NEWTON COUNTY MULTI-HAZARD MITIGATION PLAN

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EXECUTIVE SUMMARY

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

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. Further, it is required that local jurisdictions review, revise, and resubmit the MHMP every five years. As representatives from **Newton County, Brook, Goodland, Kentland, Morocco, and Mount Ayr** have provided information, attended meetings, and participated in the planning process, the planning process used to update the Newton County MHMP satisfies the requirements of a multi-jurisdictional plan.

During Planning Committee meetings, those in attendance revisited existing (in the 2010 MHMP) and identified new critical facilities and local hazards; reviewed the State's mitigation goals and updated the local mitigation goals and updated the local mitigation goals; reviewed the most recent local hazard data, vulnerability assessment, and maps; evaluated the effectiveness of existing mitigation measures and identified new mitigation projects; and reviewed materials for public participation. Meetings were also conducted with key groups such as city planners and various emergency responders and their information will continue to be incorporated into the MHMP update.

Risk Assessment

The risk assessment conducted for the Newton County MHMP is based on the methodology described in the Local Multi-Hazard Mitigation Planning Guidance published by FEMA in 2013 and is incorporated into the following sections:

1. **Hazard Identification** lists the natural, technological, and political hazards selected as having the greatest direct and indirect impact to the county as well as the system used to rank and prioritize the hazards.
2. **Hazard Profile** for each hazard, discuss the 1) historic data relevant to the municipalities where available; 2) vulnerability in terms of number and type of structures, repetitive loss properties (flood only), estimation of potential losses, and impacts based on an analysis of development trends; and 3) the relationship to other hazards identified.
3. **Hazard Summary** provides an overview of the risk assessment process; a table summarizing the relationship of the hazards; and a composite map to illustrate areas impacted by hazards.

When considering the hazards selected for study (drought; earthquake; extreme temperature; fire; flood; hail, thunder, wind; land subsidence; snow and ice storm; tornado; dam/levee failure; and hazardous materials incidents) and the information obtained regarding the hazard profile and the hazard summary, the attached table identifies the hazards studied and ranking outcome. The ranking is completed utilizing the Calculated Risk Priority Index (CPRI), a tool by which individual hazards are evaluated and ranked according to an indexing system considering probability, magnitude, warning time, and duration for any hazard.

1. **Probability** is defined as the likelihood of the hazard occurring over a given period.

2. **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.
3. **Warning Time** is defined as the length of time before the event occurs.
4. **Duration** is defined as the length of time that the actual event occurs. This does not include response or recovery efforts.

Mitigation Goals and Practices

The overall goal of the Newton 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.

As part of the planning process the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements, as well as suggested new practices. To provide further detail, information on the local status, local priority, benefit-cost ratio, project location, responsible entity, and potential funding source will be included with regard to each proposed practice. Those practices ranked by participants as a high priority are anticipated to be implemented within five years from the final Plan adoption and additional steps, or an implementation plan is included for each.

Plan Maintenance

The successful implementation of the MHMP will require the participation and cooperation of the entire Planning Committee to successfully monitor, evaluate, and update the Newton County MHMP. Local jurisdictions are required to update and resubmit the MHMP every five years. 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 Newton County.

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/Levee Failure	
	Hazardous Materials Incident	

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** includes four phases:

Figure 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 Newton 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 & 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 Newton 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.

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 Newton County MHMP Update is a multi-jurisdictional planning effort led by the Newton County Emergency Management Agency (EMA). This Plan was prepared in partnership with Newton County, the towns of Brook, Goodland, Kentland, Morocco, and Mount Ayr. 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 Newton 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 three 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 is 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 Newton County participate in the CRS.

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

1.3 ANALYSIS 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 Newton 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 2010 MHMP took 15 months. This included a review period by IDHS and FEMA for the draft MHMP Update, and time for Newton County and communities to adopt the final MHMP Update.

1.3.1 Planning Committee

In March of 2020, 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 2010. **Table 1** lists the individuals that actively participated on the Committee and the entity they represented.

Table 1: MHMP Update Committee

Name	Office	Representing
Ray Chamber	EMA Director	Newton County
Brianna Ciara	Executive Director, Newton Soil and Water Conservation District	Newton County
Mike Clements	Captain, Morocco Vol. Fire Department	Town of Morocco
Kim Durham	Public Health, Newton County Health Department	Newton County
Dillon Hall	Town Marshal	Town of Goodland
Nikki Hanger	Lake Twp Trustee	Newton County
Jim Large	E911 Director / Kentland Vol Fire Department	Newton County / Town of Kentland
Howard Marshall	Water and Sewage Committee	Town of Mount Ayr
David Pluimer	Superintendent, Highway Department	Newton County
Jane Risky	Iroquois Township Trustee	Newton County
Jacob Shufflebarger	Newton County Maintenance Technician	Newton County
Nick Snodgrass	Superintendent	Town of Brook

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 2010 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 also reviewed a draft MHMP, provided comments and suggestions, and assisted with adoption of the Newton County MHMP Update.

