MULTI-HAZARD MITIGATION PLAN UPDATE

Fulton County, Indiana

Prepared for:

Fulton County, Indiana
City of Rochester, Indiana
Town of Akron, Indiana
Town of Fulton, Indiana
Town of Kewanna, Indiana

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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, **Figure 1-1** includes four phases:

Figure 1-1 Disaster Life Cycle

- **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 Fulton 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. Recent reviews of grant programs have determined for every $1 spent on mitigation efforts, between $6 and $10 are saved within the community on efforts following disasters. The MHMP planning process identifies hazards, the extent that they affect the municipality, and formulates mitigation practices to ultimately reduce the social, physical, and economic 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 occurrences.

A FEMA-approved MHMP is required to apply for and/or receive project grants under the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA). Although the Fulton 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 (US 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 five years. MHMP updates must demonstrate that progress has been made in the last five 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 Fulton County MHMP Update is a multi-jurisdictional planning effort led by the Fulton County Emergency Management Agency (EMA). This Plan was prepared in partnership with Fulton County, the city of Rochester, and the towns of Akron, Fulton and Kewanna, Indiana. Representatives from these communities attended the 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 Fulton 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 382 points toward participation in the CRS. At the time of this planning effort, none of the municipalities within Fulton County participate in the CRS program.

Funding to update the MHMP was made available through a FEMA/DHS PDM grant awarded to the Fulton County EMA and administered by IDHS. Fulton County provided the local 25% match required by the grant. Christopher B. Burke Engineering, LLC (CBBEL) was hired to facilitate the planning process and prepare the Fulton 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 Fulton County MHMP Update began in 2017 when the County EMA submitted a PDM Grant application to IDHS. The grant request was approved by FEMA and grant funds were awarded in 2018.

Once the grant was awarded, the planning process to update the 2011 MHMP took 20 months. This included a three-month planning process, followed by a review period by IDHS and FEMA for the draft MHMP Update, and another month for Fulton County and communities to adopt the final MHMP Update.

1.3.1 **Planning Committee and Project Team**

In January of 2018, the 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 2011. **Table 1-1** lists the individuals that participated on the Committee and the entity they represented.

Table 1-1 MHMP Update Committee

NAME	OFFICE	REPRESENTING
Shoda Bechler	Rochester Clerk-Treasurer	City of Rochester
Michael Boucher	Rochester Metal Products	
Tom Butler	Rochester Fire Department	City of Rochester
Casi Cowles	Fulton County Planning and Building Department	Fulton County
Skeeter Daugherty	Fulton County Schools	
Ted Denton	Rochester Mayor	City of Rochester
Justin Gearhart	Akron Town Marshal	Town of Akron
Aaron Gearhart	Akron Superintendent	Town of Akron
Bill	Resident	Town of Rochester
Richel Fox	Fulton County EMA	Fulton County
Deb Gardner	Fulton County Health Department	Fulton County
John Geier	Fulton County Highway	Fulton County
Caleb Ingram	Hickory Creek Nursing Home	
Larry Hoover	Fulton County EMA	Fulton County/Town of Kewanna
Gail Karas	Fulton County 911/LEPC	Fulton County
Beth Keller	American Red Cross	
Fred McGlothin Jr	Fulton County REMC	
Steve Metzger	County Commissioner	Fulton County
Randy Miller	Fulton County Animal Control	Fulton County
P Olinger	Fulton County Council	Fulton County
Bernard Rudd	INDOT	
Chris Sailors	Fulton County Sheriff	Fulton County/Town of Fulton
Joe Sears	Woodburn Hospital	
Shannon Shepherd	Fulton County Health Department	Fulton County
Kevin Schultz	ERS Wireless	
Shawna Sopher	Hickory Creek Nursing Home	
Jana Vance	Rochester Schools	
Pat Varger	Fulton County EMS	Fulton County
Dave Way	INDOT	
Brad Weaver	Indiana State Police	
Adam Wilson	AirVac / Resident	Town of Fulton

Members of the Committee participated in the MHMP Update as a Planning Committee member or through various other group meetings. During these meetings, the Committee:

- revisited existing (in the 2011 MHMP) and identified new critical infrastructure 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
- 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 Committee reviewed a draft MHMP, provided comments and suggestions, and assisted with adoption of the Fulton County MHMP Update.

1.3.2 Public Involvement

A draft of the Fulton County MHMP Update was posted online on the County's website for public review and comment. A Press Release indicating the posting of the draft MHMP and the ability to comment was submitted for publishing to *The Rochester Sentinel*. Committee members were provided with an informational flyer to display in their respective offices. The media release and informational flyer are located in **Appendix 3**.

1.3.3 Involvement of Other Interested Parties

Interested agencies (INDOT, Indiana State Police), businesses (Rochester Metals, Hickory Creek), academia (Rochester Schools), and nonprofits (American Red Cross) were invited to review and comment on the draft Fulton County MHMP Update (Appendix 3). Information related to the planning process and the availability of the draft Fulton 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 Fulton County MHMP Update will rely on the partnership and coordination of efforts between such groups.

1.4 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 Fulton 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 Fulton County MHMP, and to assist the Committee in developing potential mitigation measures to reduce the social, physical, and economic losses associated with hazards affecting Fulton County.

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

- Fulton County Area Plan, 2008
- Fulton County Zoning Ordinances
- Fulton County Unsafe Building Ordinances

Planning and building ordinances and comprehensive planning efforts have been combined into one set covering all incorporated communities along with the unincorporated areas of Fulton County. This is managed in this fashion to provide a consistent and less confusing approach to development.

In addition to local agencies and offices such as those listed above, several regional and state agencies were contacted and subsequently provided data for this planning effort. Those contacts, and the information they provided, include:

- Indiana Department of Natural Resources, Division of Water – *Flood insurance policies, claims, and payment information*
- Indiana Department of Natural Resources, Division of Water – *Dam records*
- FEMA, Region V – *Repetitive loss structure counts and payments*

The CRS program credits NFIP communities a maximum of 155 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 Fulton County necessary to better understand the Risk Assessment discussed in **Chapter 3**.

Fulton County, established in 1836, is named to honor the inventor of the steamboat, Robert Fulton. The total area of Fulton County is approximately 371 square miles. The location of Fulton County within the State of Indiana is identified in **Figure 2-1**.

2.1 POPULATION AND DEMOGRAPHICS

Figure 2-1 Fulton County Location

The most recent data for Fulton County estimates that the 2018 population was 20,092 which ranks 73rd in the state. Of that total, the City of Rochester accounts for 6,000 or 30.0% of the county's population while the Town of Akron is the second largest community with 1,110 or 5.5% of the population.

In 2018, the median age of the population in the county was 41.4 years of age. The largest demographic age groups in the county are older adults (45-64 years) with a population of 5,308, and young adults (25 to 44) with a population of 4,600. School age residents (5 to 17) are the third largest age group with a population of 3,462 individuals living in Fulton County. The approximate median household income in 2017 was reported to be $51,088 while the poverty rate in the same year was reported at 12.2% county-wide. In total, 18.0% of households are married with children, and 33.8% of households are married without children.

Nearly 86% of the adults, older than 25, within the county have reportedly completed a High School education. Further, 12.8% of those same adults have also completed a Bachelor of Arts or higher degree.

2.2 EMPLOYMENT

US Census data indicates that of the Fulton County work force, 25.0% are employed in "Other" employment type positions. Manufacturing positions and Government account for 17.9% and 15.2% respectively. The total resident labor force according to estimates in 2018 is 9,958 with 338 unemployed and an unemployment rate of 2.7% or 1st in the state out of 92 counties.

Table 2-1 List of Major Employers

Rochester Metal Products Corp. (Rochester)	Dean Foods (Rochester)
LAU (Rochester)	Pike Lumber Co, Inc. (Akron)
Acument Global Technologies (Rochester)	Woodlawn Hospital (Rochester)
Winamac Coil Spring, Inc. (Kewanna)	Walmart Supercenter (Rochester)
Camcar, LLC (Rochester)	Topp Industries, Inc. (Rochester)

(Hoosiers by the Numbers, 2019)

2.3 TRANSPORTATION AND COMMUTIING PATTERNS

There are several major transportation routes passing through Fulton County and the municipalities within. US Highway 31 and State Roads 14, 17, 19, 25, 110, and 114, serve as main routes between the various municipalities. These transportation routes are identified in **Figure 2-2**.

According to the Indiana Business Research Center, nearly 1,016 people commute into Fulton County on a daily basis. Approximately 30% of those commuters travel from Miami County. Further, approximately 2,036 Fulton County residents commute to other counties with the majority traveling to Kosciusko County (39%).

Figure 2-3 indicates the number of workers 16 and older who do not live within Fulton County but commute into the county for employment purposes. Similarly, **Figure 2-4** indicates the number of Fulton County residents 16 and older that commute out of the county for employment.

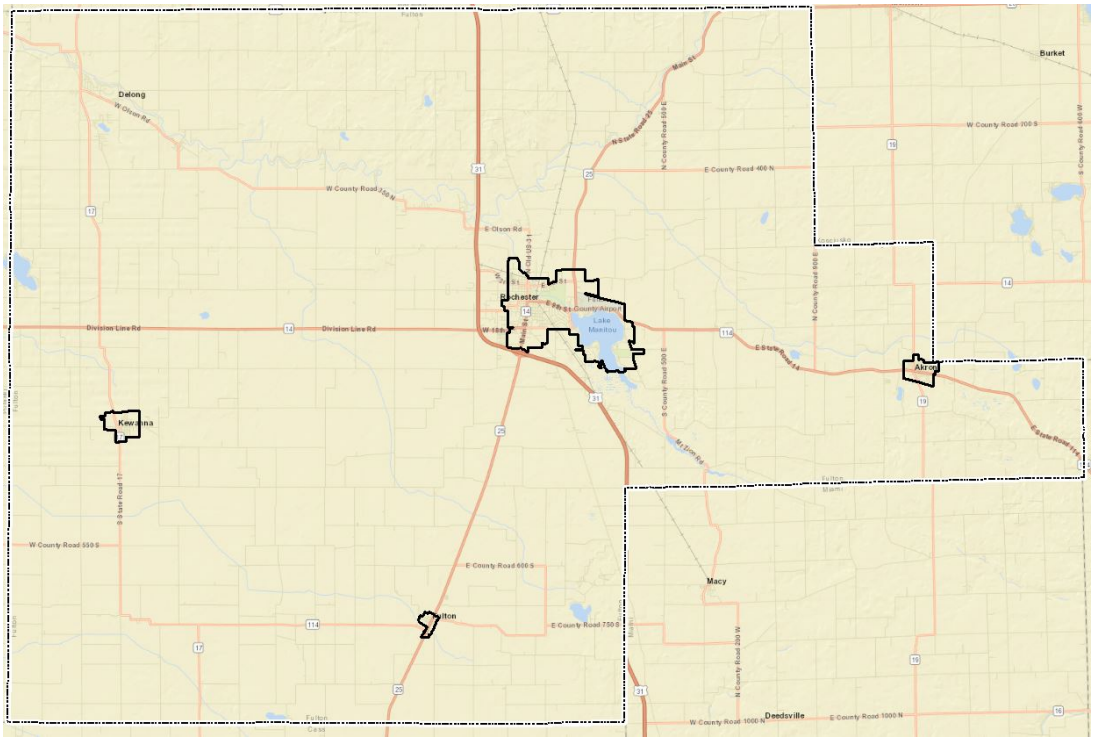


Figure 2-2 Fulton County Transportation Routes

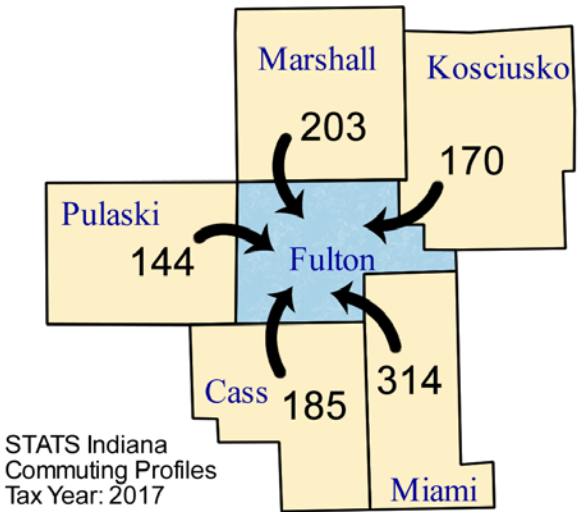


Figure 2-3 Workers Commuting into Fulton County

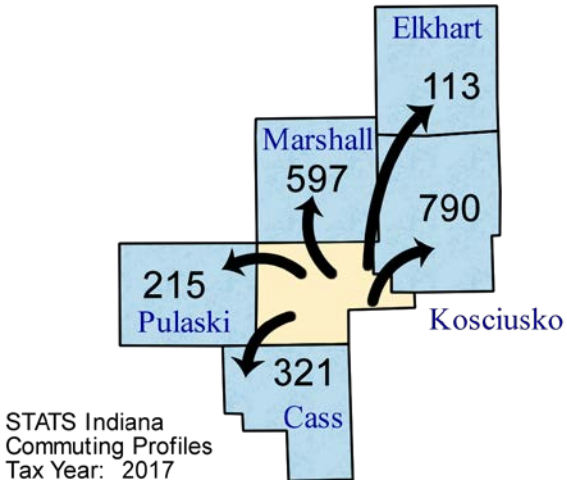


Figure 2-4 Workers Commuting out of Fulton County

2.4 CRITICAL AND NON-CRITICAL INFRASTRUCTURE

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, or critical infrastructure, are the assets, systems, and networks, whether physical or virtual, so vital to the local governments and the United States that their incapacitation or destruction would have a debilitating effect on security, economic security, public health or safety, or any combination thereof.

These structures 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.

The Fulton County EMA and Geographic Information System (GIS) Departments provided the listing and locations of the following 52 critical infrastructure points for the MHMP Update:

- 4 Airport
- 3 Dams
- 1 Electric/Power Facilities
- 1 Emergency Operation Center
- 6 Fire Departments
- 3 Government Facilities
- 1 Jail
- 10 Large Employers
- 3 Medical Care Facilities
- 4 Police Stations
- 6 Shelters
- 7 Schools
- 1 Wastewater Treatment Facilities
- 2 Water Towers

Information provided by the EMA, GIS Department, and the MHMP Planning Committee members was utilized to identify the types and locations of critical structures throughout Fulton County. Draft maps were provided to the EMA and GIS Department for their review and all comments were incorporated into the maps and associated databases.

Exhibit 1 illustrates the critical infrastructure identified throughout Fulton County. **Appendix 4** lists the critical structures in Fulton County by Community. Non-critical structures 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 structures; thus, non-critical structures are not mapped or listed.

2.5 MAJOR WATERWAYS AND WATERSHEDS

According to the United States Geological Survey (USGS) there are 108 waterways in Fulton County; they are listed in Appendix 5. The County's main waterway is the Tippecanoe River and the county lies almost entirely within one 8-digit Hydrologic Unit Code (HUC): the Tippecanoe River (05120107). This and other waterways are identified on **Figure 2-5**. Within Fulton County, there are zero active real-time USGS stream gages.

