checked="" type="checkbox"/> Tornado</p> <p><input checked="" type="checkbox"/> Winter Storm (Ice)</p> <p><input checked="" type="checkbox"/> Chemical Biological, Radiological</p> <p><input checked="" type="checkbox"/> HazMat Incident</p> <p><input checked="" type="checkbox"/> School/Workplace Violence</p>	<p><b>Ongoing -</b></p> <p>1. GIS layers have been updated to include parcel information, local soils info, critical facility information (<i>Countywide</i>)</p> <p><b>Proposed Enhancement -</b></p> <p>1. Increase staff training to better understand HAZUS-MH and the ability to run various scenarios (<i>Countywide</i>)</p>	<p>Moderate</p>	<p>Moderate</p>	<p>GIS Departments <i>(All)</i></p> <p>Planning Departments <i>(All)</i></p>	<p>Existing budget</p> <p>Grant</p>

## CHAPTER 5

# IMPLEMENTATION PLAN

The following is a proposed plan for implementing all high priority mitigation practices identified in this Plan. It should be noted that implementation of each of these proposed practices may involve several preparatory or intermediary steps. However, to maintain clarity, not all preparatory or intermediary steps are included.

### 5.1 EMERGENCY RESPONSE & RECOVERY

Add integrated real-time mobile data terminals to all emergency response vehicles.

- Work with emergency response agencies within each community to inventory vehicles with and without mobile data terminals and identify specific needs.
- Secure grant funding (via supplier grant writer), municipal bond or funds from existing budgets to purchase needed terminals.
- Install terminals.

Establish procedures to evacuate the population in known hazard areas.

- Identify known hazard areas (floodplains, hazardous materials facility buffers) based on MHMP.
- Identify the potential number of people and shelters needed for each evacuation scenario.
- Identify the primary and secondary routes for evacuation
- Establish event detection, notification and communication, expected actions, and event termination and follow up protocols

Develop and implement an immunization program for all emergency responders, inspection staff, and families.

- Develop a County-wide immunization program for all emergency responders, inspection staff, and families.
- Require proof of immunization (Tetanus, Hepatitis, etc.) for all first responders, building inspectors, etc. similar to Health Departments and hospital staff.
- Provide immunizations for families of emergency response and inspection staff.

Maintain a database of accurate and community specific information following each hazard event including extent, magnitude, cost, and response and recovery efforts.

- Develop a community specific database for hazard related information.
- Include information such as those listed above to accurately describe and assess each hazard event.

- Collect information as the EOC operates throughout the duration of the hazard, or request the information from affected communities post-hazard event.
- Compile information each year and include in the Annual Update for the MHMP.

Establish post hazard assessment protocols and reciprocal agreements for building inspectors to inspect structures in neighboring municipalities.

- Review the Flood Damage Assessment protocol in the MRBC Flood Mitigation Master Plan
- Evaluate related legal and liability issues
- Work with Indiana Building Commission to draft language
- Adopt protocol and reciprocal agreement

Investigate most efficient and effective and protected method for electronic backup of County and municipal records.

- Determine which departments and municipalities have a current electronic backup of records.
- Determine the needs of additional departments and municipalities (size of data, length of storage required, etc.).
- Collaborate with County IT Department to determine most effective method for backup.

Establish a standard procedure for issuing a burning ban during dry weather.

- Review past burning bans enacted within the County.
- Determine necessary conditions for such bans to be issued and which departments or personnel may request a ban to be issued.
- Develop ordinance language to reflect the burning ban procedure.
- Adopt local ordinances related to issuance of a burning ban.

Purchase mobile sand bagging machine and generator.

- Investigate sand bagging machines and generator requirements for operation.
- Evaluate options and determine which machine and generator best suit the needs of Adams County.
- Secure funding or include purchase of equipment within the operating budget.
- Purchase equipment.