1.3.2 Public Involvement

A draft of the Newton County MHMP Update was posted to the Newton County website (www.newtoncounty.in.gov) for public review and comment. A media release indicating the posting of the draft MHMP and the ability to comment was submitted for publishing to *The Newton County Enterprise*. Committee members were provided with an informational flyer regarding the same information to display in their respective offices and to provide to family, friends and colleagues. The media release, informational flyer, and any comments received are included in **Appendix 3**. [add comments when received]

1.3.3 Involvement of Other Interested Parties

Neighboring EMAs (Benton, Jasper, and Lake Counties in Indiana, as well as Iroquois and Kankakee Counties in Illinois) were also invited to review and comment on the MHMP update. Information related to the planning process and the availability of the draft Newton County MHMP was directly provided to such potentially interested parties via personal conversations, informational flyer, and email correspondence. Successful implementation and future updates of the Newton County MHMP Update will rely on the partnership and coordination of efforts between such groups.

REQUIREMENT §201.6(c)(1):
The plan shall include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

1.4 PLANS, STUDIES, REPORTS, AND TECHNICAL INFORMATION

During the development of the Newton 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 Newton County MHMP, and to assist the Committee in developing potential mitigation measures to reduce the social, physical, and economic losses associated with hazards affecting Newton County.

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

- Town of Morocco Municipal Code, 2010
- Newton County MHMP, 2010
- GIS data from contractual contacts

Planning and building ordinances and comprehensive planning efforts for many of the other communities do not exist or are not up to date. Several of the small communities are serviced by the county departments.

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, this section contains important background information about the physical, social, and economical composition of Newton County necessary to better understand the Risk Assessment discussed in **Chapter 3**.

Newton County, originally established in 1835, is named for Sgt. John Newton, who served in the American Revolutionary War with Gen. Francis Marion, the Swamp Fox. As the county boundaries were redrawn in 1859 to their current shape, Newton County is the last of the 92 Indiana counties to be organized. The total area of Newton County is approximately 403 square miles. The location of Newton County within the State of Indiana is identified in **Figure 2**.

2.1 POPULATION AND DEMOGRAPHICS

Figure 2 Newton County Location

The most recent data for Newton County estimates that the 2019 population was 13,984, which ranks 82nd in the State. Of that total, the Town of Kentland accounts for 1,668 or 12% of the county's population while the Town of Morocco is the second largest community with 1,094 or 7.8% of the population.

In 2019, the median age of the population in the county was 43.7 years of age. The largest demographic age groups in the county are older adults (45-64) with a population of 3,971 and young adults (25-44 years) with a population of 3,235. Seniors (65+) are the third largest age group with a population of 2,818 individuals living in Newton County. The approximate median household income in 2018 was reported to be $53,060 while the poverty rate in the same year was reported at 10.3% county-wide. In total, 17.3% of households are married with children, and 35.8% of households are married without children.

Within the county, 85.5% of the adults older than 25, have reportedly completed a High School education. Further, 11.2% of those same adults have also completed a Bachelor of Arts or higher degree.

2.2 EMPLOYMENT

US Census data indicate that of the Newton County workforce, 15.4% are employed in government positions. Manufacturing and "other private" account for 11.9% and 9.2% respectively. The total resident labor force according to estimates in 2019 is 7,035 with 289 unemployed and a June 2020 unemployment rate of 10.4% which places Newton County as 39th highest of 92 counties in the State. **Table 2** lists the ten largest employers within Newton County as of 2019.

Table 2: List of Major Employers

Republic (Brook)	South Newton Elementary School (Kentland)
Adkev Inc (Goodland)	Ruan Transportation Mgmt Systs (Fair Oaks)
North Newton High School (Morocco)	Fair Oaks Farms LLC (Fair Oaks)
South Newton High School (Kentland)	Rose Acre Farms Inc. (Brook)
George Ade Memorial Health Care (Brook)	Newton County Sheriff's Office (Kentland)