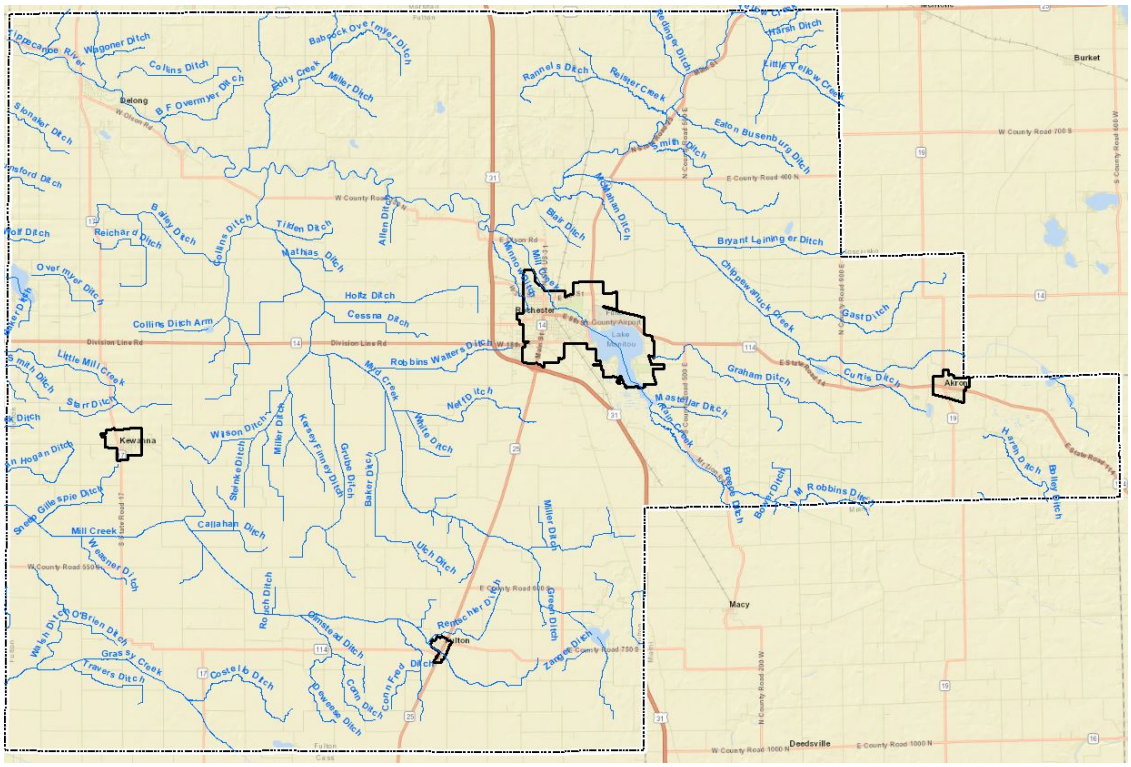


Figure 2-5 Fulton County Waterways

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. Fulton County and the City of Rochester are participants in the NFIP. The smaller communities, such as Akron, Fulton, and Kewanna, within Fulton County may also be provided coverage by the MHMP through the county's program.

At the time of preparing this MHMP, none of the municipalities participate in the NFIP's Community Rating System (CRS) program. 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% for each class level achieved. **Table 2-2** lists the NFIP number, effective map date, and the date each community joined the NFIP program.

Table 2-2 NFIP Participation

NFIP COMMUNITY	NFIP NUMBER	EFFECTIVE MAP DATE	JOIN DATE
Fulton County	180070#	08/16/2012(M)	07/03/1985
Town of Akron			
Town of Fulton			
Town of Kewanna			
City of Rochester	180071#	08/16/2012(M)	04/30/1984

(FEMA, 2018)

2.7 TOPOGRAPHY

Fulton County's topography consists of areas of strong slopes in some areas to level in others. In the southern and northeastern areas of Fulton County, the relief is said to be smooth to gently undulating with few natural drainageways. In other areas, such as those in the southeast, strong slopes with high clay soils are prevalent. In the central region, the area is rolling, morainic, and dissected by gravel pockets and sometimes extreme changes in relief. The highest elevation in Fulton County is 900 ft., NAVD and the lowest elevation is 715 ft., NAVD. The average local elevation is 760 ft., NAVD.

2.8 CLIMATE

The Midwestern Regional Climate Center (MRCC) provided climate data that includes information retrieved from a weather station located in Rochester, identified as station USC00127482. The average annual precipitation is 40.7 inches per year, with the wettest month being July averaging 4.63 inches of precipitation and the driest month being February with an average of 2.05 inches of precipitation. The highest 1-day maximum precipitation was recorded in August of 1990 with 6.25 inches of rain. On average, there are 78.8 days of precipitation greater than or equal to 0.1 inches; 27.2 days with greater than or equal to 0.5 inches; and 9.0 days with greater than or equal to 1.0 inch of precipitation.

Studies have recently been completed by the Indiana Climate Change Impacts Assessment, which is overseen by Purdue University Climate Change Research Center and comprised of a Steering Committee and several topic-oriented Working Groups. These studies indicate that average annual precipitation for Indiana is increasing seasonally during the winter and spring. Conversely, summers and autumns are trending toward less precipitation. In addition, their report shows changes in rain intensity and duration, along with frost-free days and growing seasons. These changes in climate, especially in Indiana, will impact natural hazards and how municipalities prepare for them.

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 may be affected by a hazard, and the impact on community assets. The risk assessment conducted for Fulton County and the communities is based on the methodology described in the Local Multi-Hazard Mitigation Planning Guidance published by FEMA in 2011 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 applicable; 2) vulnerability in terms of number and types 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 Fulton County 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 and technological hazards from the 2011 Fulton County MHMP and discussed recent and the potential for future hazard events. The Committee identified those hazards that affected Fulton County and the communities and selected the hazards to study in detail as part of this planning effort. As shown in **Table 3-1** these include: dam failure; drought; earthquake; extreme temperature; flooding; hailstorms, thunderstorms, and windstorms; hazardous materials incident; land subsidence; snow storms and ice storms; tornado; and wildfire. There are no FEMA certified levees within Fulton County and therefore, Levee Failure, has not been included in this planning effort.

All hazards studied with the 2011 Fulton County MHMP are included in the update.

Table 3-1 Hazard Identification

TYPE OF HAZARD	LIST OF HAZARDS	DETAILED STUDY	
		2011 MHMP	MHMP UPDATE
Natural	Drought	Yes	Yes
	Earthquake	Yes	Yes
	Extreme Temperature	No	Yes
	Flood	Yes	Yes
	Hail/Thunder/Wind	Yes	Yes
	Land Subsidence	No	Yes
	Snow / Ice Storm	Yes	Yes
	Tornado	Yes	Yes
	Wildfire	Yes	Yes
Technological	Dam Failure	No	Yes
	Hazardous Material Incident	Yes	Yes

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 Priority Risk Index (CPRI). The CPRI, adapted from MitigationPlan.com, is a tool by which individual hazards are evaluated and ranked according to an indexing system. The CPRI value (as modified by CBBEL) can be obtained by assigning varying degrees of risk probability, magnitude/severity, warning time, and the duration of the incident for each event, and then calculating as index value based on a weighted scheme. For ease of communications, 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 (1)
- Possible – incident is probable within the next five years (2)
- Likely - incident is probable within the next three years (3)
- Highly Likely – incident is probable within the next calendar year (4)

3.2.2 **Magnitude / Severity**

Magnitude/severity is defined by the extent of the injuries, shutdown of critical infrastructure, the extent of property damage sustained, and the duration of the incident response. The magnitude can be specified in one of the following categories:

- Negligible – few injuries OR critical infrastructure shutdown for 24 hours or less OR less than 10% property damaged OR average response duration of less than six hours (1)
- Limited – few injuries OR critical infrastructure shut down for more than one week OR more than 10% property damaged OR average response duration of less than one day (2)
- Significant – multiple injuries OR critical infrastructure shut down of at least two weeks OR more than 25% property damaged OR average response duration of less than one week (3)
- Critical – multiple deaths OR critical infrastructure shut down for one month or more OR more than 50% property damaged OR average response duration of less than one month (4)

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 (1)
- 12-24 hours (2)
- 6-12 hours (3)
- Less than 6 hours (4)

3.2.4 **Duration**

Duration is defined as the length of 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 (1)
- Less than 1 day (2)
- Less than 1 week (3)
- Greater than 1 week (4)

3.2.5 **Calculating the CPRI**

The following calculation illustrates how the index values are weighted and the CPRI value is calculated. CPRI = Probability x 0.45 + Magnitude/Severity x 0.30 + Warning Time x 0.15 + Duration x 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 CPRI 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 community in Fulton 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 based on the average percentage of each community's population in relation to the total population of the county. Thus, the results reflect the relative population influence of each community on the overall priority rank.

Table 3-2 Determination of Weighted Value for Communities

COMMUNITY	POPULATION (2018)	% OF TOTAL POPULATION	WEIGHTED VALUE
Fulton County	12,075	60.1%	0.60
Town of Akron	1,110	5.5%	0.06
Town of Fulton	318	1.6%	0.02
Town of Kewanna	589	2.9%	0.03
City of Rochester	6,000	29.9%	0.30
Total	**20,092**	**100.0%**	**1.00**

3.3 HAZARD PROFILES

The hazards studied for this report are not equally threatening to all communities throughout Fulton County. While it would be difficult to predict the probability of an earthquake or tornado affected 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 Planning Committee for detailed study as a part of this MHMP Update. The discussion is divided into the following subsections:

- **Hazard Overview** provides a general overview of the causes, effects, and characteristics that the hazard represents
- **Historic Data** presents the research gathered from local and national courses 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 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: 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 climactic 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.

Figure 3-1 Drought Affected Soil

There are four 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 the lack of moisture to community functions in the full range of societal functions, including power generation, the local economy, and food sources. **Figure 3-1** shows soil affected by drought conditions.

Drought: Recent Occurrences

Data gathered from the U.S. Drought Monitor indicated that between January 2011 and June 2019, there were 21 weeks where some portion of Fulton County was considered to be in a "Moderate Drought", 10 weeks in an "Severe Drought", and seven weeks in an "Extreme Drought. **Figure 3-2**, from the U.S. Drought Monitor, describes the rational to classify the severity of droughts. Those weeks of Severe and Extreme Drought are all associated with the summer 2012 event.

In July and August 2012, nearly 100% of Indiana was experiencing drought conditions ranging from "D0-Abnormally Dry" to "D4-Exceptional Drought". **Figure 3-3** identifies those areas and categories of drought throughout Indiana for August 7, 2012, the peak of the drought. Fulton County is located nearly entirely in

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: ▪ some lingering water deficits ▪ pastures or crops not fully recovered
D1	Moderate Drought	▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested
D2	Severe Drought	▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed
D3	Extreme Drought	▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions
D4	Exceptional Drought	▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies

Figure 3-2 US Drought Monitor Drought Severity Classification

the "D3-Extreme Drought". D2 includes major crop or pasture losses, and widespread shortages of water potentially resulting in restrictions on usage. It wasn't until the February 5, 2013 report that the entire county was considered out of drought condition status.

The National Data Climate Center (NCDC) does not report any events or property or crop losses within Fulton County during this planning period.

The Planning Committee, utilizing the CPRI, determined the overall risk of drought throughout Fulton County is "Elevated". The impact of drought was determined to be the same for all communities within the County. The committee agreed that a drought is "Possible" (to occur within the next five years) and the magnitude of drought is anticipated to be "Significant" to "Critical". Further it is anticipated that with the enhanced weather forecasting abilities, the warning time for a drought is greater than 24 hours and the duration will be greater than one week. A summary is shown in **Table 3-3**.

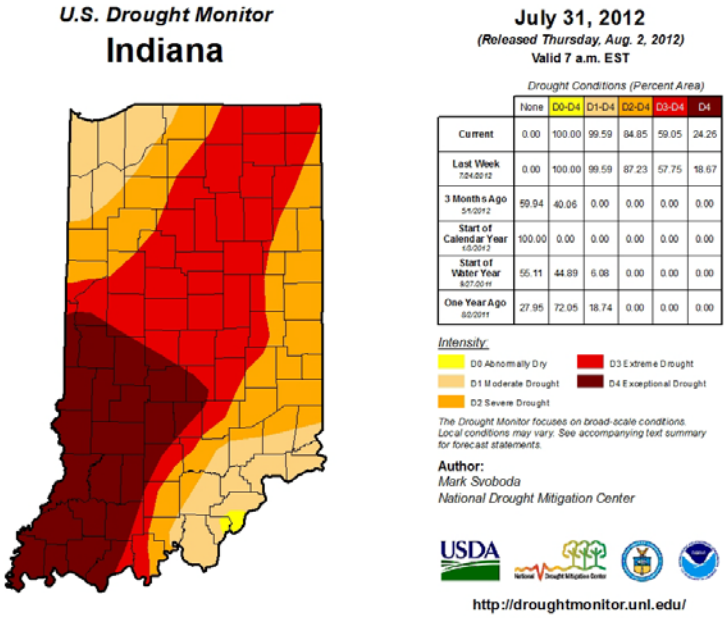


Figure 3-3 July 31, 2012 Indiana Drought Map

Table 3-3 CPRI for Drought

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Possible	Critical	> 24 Hours	> 1 Week	Elevated
Town of Akron	Possible	Significant	> 24 Hours	> 1 Week	Elevated
Town of Fulton	Possible	Significant	> 24 Hours	> 1 Week	Elevated
Town of Kewanna	Possible	Significant	> 24 Hours	> 1 Week	Elevated
City of Rochester	Possible	Significant	> 24 Hours	> 1 Week	Elevated

According to the National Drought Mitigation Center, scientists have difficulty predicting droughts more than one 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 Fulton County, the Committee estimated that the probability of a drought occurring in the area is "Possible"; or occurrence is probable within the next three years.

Damages from "Significant" to "Critical" are anticipated throughout the county as many municipalities rely on groundwater supplies for fire response efforts and face a higher risk during times of prolonged drought. Throughout the majority of the county, increased crop and livestock damages would also be expected.

Drought: Assessing Vulnerability

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

Direct Effects:

- Urban and developed areas 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 within the county may experience revenue losses from reductions in livestock and crop yields as well as increased field fires.
- Citizens served by drinking water wells may be impacted during low water periods and may require drilling of deeper wells or loss of water service for a period of time.

Indirect Effects:

- Loss of income of employees from businesses and industry affected; loss of revenue to support services (food service, suppliers, etc.)

- Loss of revenue from recreational or tourism sectors associated with reservoirs, streams, and other open water venues.
- Lower yields from domestic gardens increasing the demand on purchasing produce and increased domestic water usage for landscaping
- Increased demand on emergency responders and firefighting resources

Estimating Potential Losses

It is difficult to estimate the potential losses associated with a drought for Fulton 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 drought of record from 1988. In 2018, Fulton County produced approximately 16.5M bushels of corn and 4.0M bushels of soybeans, as reported by the United States Department of Agriculture (USDA) National Agricultural Statistics Service. Using national averages of $3.40 per bushel of corn and $9.50 per bushel of soybeans, the estimated crop receipts for 2018 would be $94.0M. Using the range of crop yield decreases reported in 1988 and 1989, just after the 1988 drought period (50%-86%) and assuming a typical year, economic losses could range between $47.0M-$80.8M; depending on the crop produced and the market demand. Effects of drought on corn crops can be seen in **Figure 3-4**.

Figure 3-4 Crops Affected by Drought

Purdue Agriculture News reports that as of March 2013, Indiana producers received more than $1.0B in crop insurance payments for 2012 corn, soybean, and wheat losses. This amount is nearly double that of the previous record, $522M following 2008 losses, also due to drought.

According to a July 5, 2012 article in *The Times* (Noblesville, IN), "The effects of drought also could touch agricultural businesses, such as handlers and processors, equipment dealers, and see, fertilizer and pesticide providers". Further, "…consumers are likely to see an increase in food prices of 2.5 percent to 3.5 percent into 2013".

Additional losses associated with a prolonged drought are more difficult to quantify. Drought has lasting impacts on urban trees: death to all or portions of a tree, reduction in the tree's ability to withstand insects and diseases, and interruption of normal growth patterns. Such effects on trees, especially urban trees can lead to

additional impacts, both environmentally and monetarily in terms of the spread of Emerald Ash Borer insect and the weakening of tree limbs and trunks which may lead to increased damages during other hazard events such as wind and ice storms.

Future Considerations

Advancements in plant hybrids and development have eased the impacts from short-lived droughts. Seeds and plants may be more tolerant of dryer seasons and therefore fewer crop losses may be experienced.

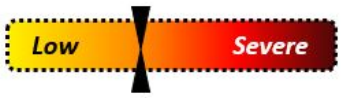
As the more urban areas of the county continue to grow and expand, protocols may need to be developed which create a consistency throughout the communities and the unincorporated portions of the county for burn bans and water usage advisories.

According to the Indiana Climate Change Impacts Assessment, Indiana has experienced a rise in the average annual precipitation between 1895 and 2016; an increase of 4.8 inches for the area of Fulton County. This increase in precipitation may lessen the likelihood or overall impact of a drought in Fulton County. However, the Assessment also notes seasonal shifts in precipitation which may lead to seasonal short-term droughts. In either scenario, changes in precipitation are not anticipated to relieve the area of a probability of a drought occurring.