Complete annual chemical, biological, and radiological informational exercise with the 53<sup>rd</sup> Civil Support Team in Indianapolis to update resources available and needs of Adams County.

- Coordinate with local response agencies and offices to conduct an informational update with the Civil Support Team.
- Determine local response enhancements, additional areas of risk, and any threats or events that have occurred since the last update/exercise.

- Determine areas of need for information or assistance from the Civil Support Team.

## 5.2 HAZARDOUS MATERIALS TRANSPORTATION

Evaluate types and impact of typical chemicals and quantities of chemicals being transported through Adams County.

- Survey the chemicals and quantities of chemicals that are transported through Adams County.
- Determine estimated response times for properly trained personnel to reach intersections or risk areas along primary routes.
- Determine equipment needs to initially evacuate and isolate spill of most common chemicals.
- Train additional staff or obtain additional equipment as necessary.

## 5.3 LAND USE PLANNING & ZONING

Incorporate hazard information into the Comprehensive Land Use Plan and Zoning Ordinance to better guide future growth and development.

- Review list of hazards and determine which are applicable to individual communities.
- Draft language and prepare exhibits to incorporate into the Adams County and City of Berne Comprehensive Land Use Plan and Zoning Ordinance.
- Adopt amendments locally.

## 5.4 WATER CONSERVATION ORDINANCE

Establish and adopt local water conservation ordinances and contingency plans to impose during water shortages or other water related emergencies.

- Evaluate existing ordinance language and contingency plans from other communities.
- Determine typical usage levels for communities and industries.
- Develop and adopt ordinance language detailing the conditions and procedures for requesting limited water usage.
- Provide information to residents describing the need for and the information within the ordinance and contingency plan.

## 5.5 BUILDING PROTECTION

Protect existing critical facilities in floodplains.

- Evaluate flood risk associated with the CFO, Erie Haven, Woodcrest/Evergreen, Decatur Sewage Treatment Plant, Decatur Lift Station, and the Decatur Water Treatment Plant facilities located within the floodway and/or the regulatory floodplain of the St. Marys River.
- Research and identify the most appropriate flood protection method
- Estimate costs and potential funding sources.



- Secure grant funding, municipal bond or funds from existing budgets efforts.

Prohibit development of new critical facilities within the 100-year and 500-year floodplains.

- Review examples of ordinance language from other communities.
- Develop ordinance language specific to Adams County and/or communities within.
- Provide support for the adoption of such ordinance language.

## 5.6 COMMUNITY RATINGS SYSTEM

Reduce flood insurance premiums through participation in the Community Rating System (CRS) program.

- Review application requirements and gather supporting documentation
- Complete application and calculate total credits
- Consult with ISO representative to review application prior to submission to local entities and NFIP.
- Submit application for entrance into or advancement within the CRS program.
- Maintain and record information as necessary for annual re-certification.

## 5.7 FLOODPLAIN MANAGEMENT

Conduct detailed flood protection studies for focused flooding problem areas and/or areas with repetitive flooding problems.

- Prioritize unstudied streams and areas of localized flooding.
- Reassess the area north of the City of Berne due to recent stormwater and drainage improvements.
- Secure funding, municipal bond, or funds from existing budgets to complete floodplain studies.
- Establish a report template for contractors to ensure consistency from reach to reach and data is in accordance to FEMA guidelines

Evaluate and implement recommendations of completed flood protection studies, and update those studies as needed.

- Evaluate prioritized recommendations outlined in the MRB Flood Mitigation Master Plan.
- Secure grant funds or provide for local funding to complete high priority recommendations for Adams County.

Develop floodplain overlay district to further protect area from development while allowing passive uses.

- Develop locally specific language regarding an overlay district as mentioned within the City of Decatur Comprehensive Land Use Plan.
- Adopt floodplain overlay district requirements.



## 5.8 PUBLIC EDUCATION & OUTREACH

Provide hazard preparedness literature (warning sirens, radio stations, go-kits, insurance protection, etc.) at public facilities and events.