2.3 TRANSPORTATION AND COMMUTING PATTERNS

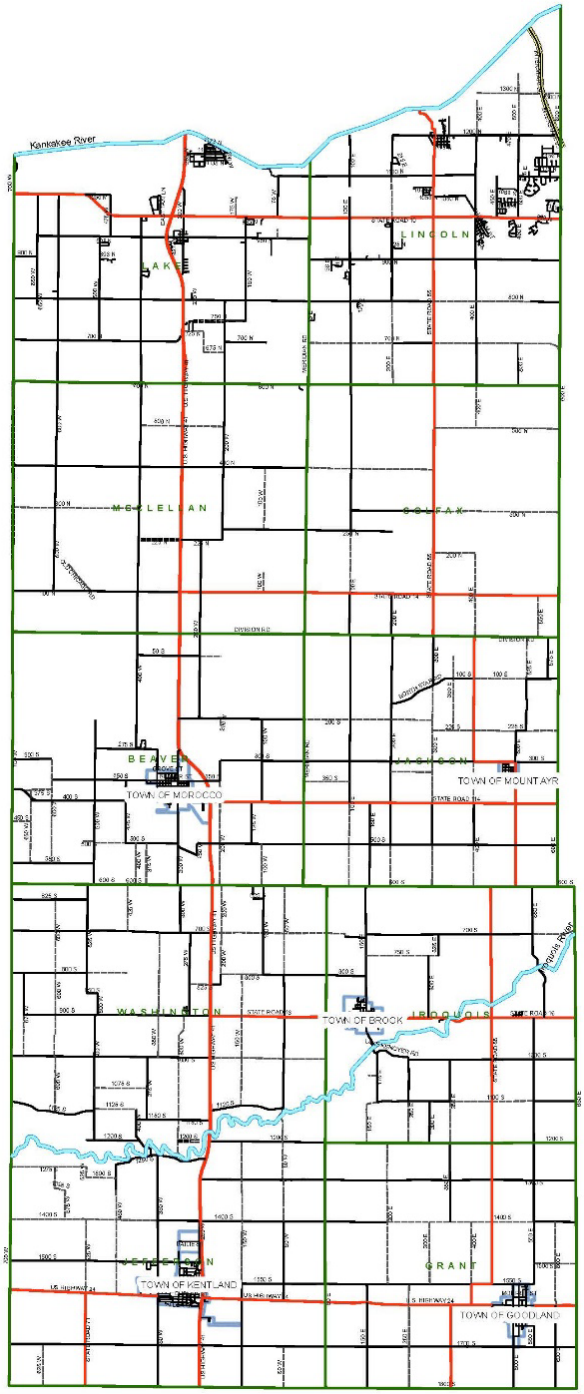


Figure 3 Newton County Transportation Routes

Several major transportation routes pass through Newton County and the municipalities within. Interstate 65; US Highways 24, 41, and 52; and State Roads 10, 14, 16, 55, 71, and 114 serve as main routes between the various municipalities. The CSX, IN and TPW also maintain rail lines which travel through the county in the northeast corner and along the southern border respectively. These transportation routes are identified in **Figure 3** and may also be reviewed on Exhibit 1.

According to STATSIndiana, nearly 800 people commute into Newton County daily. Approximately 40% of commuters travel from Jasper County. Further, approximately 3,000 Newton County residents commute to other counties, with the majority traveling to Lake County (41%).

Figure 4 indicates the number of workers 16 and older who do not live within Newton County but commute into Newton County for employment purposes. Similarly, **Figure 5** indicates the number of Newton County residents 16 and older that commute out of the county for employment.

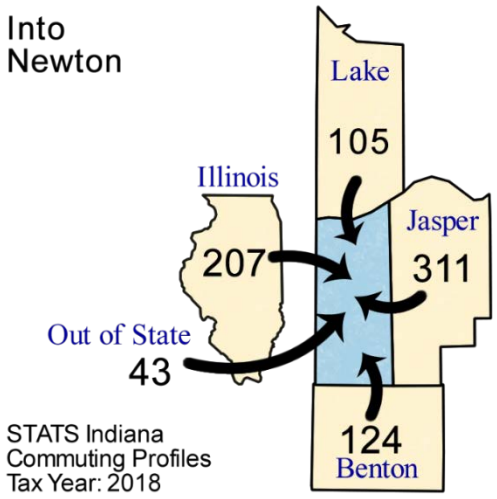


Figure 4 Workers into Newton County

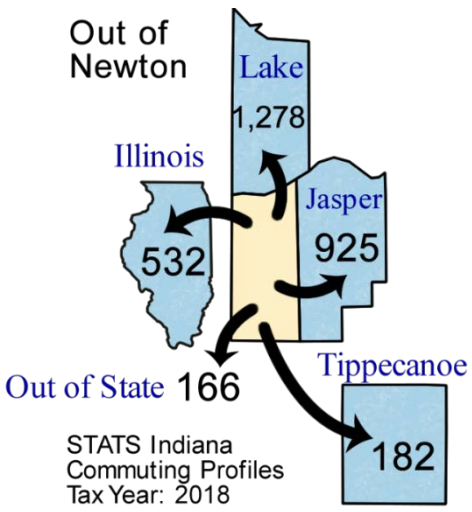


Figure 5 Workers out of Newton County

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 Newton County EMA provided the listing and locations of the following 158 critical infrastructure points for the MHMP update:

- 25 Communication
- 1 Emergency Management Agency
- 2 Emergency Medical Service
- 6 Fire Stations
- 8 Government Facilities
- 25 Hazardous Materials Facilities
- 6 Health/Daycare Facilities
- 12 Large Gathering Places
- 5 Police Departments
- 5 Potable Water Treatment Plants
- 6 Power Generation Facilities
- 5 Schools
- 21 Shelters

- 20 Warning Sirens
- 4 Wastewater Treatment Plants
- 7 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 Newton County. Draft maps were provided to the EMA and Planning Committee for their review and all comments were incorporated into the maps and associated databases.

Exhibit 1 illustrates the critical infrastructure identified throughout unincorporated Newton County and the individual municipalities. **Appendix 4** lists the critical structures in Newton 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 only on critical structures; non-critical structures are neither mapped nor listed.

2.5 MAJOR WATERWAYS AND WATERSHEDS

According to the United States Geological Survey (USGS), there are 76 waterways in Newton County; which are listed in **Appendix 5**. The county's main waterways are the Iroquois and the Kankakee Rivers, and the county lies within two 8-digit Hydrologic Unit Code (HUC): Iroquois River and Kankakee River. These major waterways, and others, are identified on **Exhibit 2**.