Drought: Relationship to Other Hazards

Discussions with the Planning Committee were held regarding the similar effects of prolonged periods of extreme heat and the similar impacts that may be experienced during these times. Planning and mitigation efforts for one hazard may benefit the other. It is anticipated that rural areas of the county may be more susceptible to cropland or woodland fires during a drought, while urban areas may experience these impacts in areas where several abandoned buildings or overgrown lots exist, and this may lead to increased losses associated with a fire.

3.3.2 Earthquake



Earthquake Overview

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 the 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.

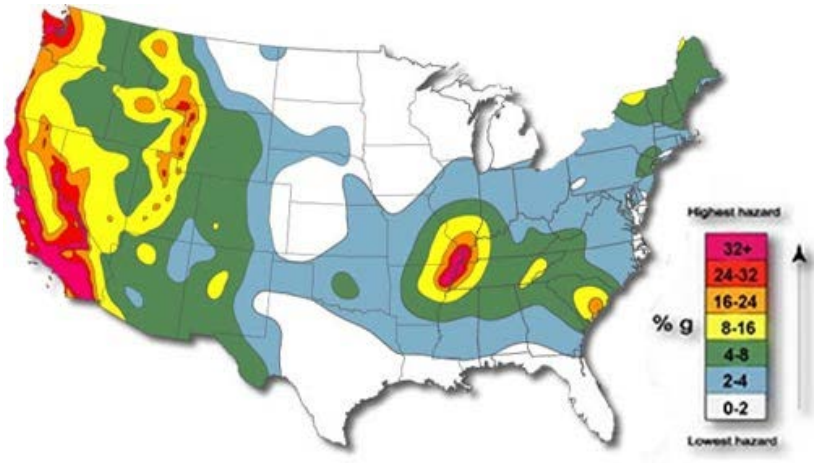


Figure 3-5 Earthquake Hazard Areas in the US

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, 70-75 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 a M6.0 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 earthquake, and they are located in every region of the country (**Figure 3-5**). 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 occurred over the entire Eastern United States, with Missouri, Tennessee, Kentucky,

Indiana, Illinois, Ohio, Alabama, Arkansas, and Mississippi experiencing the strongest ground shaking.

Earthquake: Recent Occurrences

Indiana, as well as several other Midwestern states, lies in the most seismically active region east of the Rocky Mountains. Regarding Fulton County, the nearest area of concern are the Wabash Seismic Zone and the Anna Ohio Fault zone, one of the most seismically active areas outside of the New Madrid Seismic Zone. Within this area, approximately 40 earthquakes have been felt since 1875 with damages ranging from reports of feeling shaking to toppled chimneys and cracked windows.

On April 18, 2008, an M5.2 quake, reported by the Central United States Earthquake Consortium, struck southeast Illinois in Wabash County and included reports of strong shaking in southwestern Indiana, Kansas, Georgia, and the upper peninsula of Michigan. With over 25,000 reports of feeling the earthquake, there were no reports of injuries or fatalities caused by the event.

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 3rd 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. According to *The Kokomo Tribune,* "113 people called 911 in a 15-minute period after the quake, which was the first tremblor centered in Indiana since 2004". Further, a geophysicist from the USGS in Colorado stated, "It was considered a minor earthquake", and "Maybe some things would be knocked off shelves, but as far as some significant damage, you probably wouldn't expect it from a 3.8".

Figure 3-6 Earthquake Damaged Porch

Most recently, an M5.8 centered in Mineral, Virginia affected much of the East Coast on August 23, 2011. According to USA Today, 10 nuclear power plants were shutdown of precautionary inspections following the quake, over 400 flights were delayed, and the Washington Monument was closed indefinitely pending detailed inspections by engineers.

Based on historical earthquake data, local knowledge of previous earthquakes, and the results of HAZUS-MH scenarios, the Committee determined that the probability of an earthquake occurring in Fulton County or any of the communities is "Unlikely". Should an earthquake occur, the impacts associated with this hazard are

anticipated to be "Limited" within all areas of the county. As with all earthquakes, it was determined that the residents of Fulton County would have little to no warning time (less than six hours) and that the duration of the event would be expected to be less than one day. A summary is shown in **Table 3-4**.

Table 3-4 CPRI for Earthquake

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Unlikely	Limited	< 6 Hours	< 6 Hours	Low
Town of Akron	Unlikely	Limited	< 6 Hours	< 6 Hours	Low
Town of Fulton	Unlikely	Limited	< 6 Hours	< 6 Hours	Low
Town of Kewanna	Unlikely	Limited	< 6 Hours	< 6 Hours	Low
City of Rochester	Unlikely	Limited	< 6 Hours	< 6 Hours	Low

Per 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 Committee felt that an earthquake occurring within or near to Fulton County is "Unlikely" to occur within the next 10 years.

Earthquake: Assessing Vulnerability

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

Direct Effects:

- Urban areas may experience more damages due to the number of structures and critical infrastructure located in these areas
- Rural areas 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 the 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

Figure 3-7 Minor Earthquake Damages

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 infrastructure are at risk of experiencing earthquake related damages. Damages to structures, infrastructure, and even business interruptions can be expected following an earthquake. Examples of varying degrees of damages are shown in **Figure 3-6** and **Figure 3-7**.

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 M7.1 earthquake with an epicenter within the Wabash Valley Fault Zone.

Per the HAZUS-MH scenario, total economic loss associated with this earthquake is anticipated to be near $396.0M. The HAZUS-MH model computes anticipated 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. Much of the damage is anticipated to be experienced within the western portion of the City of Rochester as indicated on **Figure 3-8.**

The HAZUS-MH Earthquake Model 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 a specific XY coordinate. HAZUS performs the damage analysis as a county wide analysis and reports losses by census tract. While the results of the hypothetical scenario appear to be plausible, care should be taken when interpreting these results.

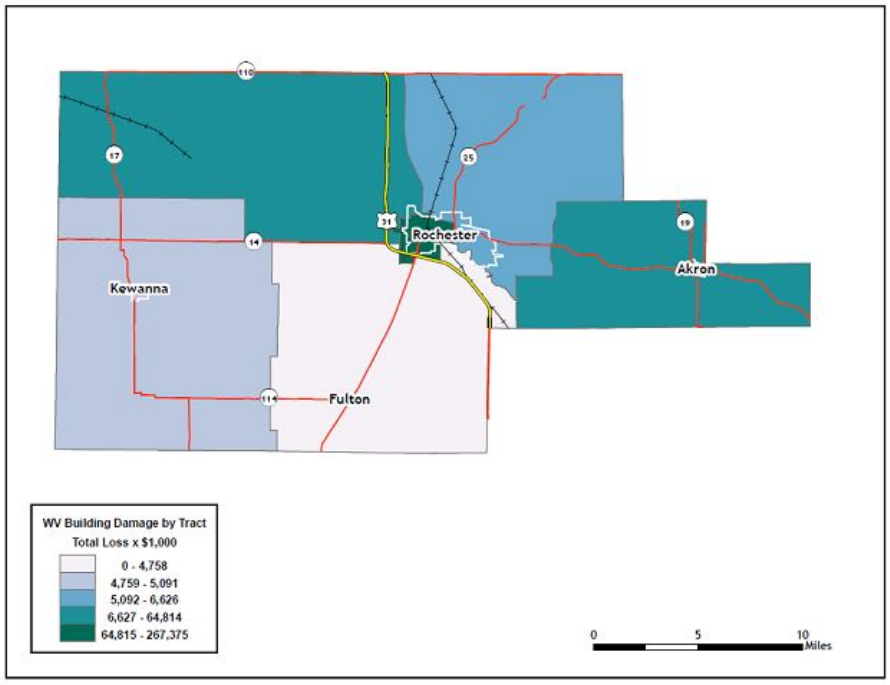


Figure 3-8 Anticipated Building Damage from Earthquake Scenario

Future Considerations

While the occurrence of an earthquake in or near to Fulton County may not be the highest priority hazard studied for the development of the Plan, it is possible that residents, business owners, and visitors may be affected should an earthquake occur anywhere within the state. For that reason, Fulton County should continue to provide education and outreach regarding earthquakes and even earthquake insurance along with education and outreach for other hazards. As Fulton 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.

It can be anticipated that while all structures in Fulton County will remain at-risk to earthquake damages and effects, new construction or redevelopment may reduce the overall risks such as those presented in Figure 3-8. As redevelopment occurs in the more urban area of Rochester, the new construction may be significantly sturdier. Further, as blighted or abandoned areas are addressed, those communities and the county as a whole, are less susceptible to economic and physical damages associated with earthquakes.

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, dam failures may occur following an earthquake or associated aftershocks due to the shifting of the soils in these hazard areas. These types of related hazards may have greater impacts on Fulton County communities than the earthquake itself. It is not expected that earthquakes will be caused by other hazards studied within this plan.

3.3.3 Extreme Temperature

Extreme Temperatures: Overview

Extreme heat is defined as a temporary elevation of average daily temperatures that hover 10 degrees or more above the average high temperature for the region for the duration of several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a dome of high atmospheric pressure traps water-laden air near the ground. In a normal year, approximately 175 Americans die from extreme heat.

According to the NWS, "The Heat Index or the "Apparent Temperature" is an accurate measure of how hot it really feels when the Relative Humidity is added to the actual air temperature". To find the Heat Index Temperature, refer to the Heat Index Chart in **Figure 3-9**. As an example, if the air temperature is 96°F and the relative humidity is 65%, the heat index – how hot it feels – is 121°F. The Weather Service will initiate alert procedures when the Heat Index is expected to exceed 105°-110°F for at least two consecutive days.

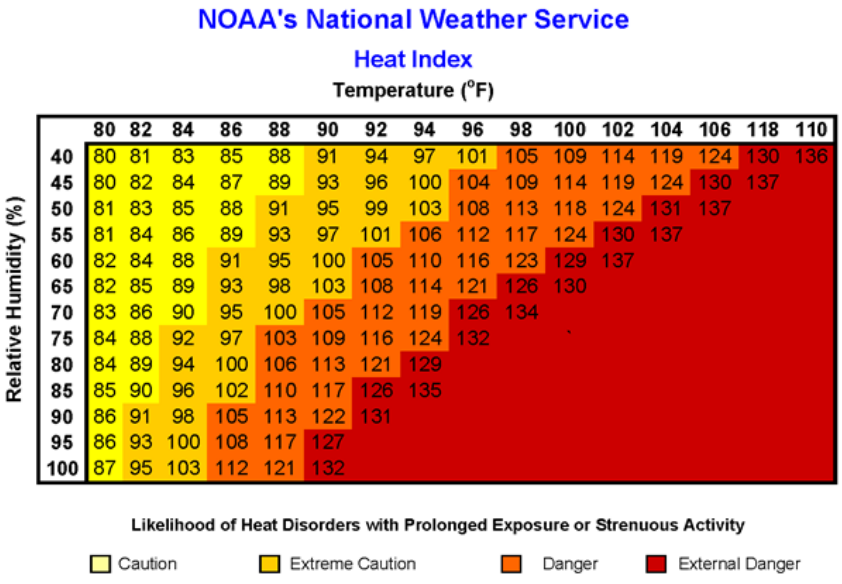


Figure 3-9 Heat Index Chart

It is important to also note that these heat index values were devised for shady, light wind conditions. Exposure to full sunshine may increase heat index values by up to 15°F. Further, strong winds, particularly with very hot, dry air, can also be extremely hazardous.

As Figure 3-9 indicates, there are four cautionary categories associated with varying heat index temperatures.

- Caution: 80°-90°F: Fatigue is possible with prolonged exposure and physical activity
- Extreme Caution: 90°-95°F: Sunstroke, heat cramps, heat exhaustion may occur with prolonged physical activity
- Danger: 105°-130°F: Sunstroke, heat cramps, or heat exhaustion is likely
- Extreme Danger: >130°F: Heatstroke is imminent

Extreme cold is defined as a temporary, yet sustained, period of extremely low temperatures. Extremely low temperatures can occur in winter months when

continental surface temperatures are at their lowest point and the North American Jet Stream pulls arctic air down into the continental United States. The jet stream is a current of fast-moving air found in the upper levels of the atmosphere. This rapid current is typically thousands of kilometers long, a few hundred kilometers wide, and only a few kilometers thick. Jet streams are usually found somewhere between 10-15 km (6-9 miles) above the Earth's surface. The position of this upper-level jet stream denotes the location of the strongest surface temperature contrast over the continent. The jet stream winds are strongest during the winter months when continental temperature extremes are greatest. When the jet stream pulls arctic cold air masses over portions of the United States, temperatures can drop below 0° F for one week or more. Sustained extreme cold poses a physical danger to all individuals in a community and can affect infrastructure function as well.

In addition to strictly cold temperatures, the wind chill temperature must also be considered when planning for extreme temperatures. The wind chill temperature, according to the NWS, is how cold people and animals feel when outside and it is based on the rate of heat loss from exposed skin. **Figure 3-10** identifies the Wind Chill Chart and how the same ambient temperature may feel vastly different in varying wind speeds.

Wind chill is a guide to winter danger

New wind chill chart

Frostbite occurs in 15 minutes or less

Wind (MPH) \ Temperature (°F)	30	25	20	15	10	5	0	-5	-10	-15	-10	-25
5	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40
10	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47
15	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51
20	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55
25	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58
30	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60
35	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62
40	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64
45	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65
50	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67
55	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68
60	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69

Figure 3-10 NWS Wind Chill Chart

Extreme Temperature: Recent Occurrences

The effects of extreme temperatures extend across large regions, typically affecting several counties, or states, during a single event. According to the NCDC, there have been zero reported occurrences of extreme heat and three wind chill events between January 2011 and March 2019. The events occurred in January 2014, January 2015, and January 2019. During the 2014 event, wind gusts up to 40 mph, wind chill of -30° to -45°, and blowing snow led to numerous vehicle accidents and slide-offs. In 2015, nearly the same conditions led to school delays and closures throughout the region. During the 2019 event, warming centers were opened in Rochester at the High School and Fire Station. Additionally, Rochester Metals shutdown productions due to the high number of absentee employees.

It is difficult to predict the probability that an extreme temperature event will affect Fulton County residents within any given year. However, based on historic knowledge and information provided by the community representatives, an extreme temperature event is "Highly Likely" (possible within the next calendar year) to occur and if an event did occur, it would result in "Significant" magnitude. **Table 3-5**

identifies the CPRI for extreme temperature events for all communities in Fulton County.

Table 3-5 CPRI for Extreme Temperatures

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe
Town of Akron	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe
Town of Fulton	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe
Town of Kewanna	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe
City of Rochester	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe

As shown in the table, index values remain identical throughout each community due to the regional extent and diffuse severity of this hazard event. The anticipation of experiencing such damages is due to the significant amount of livestock and cropland within the county as well as the difficulty to check in on or reach residents in isolated areas.

Extreme Temperatures: Assessing Vulnerability

As noted above, this type of hazard will generally affect entire counties and even multi-county regions at one time; however, certain portions of the population may be more vulnerable to extreme temperatures. For example, outdoor laborers, very young and very old populations, low income populations, and those in poor physical condition are at an increased risk to be impacted during these conditions.

By assessing the demographics of Fulton County, a better understanding of the relative risk that extreme temperatures may pose to certain populations can be gained. In total, nearly 20% of the County's population is over 65 years of age, more than 6% of the population is below the age of 5, and approximately 12% of the population is considered to be living below the poverty line. People within these demographic categories are more susceptible to social or health related impacts associated with extreme heat.