- a. Distribute literature at large public events throughout Adams County.
- b. Provide literature at all County and Municipal offices as appropriate.
- c. Evaluate additional public events or locations for dispersal or placement of literature.

## 5.9 POWER BACK-UP GENERATORS

Retrofit critical facilities with appropriate wiring and electrical capabilities or transfer switches for utilizing a large generator for power back-up.

- d. Prioritize facilities needed wiring or transfer switches.
- e. Determine needed equipment or retrofits for the prioritized facilities.
- f. Secure grant funding, municipal bond, or funds from existing budgets to complete needed retrofits.

## 5.10 EMERGENCY PREPAREDNESS & WARNING SYSTEMS

Improve local disaster preparedness and emergency response through the CERT program.

- Determine needs of existing CERT program (personnel, equipment, etc.)
- Secure grant funding or utilize existing budget to train additional CERT members or purchase additional equipment for CERT members.

Become certified by the NWS as a StormReady Community.

- Evaluate requirements of the StormReady program.
- Complete requirements of the StormReady program.
- Schedule an evaluation by an NWS representative.
- Advertise the success of entities becoming a StormReady Community

Encourage the development of a long-term in-place sheltering plan and exercise drill.

- Develop a training program on the need and basics of long-term in-place sheltering following a chemical, biological, or radiological event.
- Utilize the skills of the 53<sup>rd</sup> Civil Support Team
- Encourage large industries and public facilities to complete a plan and exercise drill for their facilities.

Evaluate and utilize flood forecasting capabilities including stream gages, flood forecast maps, and flood alerts along the Wabash River

- Confirm locations of existing USGS stream gages, the type of data collected, and if additional gages are needed

- Prioritize areas for additional stream gages, determine type (staff or electronic), or other methods (observation low-lying areas)
- Depending on the capabilities of the gage or data available, enable Advanced Hydrologic Prediction Service (AHPS) and/or text alerts via USGS Water Alert.

Prepare a Flood Response Plan to improve preparedness and response to reduce losses from a flood incident.

- Identify areas of concern such as areas that regularly flood.
- Identify stream gage locations and estimate downstream warning time
- Increase stream gage coverage if determined warning time is inadequate.
- Utilize flood forecasting capabilities including stream gages, flood forecasting maps, and flood alerts to determine potential inundation areas.
- Establish event detection, notification and communication, expected actions, and termination and follow up protocols.

Improve outdoor warning siren coverage to alert populations of severe weather conditions.

- Prioritize areas in need of coverage (Pleasant Mills, Linn Grove, Preble)
- Determine if existing sirens can be relocated to reduce duplicative coverage and provide coverage along perimeter of Decatur.
- Secure grant funding, municipal bond, or funds from existing budget to purchase and install additional outdoor warning sirens.

## 5.11 SAFE ROOMS & COMMUNITY SHELTERS

Clearly advertise the location of safe rooms or community shelters during large gatherings of people.

- Collaborate with local entities responsible for large outdoor gatherings (sporting events, 4H Fair, festivals, etc.)
- Determine location of nearest shelter area and personnel responsible for ensuring the shelter is available during outdoor event.
- Announce or advertise location of shelter during outdoor event.

## CHAPTER 6

## PLAN MAINTENANCE PROCESS

## 6.1 MONITORING, EVALUATING AND UPDATING THE PLAN

**REQUIREMENT §201.6(c)(4)(i):**

*[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

To effectively reduce social, physical, and economic losses in Adams County, it is important that implementation of this MHMP be monitored, evaluated, and updated. The Adams County EMA Director is ultimately responsible for the MHMP. As illustrated in Section 4.2 Mitigation Practices, this Plan contains mitigation program, projects, and policies from multiple departments within each NFIP community. Depending on grant opportunities and fiscal resources, mitigation practices may be implemented independently, by individual NFIP communities, or through local partnerships. Therefore the successful implementation of this MHMP will require the participation and cooperation of the entire Planning Committee to successfully monitor, evaluate, and update the Adams County MHMP.