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. Newton County and the towns of Brook, Goodland and Kentland participates in the NFIP, while the communities of Morocco and Mounty Ayr do not. At the time of this planning effort, the Newton County Building Commissioner is responsible for the administration of the floodplain program in the unincorporated areas of the County. Within the town of Brook, the Building Commission is responsible and within Kentland, it is the Clerk-Treasurer's Office which is responsible for the Floodplain 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 which 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 three 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 3** lists the NFIP number, effective map date, and the date each community joined the NFIP program.

Table 3: NFIP Participation

NFIP Community	NFIP Number	Effective Map Date	Join Date
Newton County	180179#	12/16/2014	09/01/1986
Town of Brook	180180#	12/16/2014	09/01/1986
Town of Goodland	180181#	NSFHA	08/19/1986
Town of Kentland	180182A	12/16/2014	09/18/1985
Town of Morocco			
Town of Mount Ayr			

2.7 TOPOGRAPHY

Newton County is bordered geographically to the west by Iroquois and Kankakee Counties in Illinois, to the east by Jasper County, to the north by Lake County, and to the south by Benton County. The average elevation throughout Newton County is approximately 655 feet above sea level. The highest point, located in Grant Township, the southeast corner, and is approximately 770 feet above sea level. Conversely, the lowest point of 630 feet above sea level, is located in the northwest corner of Lake Township where the Kankakee River flows into Illinois.

2.8 CLIMATE

The Midwestern Regional Climate Center (MRCC) provided climate data that includes information retrieved from a weather station located Watseka Illinois, identified as station USC00119021. As a station does not exist in Newton County, this is the nearest station available. The average annual precipitation is 38.36 inches per year, with the wettest month being July averaging 4.49 inches of precipitation and the driest month being January with an average of 1.67 inches of precipitation. The highest 1-day maximum precipitation was recorded in September of 1926 with 7.15 inches of rain. On average, there are 72.2 days of precipitation greater than or equal to 0.1 inch; 25.8 days with greater than or equal to 0.5 inch; and 8.3 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 Newton County and the communities within 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 Newton 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 2010 Newton County MHMP and discussed recent events and the potential for future hazard events. The Committee identified those hazards that affected Newton County and each community and selected the hazards to study in detail as part of this planning effort. As shown in **Table 4** these hazards include dam/levee failure; drought; earthquake; extreme temperature; fire; flooding; hailstorms, thunderstorms, and windstorms; hazardous materials incident; land subsidence/landslides; snowstorms and ice storms; and tornado.

All hazards studied with the 2010 Newton County MHMP are included in the update.

Table 4: Hazard Identification

Type of Hazard	List of Hazards	Detailed Study	
		2010 MHMP	MHMP UPDATE
Natural	Drought	Yes	Yes
	Earthquake	Yes	Yes
	Extreme Temperature	No	Yes
	Fire	No	Yes
	Flood	Yes	Yes
	Hail/Thunder/Wind	Yes	Yes
	Land Subsidence/Landslide	No	Yes
	Snow / Ice Storm	Yes	Yes
	Tornado	Yes	Yes
Technological	Dam / Levee Failure	Yes	Yes
	Hazardous Material Incident	No	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 Burke) 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
- Possible – incident is probable within the next five years
- Likely - incident is probable within the next three years
- Highly Likely – incident is probable within the next calendar year

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
- 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
- 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
- Critical – multiple deaths OR critical infrastructure shut down of one month or more OR more than 50% property damaged OR average response duration of less than one month

3.2.3 Warning Time

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

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

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 six hours
- Less than one day
- Less than one week
- Greater than one week

3.2.5 Calculating the CPRI

The following calculation illustrates how the index values are weighted and how 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 Newton County, and then a weighted CPRI value was computed based on the population size of each community. **Table 5** 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 5: Determination of Weighted Value for Communities

Community	Population (2019)	% of Total Population	Weighted Value
Newton County	9,160	65.5%	0.66
Town of Brook	955	6.8%	0.07
Town of Goodland	990	7.1%	0.07
Town of Kentland	1,668	11.9%	0.12
Town of Morocco	1,094	7.8%	0.08
Town of Mount Ayr	117	0.8%	0.01
Total	**13,984**	**100.0%**	**1.00**

3.3 HAZARD PROFILES

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

This section describes each of the hazards that were identified by the 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 upon another hazard.

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 6 Urban Drought Affects

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; and focuses 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 source **Figure 6** shows urban grassed areas affected by drought conditions.

Drought: Recent Occurrences

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

Figure 7 US Drought Monitor Severity Classification

Data gathered from the U.S. Drought Monitor indicated that between January 2015 and April 2020, there were 62 weeks where some portions of Newton County was considered to be in "Abnormally Dry". During this planning effort, Newton County has not been categorized in any of the more severe drought categories. **Figure 7**, from the U.S. Drought Monitor, describes the rationale to classify the severity of droughts.