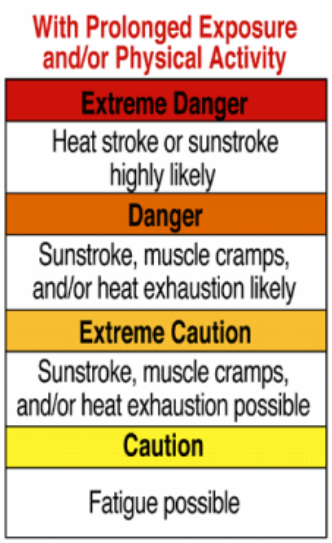


Figure 3-11 Danger Levels with Prolonged Heat Exposure

Extreme heat can affect the proper function of organ and brain systems by elevating core body temperatures above normal levels. Elevated core body temperatures, usually in excess of 104°F are often exhibited as heat stroke. For weaker individuals, an overheated core body temperature places additional stress on the body, and without proper hydration, the normal mechanisms for dealing with heat, such as sweating in order to cool down, are ineffective. Examples of danger levels associated with prolonged heat exposure are identified in **Figure 3-11**.

Extreme cold may result in similar situations as body functions are impacted as the temperature of the body is reduced. Prolonged exposure to cold may result in hypothermia, frostbite, and even death if the body is not warmed.

Within Fulton County, direct and indirect effects from a long period of extreme temperature may include:

Direct Effects:

- Direct effects are primarily associated with health risks to the elderly, infants, people with chronic medical disorders, lower income families, outdoor workers, and athletes.

Indirect Effects:

- Increased need for cooling or warming shelters
- Increased medical emergency response efforts
- Increased energy demands for heating or cooling

Estimating Potential Losses

It is difficult to estimate the potential losses due to extreme temperatures as damages are not typically associated with buildings but instead, with populations and persons.

This hazard is not typically as damaging to structures or critical infrastructure as it is to populations so monetary damages associated with the direct effects of the extreme temperature are not possible to estimate. Indirect effects would cause increased expenses to facilities such as healthcare or emergency services, manufacturing facilities where temperatures are normally elevated may need to alter work hours or experience loss of revenue if forced to limit production during the heat of the day, and energy suppliers may experience demand peaks during the hottest and/or coldest portions of the day.

Future Considerations

As more and more citizens are experiencing economic difficulties, local power suppliers along with charitable organizations have implemented programs to provide cooling and heating mechanisms to residents in need. Often, these programs are donation driven and the need for such assistance must be demonstrated. As

susceptible populations increase, or as local economies are stressed, such programs may become more necessary to protect Fulton County's at-risk populations.

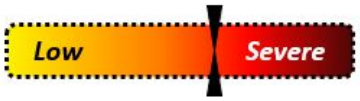
The Climate Change Assessment identifies several temperature related considerations of which communities should be aware and begin planning to avoid further impacts. For example, rising temperatures will increase the number of extreme heat days, thereby increasing the potential for heat related illnesses, potential hospitalizations, and medication costs to vulnerable populations. In addition, added days of extreme heat will impact agriculture, manufacturing, and potentially, water sources.

New construction associated with development of residential areas often brings upgraded and more efficient utilities such as central heating and air units further reducing vulnerabilities to the aging populations in those municipalities mentioned above. Conversely, new development associated with industrial or large commercial structures in the inner-urban centers often result in increased heat over time, which may cause additional stress to labor-related populations.

Extreme Temperatures: Relationship to Other Hazards

While extreme temperatures may be extremely burdensome on the power supplies in Fulton County, the Committee concluded that this type of hazard is not expected to cause any hazards studied, with the exception of a potential civil disturbance. It is anticipated that due to prolonged extreme temperatures, primarily long periods of high temperatures, citizens may become increasingly agitated and irritable and this may lead to a disturbance requiring emergency responder intervention.

3.3.4 **Fire**



Fire: Overview

Figure 3-12 Wildfire in Forested Area

A wildfire, also known as a forest fire, vegetation fire, or a bushfire, is an uncontrolled fire in wildland areas and is often caused by lightening; other common causes are human carelessness and arson. Small wildfires may be contained to areas less than one acre, whereas larger wildfires can extend to areas that cover several hundred or even thousand acres. Generally, ambient weather conditions determine the nature and severity of a wildfire event. Very low moisture and windy conditions can help to exacerbate combustion in forested or brush areas (**Figure 3-12**) and turn a small brush fire into a major regional fire event in a very short period. Wildfires can be very devastating for residents and property owners.

A structural fire is an incident where a fire starts within a structure and is largely contained to that structure. Causes of structure fires can be related to electrical shorts, carelessness with ignition sources, poor storage of flammable materials, as well as arson. These types of fires can be deadly if no warning or prevention measures are present. The most dangerous aspect of structural fires is the production of toxic gases and fumes that can quickly accumulate in enclosed areas of structures and asphyxiate those who might be in the structure.

Problems associated with structural fires are compounded when high-rise buildings catch fire. High-rise fires hinder the ability of rescue workers to fight the fire, reach impacted building occupants, and evacuate impacted occupants. Rescue efforts also become more complicated when handicapped or disabled persons are involved. Complications associated with high-rise fires typically increase as the height and occupancy levels of the buildings increase. Structural collapse is another concern associated with high-rise fires. Structural collapse often results in persons becoming trapped and severely injured. However, it is important to note that the concern associated with structural collapse, is not limited to high-rise buildings; the collapse of smaller residential buildings can also lead to severe injury and death.

Typically, a fire will incinerate all structures and objects in its path. A resident may lose all possessions and structures to a wildfire event. Additionally, combating a wildfire or a structure fire may be extremely dangerous. If weather conditions change suddenly, the wildfire may change course and overtake firefighters, causing severe injury or death. Fires can travel at speeds greater than 45 mph. Therefore, these hazard events can pose a serious threat to county residents and response agencies.

Fire: Recent Occurrences

Within the NCDC, there are no reports of wildfires occurring within Fulton County between January 1950 and March 2019. Within the same time parameter, there were

Figure 3-13 Demolition of Centennial Towers (Rochester Sentinel)

only two reported events within the State of Indiana, both within Pike County and both within 2006. During each of these events over 350 acres were burned.

The NCDC does not report structure fires; therefore, local sources were utilized to provide historical information. WNDU, Channel 16 provided details regarding a December 2011fire at the Centennial Towers in Rochester. While the building is currently vacant, six trucks from Fulton County, two trucks from Plymouth, and two trucks from Manchester responded to assist with fire suppression. During the fight, the roof and two floors collapsed. No injuries were reported as a result of the blaze.

Due to the expansive acreage of cropland and woods within Fulton County, and the potential for urban areas to be at risk due to abandoned homes, blighted areas, or industrial activities, the Planning Committee determined the probability to be "Possible" throughout the County. **Table 3-6** identifies the CPRI rankings for fire in Fulton County.

Table 3-6 CPRI for Fire

	PROBABILITY	MAGNITUDE / SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Possible	Limited	< 6 Hours	< 1 Week	Elevated
Town of Akron	Possible	Significant	< 6 Hours	> 1 Week	Elevated
Town of Fulton	Possible	Limited	< 6 Hours	< 1 Day	Elevated
Town of Kewanna	Possible	Significant	< 6 Hours	< 1 Week	Elevated
City of Rochester	Possible	Significant	< 6 Hours	> 1 Week	Elevated

Information provided in **Table 3-7** highlights the number of fire runs per department for 2018. Based on this information, annual damages to structures, contents, and vehicles may be significant for each municipality on an annual basis. Social losses, such as being unable to work following a residential structure fire or losses associated with a business fire should also be considered as an impact.

Table 3-7 2018 Fire Runs

	2018
City of Rochester	120
Town of Kewanna	23
Aubbee Twp	17
Henry Twp	80
Liberty Twp	17
Mentone Twp	5
TOTAL	**262**

Fire: Assessing Vulnerability

A fire typically affects a large regional area with potential for physical, economic, and/or social losses. Typically, a structural fire affects one or two structures, as one of the main functions of fire response is to prevent the fire from spreading to neighboring structures. This type of action works to reduce the magnitude and severity to "Limited" throughout the county and municipalities. Direct and indirect effects of a such an event within Fulton County may include:

Direct Effects:

- Loss of structures
- Loss of production crop
- Loss of natural resources

Indirect Effects:

- Loss of revenue as businesses may be closed
- Increased emergency response times based on safety of roads
- Loss of income if dependent on crop production

Estimating Potential Losses

Given the nature and complexity of a potentially large hazard such as a wildfire, it is difficult to quantify potential losses to property and infrastructure. As a result, all critical and non-critical structures and infrastructure may be at some degree of risk.

Monetary damages associated with the direct effects of the fires are difficult to estimate, other than utilizing historic information as provided. Indirect effects would cause increased efforts associated with emergency response services as wildfires are difficult to contain and may accelerate very quickly. Further, multi-level business or residential structures place increased risks to those who work or live within those structures or nearby structures.

Future Considerations

As populations increase and communities continue to grow in size, the need to respond to fire will remain an important municipal effort. As new construction or re-development occurs, especially new or existing critical infrastructure, it is important to ensure that these new structures are equipped to deal with the potential risks associated with this hazard. Those may include increased risk for wooden or flammable outer structures and potential lengthy power outages.

In addition, increased populations require increased housing. Many urban communities develop large multi-family residential structures, or apartment complexes, where structures are not only in close proximity to each other, but also contain a large number of citizens. As communities age, some structures may become abandoned, significantly increasing the risk of fire due to potential vagrant

populations and lack of maintenance. These areas should be considered at-risk and potentially demolished to avoid such risk and potential hazard.

Fires 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 fire and how it may affect those businesses directly related to cropland or natural resource areas.

Fire: Relationship to Other Hazards

Fires may certainly result in a hazardous materials incident if storage structures are within the path of the burn. Material storage containers farther away from the burn path may become damaged by high winds and embers resulting in a spill or release of materials.

Fires may result from lightning associated with a thunderstorm. Typical wind speeds during a thunderstorm may also exacerbate the impacts from any ignitions from the lightning.

3.3.5 **Flood**

Flood: Overview

Floods are the most common and widespread of all the 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 or two or more acres of normally dry land area or of two or more properties from overflow of inland or tidal waters and unusual and rapid accumulation or runoff of surface waters from any sources, or a mudflow. Floods can be slow or fast rising but generally develop over a period of days.

Flooding and associated flood damages 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 traditional benchmark for riverine or coastal flooding is a 1% Annual Exceedance Probability (AEP), or the 100-year flood. This is a benchmark used by FEMA to establish a standard of flood protection in communities throughout the country. The 1% AEP is referred to as the "regulatory" or "base" flood. Another term commonly used, the "100-year flood", can be misleading. It does not mean that only one flood of that size will occur every 100 years, but rather 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: Recent Occurrences

The NCDC indicates that between January 2011 and March 2019, there were four flood events and one flash flood event reported. Flooding in February 2018 near Grass Creek, in the extreme southwest corner of Fulton County, resulted in extensive flooding along the Tippecanoe River and tributaries. Several roads in the area were either greatly damaged or fully washed out as a result of the event. In total, it is estimated this event resulted in approximately $250K in damages.

Appendix 6 provides the NCDC information regarding flood events that have resulted in injuries, deaths, or monetary damages to property and/or crops.

Stream gages are utilized to monitor surface water elevations and/or discharges at key locations and time periods. Some such gages are further equipped with NWS' Advanced Hydrologic Prediction Service (AHPS) capabilities. These gages have the potential to provide valuable information regarding historical high and low water stages, hydrographs representing current and forecasted stages, and a map of the

surrounding areas likely to be flooded. Within Fulton County, there are zero active USGS stream gage equipped with AHPS capabilities.

Any property having received two 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 approximately 1/3 of the country's flood insurance payments. According to FEMA Region V, there are a total of 35 single-family repetitive loss properties within the unincorporated areas of Fulton County and three single-family residential properties in the City of Rochester.

There have been a small number of claims made for damages associated with flooding in Fulton County. Within the City of Rochester, there have been 24 paid losses resulting in just over $0.2M in payments. Further, within the unincorporated areas of the county, there were 199 payments totaling approximately $2.3M. Information regarding the other communities within Fulton County was not provided. **Table 3-8** identifies the number of claims per community as well as payments made, as provided by IDNR.

Table 3-8 Repetitive Loss Properties, Claims, and Payments

COMMUNITY	# OF REPETITIVE LOSS PROPERTIES	CLAIMS SINCE 1978	$$ PAID
Fulton County	35	199	$2.3M
Town of Akron			
Town of Fulton			
Town of Kewanna			
City of Rochester	3	24	$0.2M
TOTAL	**38**	**223**	**$2.5M**

(IDNR, 2019)
(FEMA Region V, 2019)

Mandatory flood insurance purchase requirements apply to structures in 1% annual chance of flooding delineated areas. Total flood insurance premiums for Fulton County and the City of Rochester is approximately $47.5K. Total flood insurance coverage for Fulton County and the City of Rochester is nearly $8.2M. Information specific to the other communities was not provided individually. **Table 3-9** further indicates the premiums and coverage totals for individual communities.

Table 3-9 Insurance Premiums and Coverage

COMMUNITY	FLOOD INSURANCE PREMIUMS	FLOOD INSURANCE COVERAGE
Fulton County	$35.3K	$5.3M
Town of Akron		
Town of Fulton		
Town of Kewanna		
City of Rochester	$12.1K	$2.9M
TOTAL	**$47.4K**	**$8.2M**

(IDNR, 2017)

As determined by the Committee, the probability of a flood occurring throughout Fulton County ranges from "Unlikely" in the towns of Akron, Fulton, and Kewanna and "Likely" in all the unincorporated county and the City of Rochester. This is largely based on the presence or absence of rivers or water systems in or near the communities. Impacts from such an event are anticipated to range from "Negligible" to "Significant". The Committee also determined that the warning time would be greater than 24 hours based on forecasting methods and local knowledge of stream activities, and that the duration of such an event is anticipated to last greater than one week for all areas. A summary is shown in **Table 3-10**.

Table 3-10 CPRI for Flood

	PROBABILITY	MAGNITUDE / SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Likely	Significant	> 24 Hours	>1 Week	Elevated
Town of Akron	Unlikely	Negligible	> 24 Hours	>1 Week	Low
Town of Fulton	Unlikely	Negligible	> 24 Hours	>1 Week	Low
Town of Kewanna	Unlikely	Negligible	> 24 Hours	>1 Week	Low
City of Rochester	Likely	Significant	> 24 Hours	>1 Week	Elevated

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 by the NCDC, and previous experiences, the Committee determined that flooding is "Unlikely" to "Likely" throughout the county.

Flood: Assessing Vulnerability

Flood events may affect large portions of Fulton County at one time as river systems and areas with poor drainage cover much of the county and several communities. The members of the Planning Committee discussed areas that experience routine flooding such as:

- 475N between 500W and 600W
- 275N at 600W

Within Fulton County, direct and indirect effects of 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 costs associated with personnel to carry out evacuations in needed areas
- 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
- Cancellations of special events in impacted areas or water related activities that become too dangerous due to high water

Estimating Potential Losses

Critical and non-critical structures located in regulated floodplains, poorly drained areas, or low-lying areas are most at risk for damages associated with flooding. For this planning effort, a GIS Desktop Analysis methodology was utilized to estimate flood damages.

For the GIS Desktop Analysis method, an analysis was completed utilizing the best available floodplain mapping from IDNR overlaid upon the Modified Building Inventory provided by Fulton County and structures located within each flood zone were tallied using GIS analysis techniques.

In the assessment, any structure that was listed as less than 400 ft^2 in area or was classified in the Assessor's database as a non-habitable structure was assumed to be an outbuilding. It was assumed that a building was located on a parcel if the value listed in the "Assessed Value (Improvements)" showed a value greater than zero dollars. Parcels that intersected any portion of the FEMA flood zones were considered to be flood prone, and subsequently, further analyzed separately from parcels without structures. were excluded from the analysis. Structure values were calculated using:

Residential = Assessed Value x 0.5
Commercial = Assessed Value x 1.0
Industrial = Assessed Value x 1.5
Agricultural = Assessed Value x 1.0
Education = Assessed Value x 1.0

Government = Assessed Value x 1.0
Religious = Assessed Value x 1.0

The resulting Modified Building Inventory was used in the GIS analyses.

In order to estimate anticipated damages associated with each flood in Fulton County and communities, it was estimated that 25% of structures in the flood zones would be destroyed, 35% of structures would be 50% damaged, and 40% of structures would be 25% damaged. **Table 3-11** identifies the estimated losses associated with structures in the floodway, the 1% AEP (100-year floodplain), and the 0.2% AEP (500-year floodplain) areas by community within Fulton County.