The Adams County EMA Director will reconvene the MHMP Planning Committee on an annual basis and following a significant hazard incident to determine whether:

- the nature, magnitude, and/or type of risk have changed
- the current resources are appropriate for implementation
- there are implementation problems, such as technical, political, legal, or coordination issues with other agencies
- the outcomes have occurred as expected
- the agencies and other partners participated as originally proposed

During the annual meetings the Implementation Checklist provided in **Appendix 9** will be helpful to track any progress, successes, and problems experienced.

The data used to prepare this MHMP was based on “best available data” or data that was readily available during the development of this Plan. Because of this, there are limitations to the data. As more accurate data becomes available, updates should be made to the list of critical facilities, the risk assessment and vulnerability analysis.

DMA 2000 requires local jurisdictions to update and resubmit their MHMP within 5 years (from the date of FEMA approval) to continue to be eligible for mitigation project grant funding. In early 2015, the Adams County EMA Director will once again reconvene the MHMP Planning Committee for a series of meetings

designed to replicate the original planning process. Information gathered following individual hazard incidents and annual meetings will be utilized along with updated vulnerability assessments to assess the risks associated with each hazard common in Adams County. These hazards, and associated mitigation goals and practices will be prioritized and detailed as in Section 3.0 this MHMP. Sections 4.0 and 5.0 will be updated to reflect any practices implemented within the interim as well as any additional practices discussed by the Planning Committee during the update process.

Prior to submission of the updated MHMP, a public meeting will be held to present the information to residents of Adams County and to provide them an opportunity for review and comment of the draft MHMP. A media release will be issued providing information related to the update, the planning process, and details of the public meeting.

## 6.2 INCORPORATION INTO EXISTING PLANNING MECHANISMS

### **REQUIREMENT §201.6(c)(4)(ii):**

*[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as the comprehensive or capital improvements, when appropriate.*

Many of the mitigation practices identified as part of this planning process are ongoing with some enhancement needed. Where needed, modifications will be proposed to be made to each NFIP communities' planning documents and ordinances during the regularly scheduled update. Among other things, local planning documents and ordinances may include comprehensive plans, floodplain management plans, zoning ordinances, building codes, site development regulations, or permits. Modifications include discussions related to hazardous material facility buffers, floodplain areas, and prohibiting development of new critical facilities in known hazard areas. These modifications or updates should be completed for documents such as:

- *Adams County Comprehensive Emergency Management Plan (2006)*
- *Adams County Comprehensive Plan (1994)*
- *Berne Comprehensive Plan (1966)*
- *Maumee River Basin Commission Flood Mitigation Master Plan (2008)*

Based on added language within each of the Comprehensive Plan updates the appropriate Zoning Ordinances and Floodplain Management Ordinances within each community would also need to be amended.

### 6.3 CONTINUED PUBLIC INVOLVEMENT

**REQUIREMENT §201.6(c)(4)(iii):**

*[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.*

Continued public involvement is critical to the successful implementation of the Adams County MHMP. Comments gathered from the public on the MHMP will be received by the EMA Director and forwarded to the MHMP Planning Committee for discussion. Education efforts for hazard mitigation will be the focus of the annual Severe Weather Awareness Week as well as incorporated into existing stormwater planning, land use planning, and special projects/studies efforts. Once adopted, a copy of this Plan will be available for the public to review in the Adams County EMA Office and the Adams County website.

Updates or modifications to the Adams County MHMP will require a public notice and/or meeting prior to submitting revisions to the individual jurisdictions for approval.



The Community Rating System (CRS) program credits NFIP communities a maximum of 37 points for adopting the Plan; establishing a procedure for implementation, review, and updating the Plan; and submitting an annual evaluation report.