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

The Planning Committee, utilizing the CPRI, determined the overall risk of drought throughout Newton County is "Severe". The impact of drought was determined to be

the same for all communities within the county and increased for the unincorporated areas due to the possible agricultural impacts and impacts to water wells. The committee agreed that a drought is "Likely" (to occur within the next three 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 6**.

Table 6 CPRI for Drought

	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Likely	Critical	> 24 Hours	> 1 Week	Severe
Town of Brook	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Goodland	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Kentland	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Morocco	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Mount Ayr	Likely	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 significant droughts and drought related impacts felt within Newton County, the Committee estimated that the probability of a drought occurring in the area is "Likely"; 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 unincorporated areas of the county, increased crop and livestock damages would also be expected during a significant drought.

Drought: Assessing Vulnerability

This type of hazard will generally affect entire counties and even multi-county regions at one time. Within Newton 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

Figure 8 Crops Affected by Drought

It is difficult to estimate the potential losses associated with a drought for Newton 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 2019, Newton County produced approximately 16.6M bushels of corn and 3.5M bushels of soybeans, as reported by the United States Department of Agriculture (USDA) National Agricultural Statistics Service. Using national averages of $3.80 per bushel of corn and $8.35 per bushel of soybeans, the estimated crop receipts for 2019 would be $69.5M. 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 $34.8M-$59.8M; depending on the crop produced and the market demand. Effects of drought on corn crops can be seen in **Figure 8**.

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 municipal 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 5.6 inches for the area of Newton County. This increase in precipitation may lessen the likelihood or overall impact of a drought in Newton 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.

Prior to municipalities expanding, provisions and considerations should be given regarding the potential additional demand for both water usage and fire response efforts. Following such expansion or development plans, alternative water sources should be explored. Since the previous MHMP was prepared, no large scale or significant development has occurred within the unincorporated areas of Newton County.

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.

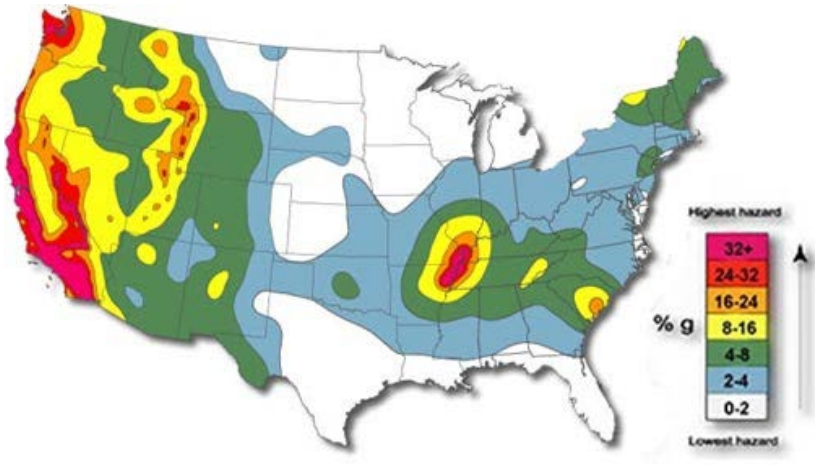


Figure 9 Earthquake Hazard Areas in the US

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 an earthquake, and they are located in every region of the country (**Figure 9**). 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 Newton County, the nearest area of concern is the Wabash Seismic Zone.

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 10 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 Newton County or any of the communities is "Unlikely". Should an earthquake occur, the impacts associated with this hazard are anticipated to be "Significant" to "Critical" within all areas of the county. As with all earthquakes, it was determined that the residents of Newton 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 7**.

Table 7 CPRI for Earthquake

	Probability	Magnitude / Severity	Warning Time	Duration	CPRI
Newton County	Unlikely	Significant	< 6 Hours	< 1 Day	Low
Town of Brook	Unlikely	Significant	< 6 Hours	< 1 Day	Low
Town of Goodland	Unlikely	Significant	< 6 Hours	< 1 Day	Low
Town of Kentland	Unlikely	Critical	< 6 Hours	< 1 Day	Low
Town of Morocco	Unlikely	Critical	< 6 Hours	< 1 Day	Low
Town of Mount Ayr	Unlikely	Significant	< 6 Hours	< 1 Day	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 Newton County is "Unlikely" to occur within the next ten years.

Figure 11 Minor Earthquake Damages

Earthquake: Assessing Vulnerability

Earthquakes generally affect broad areas and potentially many counties at one time. Within Newton 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

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 10** and **Figure 11**.

Estimating Potential Losses

In order to determine the losses associated with an earthquake, the HAZUS-MH software was utilized in the Newton County MHMP update to determine the potential impacts anticipated from an arbitrary earthquake scenario. This type of modeling is useful for planning efforts such as this.

Per the HAZUS-MH scenario noted above, total economic losses are anticipated to be near $297.6M with moderate damages to approximately 615 buildings, of which 34 are anticipated to be damaged beyond repair. 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 southwestern portion of the county.

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.

Future Considerations

While the occurrence of an earthquake in or near to Newton 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, Newton County should continue to provide education and outreach regarding earthquakes and even earthquake insurance along with education and outreach for other hazards. As Newton 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 Newton County will remain at-risk to earthquake damages and effects, new construction or redevelopment may reduce the overall risks. As redevelopment occurs in the more developed area of Kentland, 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 Newton 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.