Table 3-11 Manual GIS Analysis Utilizing Best Available Floodplain Data and Fulton County Building Inventory

	FLOODWAY		1%		0.2%		UNNUMBERED	
	#	$	#	$	#	$	#	$
Fulton County	0	0	0	0	0	0	206	$12.9M
Town of Akron	0	0	0	0	0	0	0	0
Town of Fulton	0	0	0	0	0	0	0	0
Town of Kewanna	0	0	0	0	0	0	0	0
City of Rochester	0	0	0	0	0	0	25	$2.6M
Total	0	0	0	0	0	0	**231**	**$15.5M**

Structures and damages within each zone are not inclusive

Utilizing the same GIS information and process, critical infrastructure within each of the Special Flood Hazard Areas (SFHA) in Fulton County was assessed. Within Fulton County there are three critical structures, all dams, located in the Zone A.

Utilizing the information in Table 3-11 regarding the number of structures within each Flood Hazard Area, it is also important to note the number of flood insurance policies within each area in Fulton County. **Table 3-12** provides the comparison between the number of structures in the SFHA and the number of flood insurance policies. It is also important to note that flood insurance is voluntary unless the property owner carries a federally subsidized mortgage; insurance coverage may be discontinued when the mortgage is completed.

Table 3-12 Number of Structures in the SFHA and Number of Flood Insurance Policies

COMMUNITY	# STRUCTURES IN SFHA	# POLICIES
Fulton County	0	42
Town of Akron		
Town of Fulton		
Town of Kewanna		
City of Rochester	0	8
Total	**0**	**50**

(IDNR, 2019)

Future Considerations

As the municipalities within Fulton County continue to grow in population, it can be anticipated that the number of critical and non-critical infrastructure will also increase accordingly. Location of these new facilities should be carefully considered and precautions should be encouraged to ensure that school, medical facilities, community centers, municipal buildings, and other critical infrastructure are located outside the 0.2% AEP (500-year) floodplain and/or are protected to that level along with a flood-free access to reduce the risk of damages caused by flooding and to ensure that these critical infrastructure will be able to continue functioning during major flood events. Flooding due to poor drainage, low-lying land, or flash flooding is also an important consideration. It will be important for recognition of potential flood impacts to residents and businesses in these areas to be coupled with proper planning for future development and redevelopment of the flood zones.

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 and fluvial erosion hazard areas, are well informed about the potential impacts from flooding incidents as well as proper methods to protect themselves and their property.

Increased precipitation, as predicted in the Indiana Climate Change Assessment, is anticipated to come in the form of heavier, shorter events which lead to the increased potential for flooding and stress on infrastructure such as sanitary and storm sewers. Heavy precipitation events are anticipated to occur more frequently as temperatures rise, replacing rain when previously there was snow.

Despite these efforts, the overall vulnerability and monitory value of damages is expected to increase in the area unless additional measures, such as those discussed later in Chapter 4 of this report, are implemented.

Indirect effects of flooding may include increased emergency response times due to flooded or redirected streets (**Figure 3-15**), the danger of 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. As many communities within Fulton County are closely tied to the river systems, special events occurring near to or on these rivers and waterways may be cancelled or postponed during periods of flooding or high-water levels.

Flood: Relationship to Other Hazards

Figure 3-14 Fire Engine in Flood Waters

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.

Increased volumes of water during a flood event may also lead to a dam failure. As the water levels rise in areas protected by dams, at some point, these structures will over-top or will breach leading to even more water released. These two hazards, flood and dam failure, when combined, may certainly result in catastrophic damages.

In a similar fashion, a snow 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.

Flooding in known hazard areas may also be caused by dams that experience structural damages or failures not related to increased volumes or velocities of water. These "sunny day failures", while not typical, may occur wherever these structures exist.

3.3.6 Hailstorms, Thunderstorms, and Windstorms

Hailstorms, Thunderstorms, and Windstorms: Overview

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 (**Figure 3-16**), 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, lightning, 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 lightning. Although most lightning 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: Recent Occurrences

Figure 3-15 Damaging Hail on Vehicles

In Fulton County, the NCDC has recorded 13 hailstorms and 31 thunderstorms/windstorms between January 2011 and March 2019. The largest recorded hailstone was 1.50 inches in diameter and has occurred only once during this planning effort. The average diameter hailstone occurring throughout Fulton County is approximately 1.0 inch.

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 Fulton County, NCDC reports 27 instances between January 2011 and March 2019 where top wind speeds were greater than 60 mph.

NCDC does not indicate any recorded damages for hailstorms, thunderstorms, and windstorms throughout Fulton County, and no injuries or deaths have been associated with these events. Many event reports included in the NCDC did not provide descriptive information on the social, physical, and economic losses resulting from individual storms specific to the County.

According to the Institute for Business and Home Safety, central Indiana can expect to experience damaging hailstorms three to four 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 Committee determined the probability of a hailstorm, thunderstorm, or windstorm occurring in Fulton County is "Likely" and will typically affect broad portions of the county at one time resulting in potentially "Significant" 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 Committee feels that the warning time is anticipated to be less than six hours and the duration is expected to last less than one day.

Indicative of a regional hazard, the probability, magnitude, warning time, and duration of a hailstorm, thunderstorm, or windstorm are expected to be much the same throughout the county. These events 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 provided in **Table 3-13**.

Table 3-13 CPRI for Hailstorm, Thunderstorm, and Windstorm

	PROBABILITY	MAGNITUDE / SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Likely	Significant	< 6 Hours	< 1 Day	Severe
Town of Akron	Likely	Significant	< 6 Hours	< 1 Day	Severe
Town of Fulton	Likely	Significant	< 6 Hours	< 1 Day	Severe
Town of Kewanna	Likely	Significant	< 6 Hours	< 1 Day	Severe
City of Rochester	Likely	Significant	< 6 Hours	< 1 Day	Severe

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 Committee, it was determined that all areas within the county are anticipated to experience a hailstorm, thunderstorm, or windstorm within the calendar year. More likely, these 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 Fulton 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

Figure 3-16 Home Damaged During Windstorm

Due to the unpredictability of this hazard all critical infrastructure and non-critical structures in Fulton 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 infrastructure or non-critical structures 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. 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. Damages from falling limbs or uprooted trees such as shown in **Figure 3-17**, are common.

Future Considerations

As the populations of the communities in Fulton County 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 include power outages caused by downed tree limbs, damages resulting from prolonged power outages, and damages to structures or property as a result of debris.

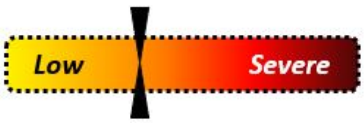
Hailstorm, Thunderstorm, and Windstorm: Relationship to Other Hazards

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 Fulton 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. High winds may also lead to structural damages to a dam or may cause damages to nearby trees or other structures, leading to indirect damages to the dam.

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.

3.3.7 **Landslide/Subsidence**



Landslide/Subsidence: Overview

The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over steepened slope is the primary reason for a landslide, there are other contributing factors. For example, erosion by rivers, glaciers, or ocean waves can cause rock to fall. Rock and soil slopes may be weakened through saturation by snowmelt or heavy rains, earthquakes can create stresses that make weak slopes fail, and excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or man-made structures that may stress weak slopes to the point of collapse.

Land subsidence, according to the USGS, is "a gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials". Further, there are three processes that attribute to subsidence: compaction of aquifer systems, drainage and subsequent oxidation of organic soils, and dissolution and collapse of susceptible rocks.

Landslide/Subsidence: Recent Occurrences

The potential for any of landslides or land subsidence within Fulton County was discussed by the Planning Committee. To the knowledge of the Planning Committee, there are no Karst areas, underground mines, or many existing areas where a landslide could occur. To date, there has not been any landslides or subsidence events in Fulton County.

The Committee determined the probability of a landslide or subsidence occurring in Fulton County is "Unlikely" resulting in potentially "Negligible" damages. Currently, the Committee feels that the warning time is anticipated to be less than six hours and the duration is also expected to last less than six hours. These events are highly unpredictable and the risk, although very low according to the Committee, is distributed throughout the county. Therefore, the CPRI values reflect the distributed risk and associated priority for a landslide or subsidence event. A summary is provided in **Table 3-14.**

Table 3-14 CPRI for Landslide/Subsidence

	PROBABILITY	MAGNITUDE / SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Unlikely	Negligible	< 6 Hours	< 6 Hours	Low
Town of Akron	Unlikely	Negligible	< 6 Hours	< 6 Hours	Low
Town of Fulton	Unlikely	Negligible	< 6 Hours	< 6 Hours	Low
Town of Kewanna	Unlikely	Negligible	< 6 Hours	< 6 Hours	Low
City of Rochester	Unlikely	Negligible	< 6 Hours	< 6 Hours	Low

Landslide/Subsidence: Assessing Vulnerability

Fulton County, without the presence of Karst geology or underground mines, is at a low risk of land subsidence or sink holes. Fluvial erosion, or erosion and failures along water courses, were considered within the flood discussion. Further, as there is little relief within the majority of the county, landslides are not considered, by the Planning Committee, to be of much concern.

The effects of a landslide or subsidence event may be minimal to extensive in nature and may affect small or broad ranges of land area. Within Fulton County, direct and indirect effects may include:

Direct Effects:

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

Indirect Effects:

- Increased response time for emergency vehicles
- Losses associated with affected land (crop loss)
- Potential contamination of groundwater resources

Estimating Potential Losses

Figure 3-17 Home Swallowed by Land Subsidence

Due to the unpredictability of this hazard all critical infrastructure and non-critical structures in Fulton County are at risk of damage including temporary or permanent loss of function. For landslide and subsidence, it is difficult to isolate specific critical infrastructure or non-critical structures that would be more or less vulnerable to damages. However, areas where karst geology or underground mines have been identified may be at a higher risk of property damages following these events (**Figure 3-18**). To prepare a basic "what-if" scenario, the Indiana karst geology and underground mines GIS layers were overlaid onto aerial photography and parcel data provided by the County. There are no areas of Karst geology or underground mines within Fulton County.

Future Considerations

As the populations of the communities in Fulton County 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 landslide or land subsidence, soils GIS layers should be integrated into the building permit or approval process.

Indirect effects resulting from a landslide or land subsidence event can include power outages caused by downed tree limbs, increased response times for emergency personnel if transportation routes are damaged, and potentially shot down of businesses.

Landslide/Subsidence: Relationship to Other Hazards

A landslide or a subsidence may be the precursor for other hazards. Depending on the location of the event, material storage containers can become damaged resulting in a spill or release of materials and potentially contaminating groundwater reserves. Dam failures may occur in much the same fashion if located in the potential hazard areas, or resulting from heavy saturation following a rainstorm, heavy snow, or rapid snow melt.

Similarly, these types of an event may be caused by hail, thunder, or windstorms and their effects on the soils; an earthquake may release the ground enough to set a slide in motion; or a flood may add increased soil saturation or weight to at-risk areas increasing the potential for an event and resulting damages.

3.3.8 **Tornado**

Tornado: Overview

Tornadoes 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 wall 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-clown debris. Tornado season is generally April through June in Indiana, although tornadoes can occur at any time of year. Tornadoes 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 as shown in **Figure 3-19**. Tornadoes occur most frequently in the United States east of the Rocky Mountains. Tornadoes in Indiana generally come from the south through the east.

Figure 3-18 Funnel Cloud During a Lightning Storm at Night

While most tornadoes (69%) have winds of less than 100 mph, they can be much stronger. Although violent tornadoes (winds greater than 205 mph) account for only 2% of all tornadoes, 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: Recent Occurrences

The classification of tornadoes utilizes the Enhanced Fujita Scale of tornado intensity and damages, described in **Table 3-15**. Tornado intensity ranges from low intensity (EF0) tornadoes with effective wind speeds of 65-85 mph to high intensity (EF5+) tornadoes with effective wind speeds of 200+ mph. According to the NCDC, Fulton County has not experienced a tornado within this planning effort, or between January 2011 and March 2019.

Table 3-15 Enhanced Fujita Scale of Tornado Intensity

EF-SCALE	WINDS	CHARACTER OF DAMAGE	RELATIVE FREQUENCY	TYPICAL DAMAGES
EF0	65-85 mph	Light damage	29%	Shallow rooted trees blown over; damage to roofs, gutters, siding
EF1	86-110 mph	Moderate damage	40%	Mobile homes overturned, roofs stripped, windows broken
EF2	111-135 mph	Considerable damage	24%	Large trees snapped, light-object missiles generated, cars lifted
EF3	136-165 mph	Severe damage	6%	Severe damages to large buildings, trains overturned
EF4	166-200 mph	Devastating damage	2%	Whole houses destroyed, cars thrown
EF5	200+ mph	Incredible damage	<1%	High-rise buildings with significant damage, strong framed homes blown away

Figure 3-19 May 2019 Tornado Damage

A tornado reported by ABC57 and not yet reported by the NCDC touched down near Akron Indiana on May 27, 2019 around 8:00pm. Several residents reported downed trees and damages to homes, barns and other structures. Roads were closed due to downed trees and limbs and according to the resident interviewed, the tornado path followed 1500 N from Macy to near Akron. Damages within Fulton County are pictured in **Figure 3-20**, a photo taken by Kylie Walker of ABC57. According to the news report, no injuries or deaths were reported due to the tornado.

In early August of 2015, a suspected tornado destroyed the roof of Fulton County Historical Society's Round Barn in Rochester. Other buildings, including a jail and cider mill, also sustained damages during the event. Reports of this event provided by the inkFreeNews did not include any reports of injuries or deaths as a result of the event. Damages to the barn are shown in the Fulton County Historical Society's photo, **Figure 3-21.**

Figure 3-20 Round Barn Damages

The Committee estimated the probability of a tornado occurring in Fulton County would be within all areas. While this may not seem to coincide with the number of tornadoes recorded by NCDC, it is the anticipation of the Planning Committee that this hazard may occur. The magnitude and severity of such an event to be "Critical" if a tornado were to strike any of the municipalities. As with many hazardous events, the Committee anticipated a short warning time, less than six hours, and a short duration, also less than six hours. The summary is shown in **Table 3-16**.

Table 3-16 CPRI for Tornado

	PROBABILITY	MAGNITUDE / SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Possible	Critical	< 6 Hours	< 6 Hours	Elevated
Town of Akron	Possible	Critical	< 6 Hours	< 6 Hours	Elevated
Town of Fulton	Possible	Critical	< 6 Hours	< 6 Hours	Elevated
Town of Kewanna	Possible	Critical	< 6 Hours	< 6 Hours	Elevated
City of Rochester	Possible	Critical	< 6 Hours	< 6 Hours	Elevated

The Indiana State Climate Office estimates that throughout Indiana, there is an average of 20 tornado touchdowns per year. Based on the number of tornado touchdowns previously reported through the NCDC and local weather agencies, the Committee determined the general probability of a future tornado occurring in Fulton County is possible (within the five years).

Tornado: Assessing Vulnerability

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

Direct Effects:

- Damages to older construction 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 critical and non-critical structures within the county are at risk of future damage or loss of function. Estimates of potential physical losses were determined through a hypothetical exercise where an F2 intensity tornado traveled through portions of the county. 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 structures in the path of the tornado would be completely destroyed, 35% would be 50% damaged, and 40% would have only 25% damage. These estimations were also determined utilizing three wind speed zones based on distance from the tornado path. Zone A is nearest the center of the tornado path, while Zone C is the farthest from the path and with

a theoretical lower wind speed. **Table 3-17** provides summary data for the hypothetical tornado, which is identified on Exhibit 3.

Table 3-17 Summary of Hypothetical Tornado Damages

	Zone 1		Zone 2		Zone 3		Total	
	#	$	#	$	#	$	#	$
County/Rochester	343	$30.4M	284	$20.5M	259	$18.8M	886	$69.7M

Future Considerations

Within Fulton County, there are numerous events each year that draw thousands of guests. Due to this, it is imperative that the EMA place continued importance on the need to maintain, and as necessary, upgrade their outdoor warning siren coverage. Currently, much of the more populous areas of the County are covered by the audible ranges of the existing outdoor warning sirens. The existing siren locations and their coverage areas are provided in **Figure 3-22**.

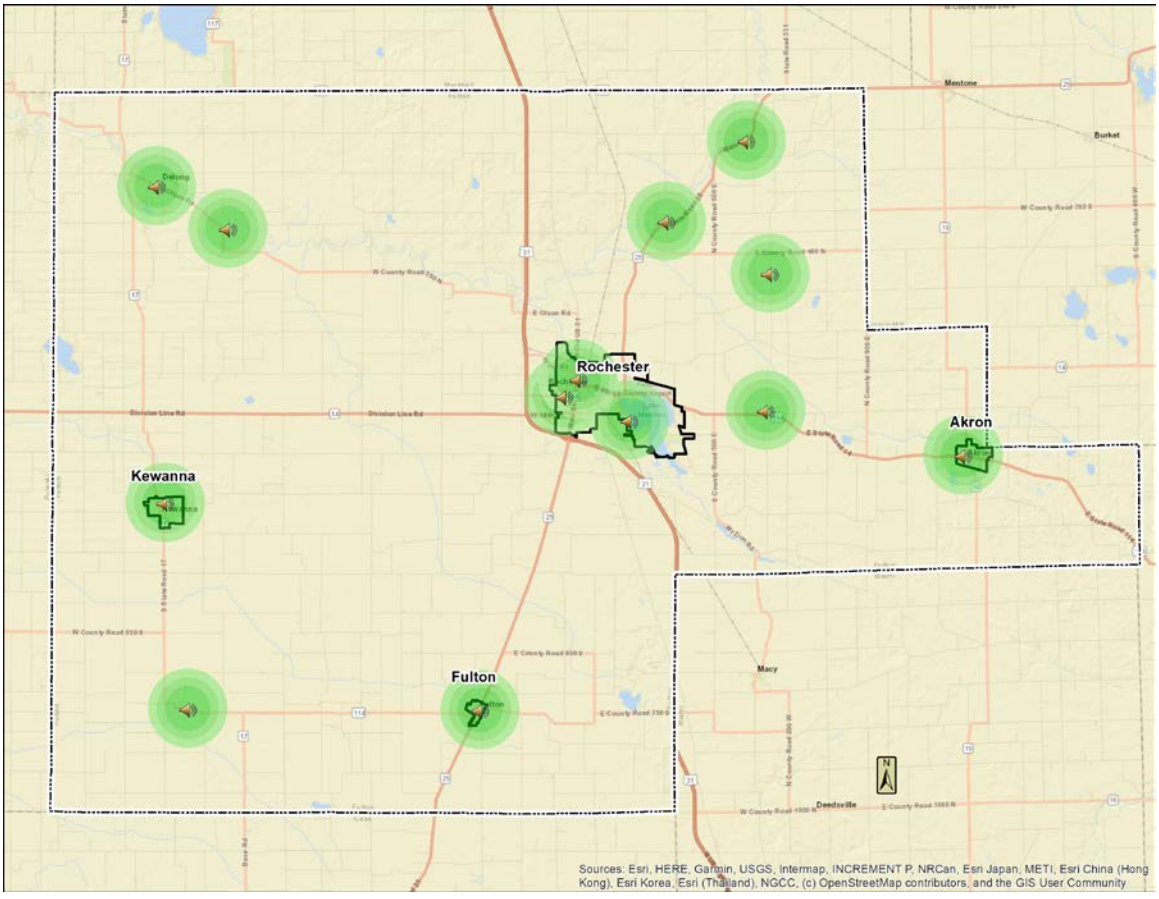


Figure 3-21 Fulton County Outdoor Warning Sirens

While it can be anticipated that new construction associated with development may be stronger than older or existing construction, most of Fulton County will remain

vulnerable in areas left uncovered by outdoor warning sirens. It is impossible to predict the path of a tornado and therefore all current and future development will continue to be at-risk for damages. However, risk to the citizens of Fulton County has been lessened through participation in mass notification programs and outdoor warning siren activations

There may also be 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 business owners 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 of recovery.

Tornado: Relationship to Other Hazards

Tornadoes may result in a hazardous materials incident. Material storage containers can become damaged by high winds and debris 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.

Tornadoes may also result in a dam failure as the increased wind speeds, and debris caused by the tornado, may directly impact the dam, or cause indirect damages through large debris or downed trees. In addition, tornadoes may lead to structural fires as the destruction path is sometimes long and broad, leading to an increased number of potentially damaged homes, exposed power lines, and large amounts of debris.

3.3.9 Winter Storm & Ice

Winter Storm & Ice: Overview

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 four or more inches of snow during a 12-hour period, or six 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.

Figure 3-22 Ice Covered Power Lines

Storm effects such as extreme cold, flooding, and snow and ice accumulation (**Figure 3-23**) 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 Fulton County. Such conditions can result in substantial personal and property damage, even death.

Winter Storm & Ice: Recent Occurrences

Since January 2011, the NCDC has recorded one blizzard, 28 winter weather events, seven winter storms and five heavy snow events. NCDC reports did not include injuries, deaths, or monetary damages associated with any of the events. Narrative descriptions indicated poor travel conditions, power outages and debris associated with similar events.

Typical of a winter storm in Fulton County, the January 19, 2019 event resulted in snow accumulations between four and six inches with approximately five inches in the City of Rochester. To compound issues, wind gusts ranged from 30 to 40 mph causing snow drifts rendering secondary roads impassable. Several accidents and vehicles sliding off the road were reported through local response agencies.

The January 2014 winter storm resulted in a Presidential Declaration of Emergency (FEMA-4173-DR) for Fulton County along with eighteen other counties in Indiana. Public Assistance was made available to certain state and local governments and certain private nonprofit organizations for emergency work and repairs or replacements to facilities damaged in the storm. The NCDC narrative describes snow accumulations ranging between eight and 12 inches with wind gusts between 30 and 40 mph. Local snow emergencies were enacted resulting in school and business closures for the next day.

Similar conditions were reported for the March 6, 2013 heavy snow event. Total snowfall of seven to ten inches were common through the county with the highest report from Akron; nine inches. Hazardous driving conditions resulted in several school closings the following day.

The probability, magnitude, warning times, and duration of a snow storm or ice storm causing disruption to residents and businesses in Fulton County, as determined by the Planning Committee, is expected to be consistent throughout the County and 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 primarily "Significant" severity. The warning time for severe temperatures or several inches of snow associated with a winter storm is usually greater than 24 hours while the duration of the incident is anticipated to last less than one week. A summary is shown in **Table 3-18**.

Table 3-18 CPRI for Winter Storm and Ice

	PROBABILITY	MAGNITUDE / SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Highly Likely	Significant	> 24 Hours	< 1 Week	Severe
Town of Akron	Highly Likely	Significant	> 24 Hours	< 1 Week	Severe
Town of Fulton	Highly Likely	Significant	> 24 Hours	< 1 Week	Severe
Town of Kewanna	Highly Likely	Significant	> 24 Hours	< 1 Week	Severe
City of Rochester	Highly Likely	Significant	> 24 Hours	< 1 Week	Severe

The Planning Committee determined that the probability for a snow storm or ice storm to occur in Fulton 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, snow storms are common within Fulton County and will continue to be an annual occurrence.

Winter Storm & Ice: Assessing Vulnerability

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

Direct Effects:

- More urban area 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 snow storm, it is difficult to quantify potential losses to property and infrastructure. As a result, all critical and non-critical structures and infrastructure are at risk from snow storm and ice storm incidents.

For planning purposes, information collected in snow 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 Fulton County communities. For example, a March 2003 snow storm 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. Snow storms and blizzards also make road travel difficult and dangerous, as in **Figure 3-24**.

Figure 3-23 Travel Impacted During Snow Storm

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, the need to respond to snow storms or ice storms will remain an important municipal effort. As new construction or re-development occurs, especially new or existing critical

infrastructure, 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 & Ice: Relationship to Other Hazards

Figure 3-24 Flooding Caused by Snow Melt

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 (**Figure 3-25**) as well as within the stream or river channel. The increased flooding may then lead to a dam failure within the same area, further exacerbating the damages.

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 Fulton 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

3.3.10 Dam Failure

Dam Failure: Overview

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams typically are constructed of earth, rock, concrete, or mine tailings. A dam failure is a collapse, breach, or other failure resulting in downstream flooding.

A dam impounds water in the upstream area, referred to as the reservoir. The amount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of one foot. As a function of upstream topography, even a very small dam may impound or detain many acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

Of the approximately 80,000 dams identified nationwide in the National Inventory of Dams, the majority are privately owned. Each dam is assigned a downstream hazard classification based on the potential loss of life and damage to property should the dam fail. The three classifications are high, significant, and low. With changing demographics and land development in downstream areas, hazard classifications are updated continually. The following definitions of hazard classification currently apply to dams in Indiana:

- High Hazard Dam: a structure the failure of which may cause the loss of life and serious damage to homes, industrial and commercial buildings, public utilities, major highways, or railroads.
- Significant Hazard Dam: a structure the failure of which may damage isolated homes and highways or cause the temporary interruption of public utility services.
- Low Hazard Dam: a structure the failure of which may damage farm buildings, agricultural land, or local roads.

Dam Failure: Recent Occurrences

Within Fulton County, there are no IDNR regulated High Hazard dams. There are three Significant Hazard Dams: Mount Zion Millpond Dam, Millark Millpond Dam, and Lake Manitou Dam

There have been no recorded dam failures within Fulton County although residents were fearful of an impending failure at Lake Manitou. For this reason, and through several years of effort and planning, a new structure was opened in December 2011. Several state and local agencies worked to provide funding for the construction of the new dam, associated structures, and a bridge over Rain Creek. More recently, ahead of improvements in 2017, an Incident and Emergency Action Plan (IEAP) was developed for Lake Manitou Dam.

Based on the information provided to them, the Committee determined the probability of a dam failure is "Unlikely" due to the inspections associated with the dams. Anticipated damages from a failure range from "Significant" damages (areas near structures without potential inundation mapping) to "Critical" damages for those areas in the identified potential inundation area of Lake Manitou. For a dam failure that occurs on a sunny day, the warning time is anticipated to be less than six hours (those areas without a dam will have a much longer warning time); and the duration is anticipated to last less than one week. **Table 3-19** provides a summary of the Planning Committee's expectations during a dam failure.

Table 3-19 CPRI for Dam Failure

	PROBABILITY	MAGNITUDE / SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Unlikely	Critical	< 6 Hours	< 1 Week	Elevated
Town of Akron	Unlikely	Significant	> 24 Hours	< 6 Hours	Low
Town of Fulton	Unlikely	Significant	> 24 Hours	< 6 Hours	Low
Town of Kewanna	Unlikely	Significant	> 24 Hours	< 6 Hours	Low
City of Rochester	Unlikely	Critical	< 6 Hours	< 1 Week	Elevated

Dam Failure: Assessing Vulnerability

The actual magnitude and extent of damages due to a dam failure depend on the type of breach, the volume of water that is released, and the width of the floodplain valley to accommodate the flood wave. Within Fulton County, direct and indirect effects from a dam failure may include:

Direct Effects:

- Loss of life and serious damage to downstream homes, industrial and commercial buildings, public utilities, major highways, or railroads
- Loss of use of reservoirs for flood control, recreation or water supply

Indirect Effects:

- Loss of land in the immediate scour area
- Increased response times due to damaged or re-routed transportation routes and/or bridges

Due to the conditions beyond the control of the dam owner or engineer, there may be unforeseen structural problems, natural forces, mistakes in operation, negligence, or vandalism that may cause a dam to fail. As discussed previously, Lake Manitou does have an IEAP prepared along with estimated dam failure inundation mapping. An example of such potential mapping is illustrated in **Figure 3-26**.

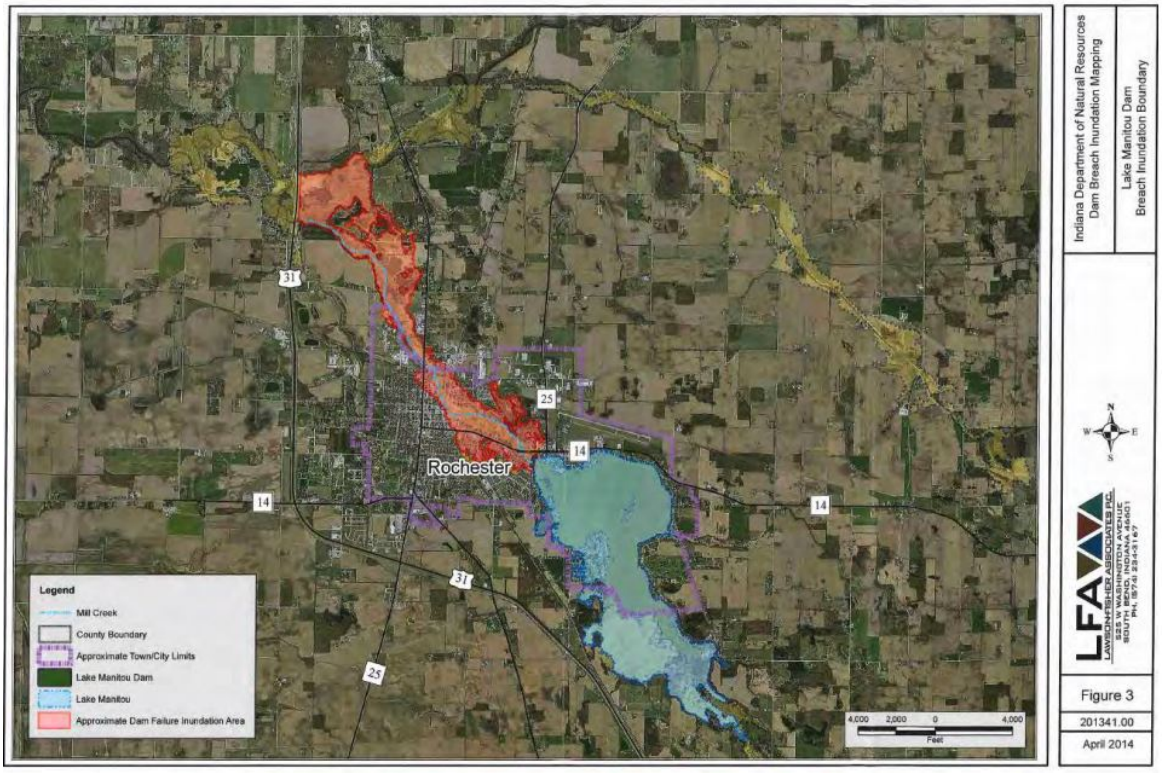


Figure 3-25 Potential Dam Failure Inundation Area, Lake Manitou Dam

Estimating Potential Losses

To provide an example of anticipated damages, the potential dam failure inundation area map (created during the development of the IEAP) for the Lake Manitou Dam was reviewed to estimate the number of critical and non-critical structures that may be affected by a dam failure. The actual magnitude and extent of damages would depend on the type of dam break, volume of water that is released, and the width of the floodplain valley to accommodate the dam break flood wave. The estimated number of structures and the estimated damages are outlined in **Table 3-20**.

Table 3-20 Estimated Lake Manitou Dam Failure Damages

COMMUNITY	ESTIMATED DAMAGES	
	#	$
Rochester	203	$13.8M
Fulton County	30	$3.4M
TOTAL	**233**	**$17.2M**

In addition, the Rochester WWTP, water tower, Duke Electric substation, Rochester Metals, and the hospital are located within the potential dam failure inundation area.

Future Considerations

As areas near existing dams continue to grow in population, it can be anticipated that the number of critical and non-critical structures will also increase accordingly. Location of these new facilities should be carefully considered, and precautions should be taken to ensure that schools, medical facilities, municipal buildings, and other critical infrastructure are located outside of the delineated or estimated dam failure inundation areas. Also, flood-free access should be provided for these facilities.

It is also very important to all downstream communities and property owners that IEAPs are developed, kept up-to-date, and routinely exercised to ensure the greatest safety to those within the hazard area. Large areas of new development have not yet occurred downstream of the significant hazard dams in Fulton County. Until such development or re-development downstream of a dam is prohibited, those areas remain vulnerable to losses and damages associated with a failure of that structure.

It is also very important to all downstream communities and property owners that dam IEAPs are developed, kept up-to-date, and routinely exercised to ensure the greatest safety to those within the hazard areas.