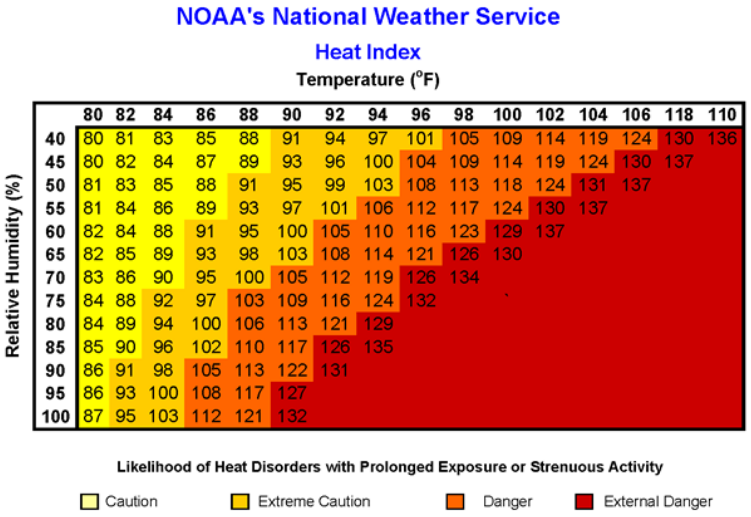


Figure 12 Heat Index Chart

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 12**. 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.

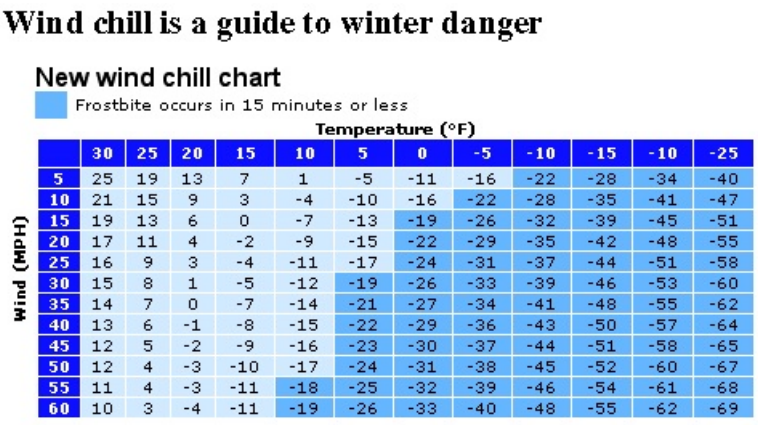
It is important to also note that these heat index values were devised for shady, light wind conditions. Exposure to full sunshine may increase heat index values by up to 15°F. Further, strong winds, particularly with very hot, dry air, can also be extremely hazardous.

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.



	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 13 NWS Wind Chill Chart

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 13** identifies the Wind Chill Chart and how the same ambient temperature may feel vastly different in varying wind speeds.

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 has been one extreme heat event and three extreme cold events between January 2010 and April 2020. The heat event occurred in 2012 when temperatures peaked with a heat index of between 105° and 115° each day July 4th through July 7th. January of 2014 2018, and 2019 were the times of the three recorded extreme cold events for Newton County. During each of these events temperatures dipped to nearly 50° below zero and resulted in numerous school closings and delays throughout the region.

It is difficult to predict the probability that an extreme temperature event will affect Newton 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. identifies the CPRI for extreme temperature events for all communities in Newton County. **Table 8**

Table 8 CPRI for Extreme Temperatures

	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe
Town of Brook	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe
Town of Goodland	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe
Town of Kentland	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe
Town of Morocco	Highly Likely	Significant	> 24 Hours	> 1 Week	Severe
Town of Mount Ayr	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 amount of livestock and cropland within the county and the potential to realize impacts within the urban 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 Newton County, a better understanding of the relative risk that extreme temperatures may pose to certain populations can be gained. In total, 20% of the county's population is over 65 years of age, more than 5% of the population is below the age of 5, and approximately 10% 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.

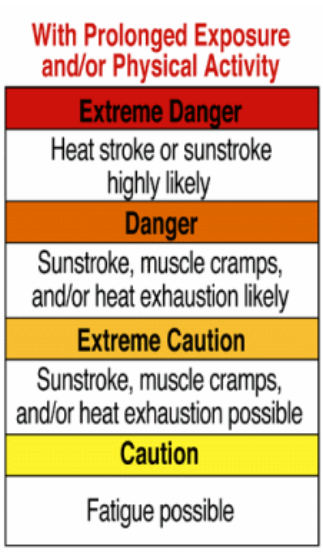


Figure 14 Danger Levels with Prolonged Heat Exposure

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 14**.

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 Newton 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 Newton 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. Within Newton County, new residential construction, even at a minimal growth rate, has reduced the vulnerability to this hazard. Since the last planning effort, there has not been any significant, large-scale development of industrial or commercial properties to increase the vulnerability.