<u>Dam Failure: Relationship to Other Hazards</u>

With the large volumes and velocities of water released during a dam breach, it can be expected a dam failure would lead to flooding within the inundation areas downstream of the dam. Downstream bridges and roads are also in danger of being destroyed or damaged. Bridges may become unstable and portions of road surfaces may be washed away, or the entire road may be undermined. Other infrastructure such as utility poles and lines may be damaged as the water flows along the surface or pipes may become exposed due to scouring; all of which may lead to utility failures within the area downstream of the dam.

Several other independent hazards may also lead to a dam failure. Hazards such as flooding, the melting of snow or ice, or rapid precipitation associated with thunderstorms, may all lead to increased pressure on the dam structures or overtopping of the structures, leading to failure. Additionally, earthquakes or

tornadoes may cause damage to the structures or earthen components of the dam resulting in irreparable damages or failure.

3.3.11 **Hazardous Materials Incident**

Hazardous Materials Incident: Overview

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.

Figure 3-26 Drums of Potentially Hazardous Waste

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 Fulton County and its residents if proper and immediate actions are not taken. Most releases are the result of human error or improper storage (**Figure 3-27**), 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: Recent Occurrences

During conversations with Committee members and through information provided by local news outlets, it was noted that no significant incidents involving manufacturing facilities and transportation routes have occurred since the development of the original MHMP. However, the number of facilities utilizing, storing, and/or manufacturing chemicals and the number of high-volume transportation routes increase the likelihood of an incident.

According to the Committee, the probability of a hazardous materials release or incident is "Possible" within all areas due to the number of facilities and transportation routes within and through the municipalities and unincorporated areas of the county. "Critical" damages are anticipated to result from an incident regardless of the location of the incident. As with hazards of this nature, a short warning time of less than six hours and event duration of less than one day is anticipated. A summary is shown in **Table 3-21**.

Table 3-21 CPRI for Hazardous Materials Incident

	PROBABILITY	MAGNITUDE / SEVERITY	WARNING TIME	DURATION	CPRI
Fulton County	Possible	Critical	< 6 Hours	< 1 Day	Elevated
Town of Akron	Possible	Critical	< 6 Hours	< 1 Day	Elevated
Town of Fulton	Possible	Critical	< 6 Hours	< 1 Day	Elevated
Town of Kewanna	Possible	Critical	< 6 Hours	< 1 Day	Elevated
City of Rochester	Possible	Critical	< 6 Hours	< 1 Day	Elevated

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

Hazardous Materials Incident: Assessing Vulnerability

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

Direct Effects:

- More densely populated areas 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 Fulton 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.

Figure 3-27 Fuel Tanker Fire

In Fulton County, approximately 30 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.

Estimating Potential Losses

In addition, the very nature of these events makes predicting the extent of their damage very difficult. A small-scale spill or release might have a minor impact and would likely require only minimal response efforts. Another slightly larger incident might result in the disruption of business or traffic patterns, and in this situation might require active control response measures to contain a spill or release. On the other hand, even small or moderate events could potentially grow large enough that mass evacuations or shelter in place techniques are needed, multiple levels of response are utilized, and additional hazards such as structural fires and/or additional hazardous materials releases (or explosions) may occur. Given the unpredictable nature of hazardous materials incident, an estimate of potential losses was not estimated.

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. As previously noted, several routes including US Highway 31; SR 14, 17, 19, 25, 110, and 114; are traveled by carriers of hazardous materials. Additionally, the Fulton County Rail and Evansville Western Rail companies have active lines within the county.

By restricting development within the known hazardous materials facility buffer zones, future losses associated with a hazardous materials release can be reduced. Critical infrastructure should be especially 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 infrastructure such as schools, medical facilities, municipal buildings, and daycares. Such construction would likely reduce the risk to highly populated buildings and populations with specials needs or considerations such as children, elderly, and medically unfit.

Local zoning ordinances help to ensure facilities constructed near a hazardous materials facility are similar in nature. This reduces the risk and vulnerability to some

populations. However, there are several existing facilities and numerous transportation routes located throughout each of the communities making current and future development at risk for losses associated with a hazardous materials release.

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.

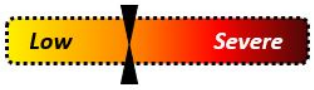
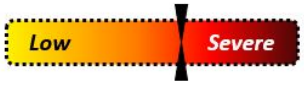
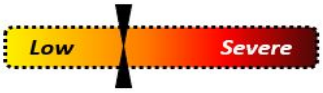
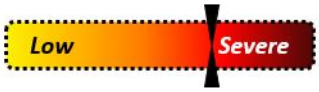
3.4 HAZARD SUMMARY

For the development of this MHMP, the Committee utilized the CPRI method to prioritize the hazards they felt affected Fulton 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 communities.

Table 3-22 summarizes the CPRI values for the various hazards studied within this MHMP.

- Hazards ranked as "Low" were Earthquake and Landslide and Subsidence.
- Hazards ranked as "Elevated" were Dam Failure; Drought; Fire; Flood; Hazardous Materials; and Tornado.
- Hazards ranked as "Severe" were Extreme Temperature; Hail, Thunder, and Windstorms; and Winter Storm and Ice.

Table 3-22 Combined CPRI

TYPE OF HAZARD	LIST OF HAZARDS	WEIGHTED AVERAGE CPRI
Natural	Drought	
	Earthquake	
	Extreme Temperature	
	Fire	
	Flood	
	Hail/Thunder/Windstorm	
	Landslide/Subsidence	
	Tornado	
	Winter Storm/Ice	
Technological	Dam Failure	
	Hazardous Materials Incident	

It can be important to understand the cause and effect relationship between the hazards selected by the 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; tornado; or a winter storm or ice storm (along the side of the table)

Table 3-23 Hazard Relationship Table.

EFFECT → / CAUSE ↓	Drought	Earthquake	Extreme Temperature	Fire	Flood	Hailstorm/ Thunderstorm/ Windstorm	Landslide / Subsidence	Tornado	Winter Storm / Ice	Dam Failure	Hazardous Materials
Drought											
Earthquake				X			X			X	X
Extreme Temperature											X
Fire											X
Flood							X			X	X
Hailstorm/ Thunderstorm/ Windstorm				X	X		X			X	X
Landslide / Subsidence											X
Tornado				X						X	X
Winter Storm/ Ice					X					X	X
Dam Failure					X		X				X
Hazardous Materials				X							

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 hazardous materials facilities. For this reason, the City of Rochester or any other community may be impacted by more than one hazard at a 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 (dam failure inundations 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 infrastructure should not be constructed within these regions.

CHAPTER 4 MITIGATION GOALS AND PRACTICES

This section identifies the overall goal for the development and implementation of the Fulton County MHMP. A summary of existing and proposed mitigation practices discussed by the 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 Committee reviewed the mitigation goals as outlined within the 2011 Fulton County MHMP and determined that each of these remain valid and effective. In summary, the overall goal of the Fulton 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 section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

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 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.

A more recent (2017) study by the National Institute of Building Sciences, reviewed over 20 years of federally funded mitigation grants, not only from FEMA, but also

from the US Economic Development Administration (EDA) and the US Department of Housing and Urban Development (HUD). From this broadened review, it has been determined that for every $1 spent on mitigation, $6 are saved on disaster costs. In addition, by designing and construction buildings which exceed select items in the 2015 International Code, $4 can be saved for every $1 invested in those changes.

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 effort, the 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 Fulton County. Mitigation measures that were included in the 2011 Fulton County MHMP are noted as such.

<u>Emergency Services</u>

- The county has developed a centralized system for testing and operation of outdoor warning sirens, which is operated by Central Dispatch. *(2011 Measure)*
- Weather radios are encouraged and provided throughout the county during presentations, events, and on the EMA website. *(2011 Measure)*
- Stream gages upstream on the Tippecanoe River, the NWS, and other alerts are utilized for flood forecasting and flood warnings for various stream levels. *(2011 Measure)*
- Aubee Twp and Rochester Fire Department have a water rescue team

Natural Resource Protection

- Fulton County is in good standing with the NFIP Program and has flood protection ordinances which meet the minimum requirements.

Prevention

- Information related to hazard mitigation has been incorporated, where appropriate, into individual Comprehensive Land Use Plans, other long-range plans, and decision-making processes.
    - Strategies for future land use decisions highlight the need to adopt and follow strict guidelines for zoning and subdivisions
    - To recognize environmentally sensitive areas, protecting drainage ways and watershed from pollutants. This includes floodplains
- Fulton County utilizes a contract service provide to maintain a GIS database which is used in land use planning decisions and can be utilized in HAZUS-MH "what-if" scenarios and E911 address verification.
- The Fulton County LEPC provides routine training regarding hazard event planning, response, and mitigation *(2011 Measure)*
- Electric providers routinely complete preventative maintenance on trees within the ROW and utility corridor.
- Local developers routinely bury new and retrofitted utilities to minimize exposure to hazards.

Property Protection

- Fulton County and the municipalities follow the International Building Code which includes requirements to minimize damages from natural hazards.
- Several communities and the county have developed protocols for redundant systems and off-site records back-up
- Fulton County does not allow variances to the Floodplain Ordinance *(2011 Measure)*

Public Information

- Outreach materials are routinely provided within office and agencies throughout Fulton County, large public events, speaking opportunities within schools, etc. *(2011 Measure)*
- The EMA partners with WROI 92.1 FM and RTC Channel 4 to provide updates on impending weather and other hazardous events as needed.

Structural Control

- Stormwater conveyances and regulated drains are maintained on a routine basis to prevent localized flooding, increased erosion, and material deposition as a result of rainfall or snowmelt. *(2011 Measure)*
- Fulton County completes an annual bridge survey of 62 bridges, then completes repairs or replacements based on a prioritization and as funding is available *(2011 Measure)*
- The City of Rochester, the owner of Lake Manitou Dam, utilizes a contract service provider to complete inspections and maintenance of the dam.

4.2.2 Proposed Mitigation Practices

After reviewing existing mitigation practices, the Committee reviewed mitigation ideas for each of the hazards studied 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** –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** –mitigation project will be technically feasible, reduce losses in the long-term, and will not create more problems than they solve.
- **Administrative** –mitigation projects may require additional staff time, alternative sources of funding, and have some maintenance requirements.
- **Political** –mitigation projects will have political and public support.
- **Legal** –mitigation projects will be implemented through the laws, ordinances, and resolutions that are in place.
- **Economic** –mitigation projects can be funded in current or upcoming budget cycles.
- **Environmental** –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 Fulton County for implementation. Projects identified by the Committee to be of "high" local priority may be implemented within five years from final Plan adoption. Projects identified to be of "moderate" local priority may be implemented within five to 10 years from final Plan adoption, and projects identified by the Committee to be of "low" local priority may be implemented 10 or more 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 Fulton County. The intent of this planning effort was to identify the hazards and the extent to which they affect Fulton 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 HMGP, PDM, and FMA. 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 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.

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Table 4-1 Proposed Mitigation Practices

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Public Education & Outreach 1. Provide multi-lingual hazard preparedness literature (warning sirens, radio stations, go-kits, insurance protection, etc.) during Severe Weather Awareness Week, at public facilities and events and to populations within known hazard areas such as floodplains, downstream of a dam, near hazmat facilities, etc. *(2011 Measure)*	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☐ Structural Control	☒ Drought ☒ Earthquake ☒ Extreme Temperature ☒ Fire ☒ Flood ☒ Hail/Thunder/Wind ☒ Landslide/Subsidence ☒ Tornado ☒ Winter Storm/Ice ☒ Dam Failure ☒ HazMat Incident	Ongoing – 1. Literature is provided at several public facilities and office locations as well as large public events throughout the County. Populations within the special flood hazard areas are educated through required flood insurance purchases and various website and literature pieces. Proposed Enhancement – 1. Encourage the enhancement of the messages provided to various cultural groups and neighborhoods; Educate landowners within the dam inundation areas of the potential dangers and what to do in an emergency situation. Such as encourage voluntary purchase of federally-subsidized flood insurance; formalize a neighborhood or local campaign where community representatives provide residents with emergency information and protocols.	High	High	EMA Red Cross Mayoral Offices/Town Hall/Council Chambers/Court House *(County, Akron, Kewanna, Fulton, Rochester)* Parks Departments *(County, Rochester)*	Existing budget
Management of Dams 1. Encourage other Significant Hazard dam owners to develop an IEAP.	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☐ Public Information ☒ Structural Control	☐ Drought ☐ Earthquake ☐ Extreme Temperature ☐ Fire ☐ Flood ☐ Hail/Thunder/Wind ☐ Landslide/Subsidence ☐ Tornado ☐ Winter Storm/Ice ☒ Dam Failure ☐ HazMat Incident	**Ongoing –** 1. Lake Manitou dam has an IEAP of which the EMA is familiar **Proposed Enhancements –** 1. Encourage and assist owners of other significant hazard dams in completing an IEAP	High	Moderate	Dam Owners EMA IDNR	Existing budget
Water Conservation 1. Investigate and propose local water conservation ordinance and contingency plans to implement during water shortages 2. Develop standard procedures for issuing a countywide open burning ban during dry periods	☒ Emergency Services ☐ Nat. Res. Protection ☐ Prevention ☐ Property Protection ☒ Public Information ☐ Structural Control	☒ Drought ☐ Earthquake ☐ Extreme Temperature ☒ Fire ☐ Flood ☐ Hail/Thunder/Wind ☐ Landslide/Subsidence ☐ Tornado ☐ Winter Storm/Ice ☐ Dam Failure ☐ HazMat Incident	**Ongoing –** 2. Some areas have banned open burning due to location (next to school) **Proposed Enhancement –** 1. Propose and adopt ordinance for water conservation methods during times of drought 2. Develop standard for issuing countywide ban on recreational open burning no matter location	High	Low	EMA Planning Departments *(County)*	Existing budget

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Emergency Preparedness & Warning 1. Improve disaster preparedness and emergency response within the county through the StormReady Community Program 2. Purchase additional mobile electronic messaging boards and develop protocol for local interactions to provide current hazard information. 3. Create bilingual notifications and hazard preparedness materials (Spanish) 4. Improve disaster preparedness and emergency response at the local level through the VOAD program 5. Increase awareness of hazard broadcast system (NIXLE) to distribute mass notifications to subscribers 6. Improve outdoor warning siren coverage and update existing sirens to alert population of severe weather conditions *(2011 Measure)*	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☐ Structural Control	☒ Drought ☒ Earthquake ☒ Extreme Temperature ☒ Fire ☒ Flood ☒ Hail/Thunder/Wind ☒ Landslide/Subsidence ☒ Tornado ☒ Winter Storm/Ice ☒ Dam Failure ☒ HazMat Incident	**Ongoing –** 2. Few message boards exist in county 3. County and communities have various notifications and materials 4. A VOAD program has been started within the county 5. The county utilizes NIXLE for notifications 6. The County has 14 outdoor warning sirens **Proposed Enhancements –** 1. Achieve certification for Fulton County to be recognized as StormReady 2. Purchase six additional boards and store one board at each Fire Station 3. Increase offerings in Spanish to reach additional populations 4. Increase awareness and participation in the VOAD program and offer routine trainings 5. Develop outreach campaign to increase awareness and participation 6. Investigate potential for additional sirens in [where]	High *(StormReady, mobile message boards, bilingual)* Moderate *(VOAD, NIXLE, sirens)*	High	EMA Purdue Extension /COAD Floodplain Administrator *(County)* NWS/StormReady	Existing budgets Grants
Safer Rooms and Community Shelters 1. Maintain and develop shelter agreements within the County. Potential for tiered levels of shelters, domestic animal shelters, etc. especially in small communities *(2011 Measure)* 2. Clearly advertise location of safer areas and community shelters for large gatherings of people (sporting events, 4H fair, etc.) 3. Develop and a domestic animal friendly evacuation plan and domestic animal friendly shelter	☒ Emergency Services ☐ Nat. Res. Protection ☐ Prevention ☐ Property Protection ☒ Public Information ☒ Structural Control	☐ Drought ☒ Earthquake ☒ Extreme Temperature ☒ Fire ☒ Flood ☒ Hail/Thunder/Wind ☒ Landslide/Subsidence ☒ Tornado ☒ Winter Storm/Ice ☒ Dam Failure ☒ HazMat Incident	**Ongoing –** 1. Shelter locations are spaced throughout the county as available and as needed 2. Signs are provided at baseball fields **Proposed Enhancement –** 1. Continue to determine if additional shelter locations or services are needed 2. Provide additional signage or announcements during events for out-of-town guests 3. Develop plan and shelter for humans and domestic animals	High *(agreements, advertise locations)* Moderate *(animal friendly)*	High	EMA Red Cross	Existing budget Facility owners

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Emergency Response & Recovery 1. Inventory needs for mobile data terminals in response vehicles and purchase and install as prioritized 2. Create a database of at-risk populations and establish procedures to evacuate the population in known hazard areas (SFHA, dam failure, Tier II) 3. Coordinate communications, documentation, and record keeping between communities and agencies including a database of accurate and community specific information following each hazard events 4. Purchase equipment such as ATVs and portable lighting to use in remote areas such as along rivers and trails 5. Purchase additional snow removal equipment and pre-treatment equipment and supplies *(2011 Measure)* 6. Develop additional offerings for a voluntary immunization program for all emergency responders, inspection staff, and families 7. Identify alternate routes to use in case of road closures during a disaster *(2011 Measure)*	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☐ Property Protection ☒ Public Information ☐ Structural Control	☒ Drought ☒ Earthquake ☒ Extreme Temperature ☒ Fire ☒ Flood ☒ Hail/Thunder/Wind ☒ Landslide/Subsidence ☒ Tornado ☒ Winter Storm/Ice ☒ Dam Failure ☒ HazMat Incident	**Ongoing –** 1. Few vehicles in each municipality have terminals 3. Some coordination occurs depending on event and municipality 4. Some vehicles have AWD 5. The county and city have snow removal equipment 6. Some immunizations are offered through county health plan **Proposed Enhancement –** 1. Inventory and prioritize needed hardware and software 2. Develop evacuation routes and protocols for various hazard events 3. Utilize WebEOC or similar program to fully coordinate communications, documentation, and recordkeeping 4. Purchase additional equipment to reach more remote areas 5. Inventory and prioritize needed equipment, purchase as funding is obtained 6. Determine which immunizations are offered and provide additional immunizations based on risks to employees and family members 7. Review areas at risk and develop alternate routes of egress during hazard events	High *(data terminals, at-risk populations, recordkeeping, ATVs, snow equipment)* Moderate *(immunizations, alternate routes)*	Moderate	EMA Sheriff Department Police Departments/Town Marshall *(Rochester)* Fire Departments Health Department County Highway Municipal Street and/or Utility Department *(Rochester)* Building Department *(Rochester)*	Existing budget Grant
Hazardous Materials 1. Review/revise transportation survey to determine typical chemicals and quantities of chemicals being transported through the county *(2011 Measure)* 2. Maintain hazmat response teams, increase personnel and training as funding allows	☒ Emergency Services ☐ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☐ Public Information ☐ Structural Control	☐ Drought ☐ Earthquake ☐ Extreme Temperature ☒ Fire ☐ Flood ☐ Hail/Thunder/Wind ☐ Landslide/Subsidence ☐ Tornado ☐ Winter Storm/Ice ☐ Dam Failure ☒ HazMat Incident	**Ongoing –** 1. Older survey exists 2. No fire personnel are trained to Technician level **Proposed Enhancement –** 1. Completed updated survey on prioritized thoroughfares and utilize the results for training and planning efforts 2. Increase some responders to Technician Level	High *(survey)* Moderate *(response teams)*	Moderate	LEPC EMA Fire Departments INDOT	Existing Budget

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Power Back-Up Generators 1. Designate a fuel reserve transportation route 2. Secure a fuel reserve, or ensure emergency provisions re outlined in contracts, to ensure critical infrastructure may run on power back-up for extended periods of time 3. Inventory, prioritize, and retrofit public facilities and/or critical facilities with appropriate wiring and electrical capabilities for utilizing a large generator for power back up *(2011 Measure)* 4. Investigate the potential to utilize alternative (solar) generators where appropriate	☒ Emergency Services ☐ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☐ Public Information ☒ Structural Control	☒ Drought ☒ Earthquake ☒ Extreme Temperature ☒ Fire ☒ Flood ☒ Hail/Thunder/Wind ☒ Landslide/Subsidence ☒ Tornado ☒ Winter Storm/Ice ☒ Dam Failure ☒ HazMat Incident	**Ongoing –** 2. County vehicles typically are provided fuel as needed 3. Some facilities have wiring or generators **Proposed Enhancements –** 1. Develop route and ensure clear path following hazard events 2. Secure fuel reserve via contract service agreements 3. Inventory and prioritize critical facilities for retrofitting wiring and generator capabilities 4. Determine locations or demonstration sites for alternative generators	High *(fuel route, fuel reserve)* Moderate *(wiring, alternative generators)*	Low	EMA Facility Owners County Highway Department	Existing budget Grant
Building Protection 1. Inventory assets and prioritize needs for additional firefighting equipment of each fire station or first response agency 2. Protect existing critical facilities in floodplains 3. Develop and complete an inventory for at-risk structures (abandoned buildings, blighted areas, etc.) 4. Harden critical or public facilities to withstand severe weather damages *(2011 Measure)* 5. Install inertial valves in critical facilities *(2011 Measure)* 6. Relocate, buyout, or floodproof existing structures subject to repetitive flooding *(2011 Measure)* *(Will assist with NFIP compliance)*	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Drought ☒ Earthquake ☐ Extreme Temperature ☒ Fire ☒ Flood ☒ Hail/Thunder/Wind ☒ Landslide/Subsidence ☒ Tornado ☒ Winter Storm/Ice ☒ Dam Failure ☒ HazMat Incident	**Ongoing –** 3. Rochester has an abandoned building ordinance **Proposed Enhancements –** 1. Complete inventory and prioritization and implement as funding is obtained 2. Protect the existing facilities identified as within the SFHA 3. Develop a method to determine when structures are at-risk and use in conjunction with the abandoned building ordinance 4. Inventory needs of each facility, prioritize on a municipal level and implement upgrades as funding is available 5. Inventory and prioritize the facilities needing inertial valves 6. Continue to work with property owners to relocate, buyout, or floodproof structures in the SFHA or subject to flooding	High *(firefighting needs)* Moderate *(protect critical facilities, at-risk inventory, harden facilities)* Low *(inertial valves, buyout program)*	Moderate	Building Departments *(County/Rochester)* EMA Floodplain Administrators *(County/Rochester)* Property Owners	Grant Existing budget
Community Rating System 1. Reduce flood insurance premiums through participation in the NFIP's CRS Program. *(Will assist with NFIP compliance)*	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☐ Drought ☐ Earthquake ☐ Extreme Temperature ☐ Fire ☒ Flood ☐ Hail/Thunder/Wind ☐ Landslide/Subsidence ☐ Tornado ☐ Winter Storm/Ice ☐ Dam Failure ☐ HazMat Incident	**Ongoing –** 1. None participate in the CRS program **Proposed Enhancement –** 1. Participation from Fulton County and others	Moderate	Moderate	Floodplain Administrator *(County)*	Existing budget

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Floodplain Management 1. Complete flood depth mapping (RiskMAP) to better understand flood risk potential 2. Conduct detailed flood protection studies for problem areas and/or areas with repetitive flooding problems *(2011 Measure)* 3. Conduct stream maintenance in regulated drains to reduce flood risks *(Will assist with NFIP compliance)*	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☐ Drought ☐ Earthquake ☐ Extreme Temperature ☐ Fire ☒ Flood ☐ Hail/Thunder/Wind ☐ Landslide/Subsidence ☐ Tornado ☐ Winter Storm/Ice ☐ Dam Failure ☐ HazMat Incident	**Ongoing –** 3. Stream maintenance occurs largely based on complaints and available funding **Proposed Enhancements –** 1. Prioritize areas for RiskMAP studies and complete as feasible 2. Complete studies to determine reason for repetitive flooding as well as potential mitigation measures 3. Continue to conduct stream maintenance with input from completed studies and response agencies	Moderate *(RiskMAP, detailed flood studies, stream maintenance)*	Moderate	Floodplain Administrators *(County/Rochester)* Fulton County Surveyor	Existing budget Grant
Flood Protection 1. Inventory roads that frequently flood and prioritize for elevation or other measures to mitigate flooding *(2011 Measure)* *(Will assist with NFIP compliance)*	☐ Emergency Services ☐ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☐ Public Information ☒ Structural Control	☐ Drought ☐ Earthquake ☐ Extreme Temperature ☐ Fire ☒ Flood ☐ Hail/Thunder/Wind ☐ Landslide/Subsidence ☐ Tornado ☐ Winter Storm/Ice ☐ Dam Failure ☐ HazMat Incident	**Ongoing –** 1. Few roads have been identified **Proposed Enhancements –** 1. Complete a countywide inventory and prioritization	Moderate *(inventory roads)*	Moderate	Floodplain Administrator *(County)* Fulton County Surveyor	Existing budget Grant
Geographic Information Systems 1. Train responders in basic GIS to use mobile terminals when preparing for or responding to hazard events	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Drought ☒ Earthquake ☒ Extreme Temperature ☒ Fire ☒ Flood ☒ Hail/Thunder/Wind ☒ Landslide/Subsidence ☒ Tornado ☒ Winter Storm/Ice ☒ Dam Failure ☒ HazMat Incident	**Ongoing –** **Proposed Enhancement –** 1. GIS training for response staff	Moderate	Low	GIS Contract Service Provider LEPC	Existing Budget

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 BUILDING PROTECTION

Inventory assets and prioritize needs for additional firefighting equipment of each fire station or first response agency

- Develop and prioritize list of needed equipment at each fire station or first response agency
- Aggregate list to develop a Fulton County listing of needed equipment
- Seek and obtain funding through grants or municipal budgets
- Purchase as funding is obtained

5.2 EMERGENCY PREPAREDNESS & WARNING

Improve disaster preparedness and emergency response within the county through the StormReady Community Program

- Prepare community and hazard specific materials
- Offer StormReady Community events and outreach efforts throughout the county to increase awareness
- Document information as necessary for annual evaluation

Purchase additional mobile electronic messaging boards and develop protocol for local interactions to provide current hazard information.

- Inventory existing mobile message boards
- Determine need for additional message boards and best storage location
- Develop SOP for message board use, storage, and maintenance

Create bilingual notifications and hazard preparedness materials (Spanish)

- Develop partnership with professional translator
- Provide existing materials to be translated
- As materials are prepared, provide to Spanish-speaking community in appropriate locations and through appropriate methods

5.3 EMERGENCY RESPONSE AND RECOVERY

Inventory needs for mobile data terminals (hardware or software) in response vehicles and purchase and install as prioritized

- Work with municipal liaisons to inventory existing terminals, software, and accessories throughout all response agencies (fire, police/sheriff, EMS)
- Determine needs to adequately cover each community and to allow cross-communication between agency and between community
- Prioritize purchases, upgrades, or training and implement as feasible.

Create a database of at-risk populations and establish procedures to evacuate the population in known hazard areas (SFHA, dam failure, Tier II)

- Develop protocols for database management such as access, updates, and information requested
- Determine which at-risk populations are located in hazard areas such as SFHA, potential dam failure inundation areas, and within hazmat facility buffers
- Develop evacuation procedures based on type of hazard event and needs of populations involved
- Coordinate with facility liaisons to review procedures annually

Coordinate communications, documentation, and record keeping between communities and agencies including a database of accurate and community specific information following each hazard events

- Review current protocols for post-event communications
- Utilize existing IDHS software or develop a county-wide database
- Review database with each municipality to review what information should be collected and reported in a consistent manner

Purchase equipment such as ATVs and portable lighting to use in remote areas such as along rivers and trails

- Research available equipment and accessories needed for remote area function
- Ensure compatibility with current equipment (generator, hauling/towing, etc.)
- Obtain funding, purchase equipment

Purchase additional snow removal equipment and pre-treatment equipment and supplies

- Develop and prioritize list of needed equipment
- Seek and obtain funding through grants or municipal budgets
- Purchase as funding is obtained

5.4 HAZARDOUS MATERIALS RESPONSE

Review/revise transportation survey to determine typical chemicals and quantities of chemicals being transported through the county

- Complete transportation study
- Survey the chemicals and quantities of chemicals that are routinely transported through Fulton 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

5.5 MANAGEMENT OF DAMS

Encourage Mount Zion Dam and Millark Dam (both significant hazard dams) owners to develop an IEAP

- Meet with dam owners to review example IEAPs and inundation mapping to better understand the IEAP products and information
- Collaborate to develop an IEAP for the dam
- Prepare the exercise to provide training to appropriate planning and response agencies within the area.
- Partner with the dam owner and IDNR to provide outreach materials to property owners within the inundation area

5.6 POWER BACK-UP GENERATORS

Secure a fuel reserve so critical infrastructure may run on power back-up for extended periods of time

- Determine where county and municipal vehicles (and generators) routinely receive fuel
- Review contract language to ensure municipal and critical facilities have ability to receive fuel prior to other clients
- If necessary, add such language to contracts

Designate a fuel reserve transportation route

- Determine most efficient route between municipal fleet and fuel reserve
- Map route and provide to highway or street department as a prioritized route for immediate debris clearing

5.7 PUBLIC EDUCATION AND OUTREACH

Provide multi-lingual hazard preparedness literature (warning sirens, radio stations, go-kits, insurance protection, etc.) during Severe Weather Awareness Week, at public facilities and events and to populations within known hazard areas such as floodplains, downstream of a dam, near hazmat facilities, etc.

- Review existing materials provided by Federal, State, and local programs
- Determine if materials need to be revised, additional hazards need to be covered, or if distribution methods need to be revised
- Develop or provide additional materials targeting at risk populations or areas based on hazards

5.8 SAFER ROOMS AND COMMUNITY SHELTERS

Maintain and develop shelter agreements within the County. Potential for tiered levels of shelters, domestic animal shelters, etc. especially in small communities

- Review locations and capabilities of existing shelters within the county
- Determine if adequate coverage is provided in populated areas or in centralized areas of the unincorporated areas within the county
- Determine if alternative shelters are available (those which may not be Red Cross certified but may be suitable for short term shelter at the agreement of the client)
- Determine need for sheltering of domestic animals; develop appropriate plans and shelter agreements

Clearly advertise location of safer areas and community shelters for large gatherings of people (sporting events, 4H fair, etc.)

- Partner with event representatives to assess methods possible to advertise safe locations in case of emergencies
- Incorporate advertisement of safe locations into early planning and coordination steps of events such as sporting events, community festivals, and large outdoor events

5.9 WATER CONSERVATION

Propose and adopt a water conservation ordinance and contingency plans to implement during water shortages

- Review language from existing water conservation ordinances
- Localize language to make specific to Fulton County and municipalities
- Develop contingency plans for water usage, restrictions, and bans

- Propose and support ordinance and plans before councils

Develop standard protocol for issuing an open burning ban during dry periods

- Review example "burn ban" language and protocols from neighboring areas
- Develop Fulton County specific protocols for each municipality
- Propose and support before appropriate councils

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 Fulton County, it is important that implementation of this MHMP be monitored, evaluated, and updated. The 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 community. Depending on grant opportunities and fiscal resources, mitigation practices may be implemented independently, by individual communities, or through local partnerships. Therefore, the successful implementation of this MHMP will require the participation and cooperation of the entire Committee to successfully monitor, evaluate, and update the Fulton County MHMP.

The EMA Director will reconvene the MHMP Committee on an annual basis and follow 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 10** 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 infrastructures, the risk assessment and vulnerability analysis.

DMA 2000 requires local jurisdictions to update and resubmit their MHMP within five years (from the date of FEMA approval) to continue to be eligible for mitigation project grant funding. In early 2024, the EMA Director will once again reconvene the MHMP 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 Fulton 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 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 Fulton 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 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 discouraging development of new critical infrastructure in known hazard areas.

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 Fulton County MHMP. Comments gathered from the public on the MHMP will be received by the EMA Director and forwarded to the MHMP 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 EMA Office and the Fulton County website.

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

The 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.

CHAPTER 7 REFERENCES

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