Extreme Temperatures: Relationship to Other Hazards

While extreme temperatures may be extremely burdensome on the power supplies in Newton County, the Committee concluded that this type of hazard is not expected to cause any hazards studied. 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 15 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 15**) 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 Newton County between January 1950 and April 2020. Within the same time parameter, there were 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. According to WLFI Channel 18, The International Cushioning Company in Kentland experienced a total structural loss during a massive fire in October 2019 (**Figure 16**). The industry produces the highly flammable packing peanuts and bubble wrap and the flames spread very quickly. Dozens of fire trucks from five counties responded to the incident. No injuries were reported as a result of this event although residents near the facility were asked to close windows and doors to keep the toxic fumes outside.

Figure 16 International Cushioning Company Fire

In a similar regard, the Newton County Enterprise reported an event from December 2012 where the Finer Foods grocery store burned overnight beginning shortly after the store closed for the evening. Six departments assisted with the response and the fire continued to smolder into the following day.

Due to the expansive acreage of cropland and woods within Newton 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 "Highly Likely" throughout the County. **Table 9** identifies the CPRI rankings for fire in Newton County.

Table 9 CPRI for Fire

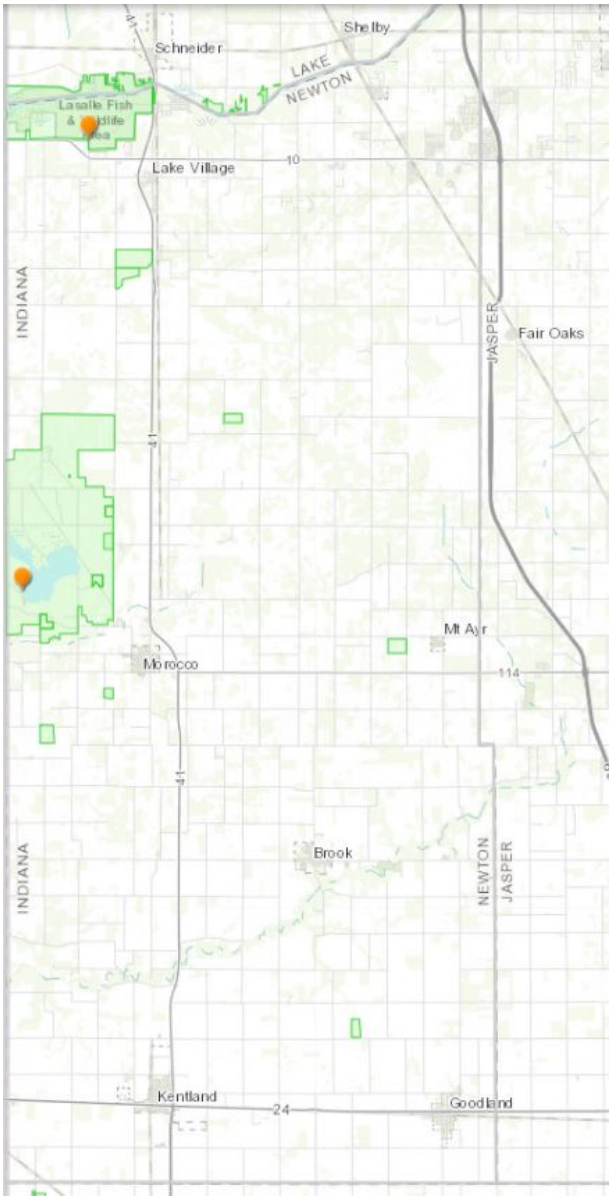
	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Highly Likely	Critical	< 6 Hours	< 1 Week	Severe
Town of Brook	Highly Likely	Critical	< 6 Hours	< 1 Week	Severe
Town of Goodland	Highly Likely	Critical	< 6 Hours	< 1 Week	Severe
Town of Kentland	Highly Likely	Critical	< 6 Hours	< 1 Week	Severe
Town of Morocco	Highly Likely	Critical	< 6 Hours	< 1 Week	Severe
Town of Mount Ayr	Highly Likely	Critical	< 6 Hours	< 1 Week	Severe

Information provided in **Table 10** highlights the number of fire runs for the Newton County fire departments for the time period January 2017 through December 2019. 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 10 Newton County Fire Runs

	Fire Runs
Town of Brook	269
Town of Goodland	864
Town of Kentland	2,097
Lake Township	1,190
Lincoln Township	3,142
Town of Morocco	963
TOTAL	**8,525**

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 from "Critical" throughout the county and municipalities.

Much of the county is rural and agricultural in land use, which may be more susceptible to brush or crop fires, especially in times of drought. Furthermore, the forested wetland areas, many managed by IDNR and are shown as green areas on **Figure 17** may be at an increased risk for woodland fires. As very little development has occurred within Newton County since the last planning effort, vulnerabilities to this hazard have not shifted in location. In addition, there is little urbanized area within Newton County leaving nearly the entire county vulnerable to field, crop, and woodland fires, in addition to the urban fires within the small communities throughout.

Figure 17 Lands Managed by IDNR in Newton County

Direct and indirect effects of a such an event within Newton 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 2010 and April 2020, there were two floods and seven flash floods reported.

The narrative report through NCDC regarding the February 2018 flood event was that many areas of Newton County were flooded and that some roads were closed. Rainfall slightly exceeded six inches on February 20, 2018. An additional piece noted the Iroquois River crested above major flood stage at 24.35 feet on February 22, 2018. Neither event noted property or crop damages. In other news outlets, the February flooding in Newton County, and throughout northern Indiana would become a flood event for the record books.

A local report from the Newton County Enterprise indicates schools were closed as well as the northbound lanes of US 41 north of SR 10 and in some areas along SR 55. North and South Newton Schools were closed for several days during this event and the Brook Fire Department staff were assisting with sandbagging near homes to prevent floodwaters entering structures and causing more damage.

A more recent occurred in June 2020 and affected the Town of Kentland as approximately eight inches of rain hit the area in a short amount of time. During the event, town representatives indicated they could see the water rise three feet within 20 minutes. Four fire stations assisted with evacuations of nearly 80 residents from streets, homes, and cars. **Figure 18**, taken by Gregory Myers of the Newton County Enterprise shows one area of Kentland affected following the water overtopping the railroad tracks in the area.

Figure 18 Flooding in Kentland

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 Newton County, there are three active USGS stream gages with capabilities of issuing forecasts as needed during flood events.

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 three single-family repetitive loss properties within the unincorporated areas of Newton County.

There have been a small number of claims made for damages associated with flooding in Newton County. Within the Town of Brook, there have been five paid losses resulting in nearly $17.0K in payments. Further, within the unincorporated areas of the county, there were 33 payments totaling approximately $137K. **Table 11** identifies the number of claims per community as well as payments made, as provided by IDNR. Information regarding the Towns of Morocco and Mount Ayr was not provided independently as they do not participate in the NFIP program individually and are included within the information for the unincorporated county.

Table 11 Repetitive Properties, Claims, and Payments

Community	# of Repetitive Loss Properties	Claims Since 1978	$$ Paid
Newton County	3	33	$136.6K
Town of Brook	0	5	$16.6K
Town of Goodland	0	0	$146.1K
Town of Kentland	0	1	
Town of Morocco			
Town of Mount Ayr			
TOTAL	**3**	**39**	**$299.4K**

Mandatory flood insurance purchase requirements apply to structures in 1% annual chance of flooding delineated areas. Total flood insurance premiums for Newton County and the communities is approximately $68K. Total flood insurance coverage for Newton County and the communities is just over $9.0M. **Table 12** further indicates the premiums and coverage totals for individual communities. Information regarding the Towns of Morocco and Mount Ayr is not provided independently and is included within the information for the unincorporated county.

Table 12 Insurance Premiums and Coverage

Community	Flood Insurance Premiums	Flood Insurance Coverage
Newton County	$58.1K	$5.7M
Town of Brook	$8.2K	$2.3M
Town of Goodland	$0.5K	$0.3M
Town of Kentland	$1.1K	$0.8M
Town of Morocco		
Town of Mount Ayr		
TOTAL	**$67.9K**	**$9.0M**

As determined by the Committee, the probability of a flood occurring throughout Newton County ranges from "Possible" in Mount Ayr; "Likely" in Brook, Goodland, Kentland, and Morocco; and "Highly Likely" in the unincorporated county. 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 "Critical". The Committee also determined that the warning time would range based on forecasting methods, local knowledge of stream activities, and the warning provided by gages upstream. Finally, the duration of such an event is anticipated to last greater than one week for some areas, and less than one week for others. A summary is shown in **Table 13**.

Table 13 CPRI for Flood

	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Highly Likely	Critical	> 24 Hours	>1 Week	Severe
Town of Brook	Likely	Limited	> 24 Hours	< 1 Week	Elevated
Town of Goodland	Likely	Limited	> 24 Hours	< 1 Day	Elevated
Town of Kentland	Likely	Limited	> 24 Hours	< 1 Day	Elevated
Town of Morocco	Likely	Limited	> 24 Hours	< 1 Day	Elevated
Town of Mount Ayr	Possible	Negligible	> 24 Hours	< 1 Day	Low

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 "Possible" to "Highly Likely" throughout the county. While it appears Mount Ayr may not be impacted by riverine flooding, the committee discussed problems associated with poor drainage leading to many of the same issues as riverine flooding in other communities.

Flood: Assessing Vulnerability

Flood events may affect large portions of Newton County at one time as river systems and areas with poor drainage cover much of the county and several communities. Within Newton 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

In the time period since the last planning effort, no significant development has occurred within any of the municipalities. What has occurred, has been directed away from floodplains which has helped to reduce the flood risk and vulnerability. Structures have prevented from being built in the high-risk areas while growth has been directed to more appropriate areas, less at risk from riverine flooding.

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 effective Digital FIRMs (DFIRMs) overlaid upon a Modified Building Inventory developed with information provided by Newton County. Structures located within each flood zone were tallied using GIS analysis techniques.

In the assessment, any structure listed as less than 400 ft^2 in area or 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

In order to estimate anticipated damages associated with each flood zone in Newton 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 14** 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 Newton County.

Table 14 Manual GIS Analysis Utilizing Best Available Data and Newton County Building Inventory

	Floodway		1%		0.2%		Unnumbered	
	#	$	#	$	#	$	#	$
Newton County	0	$0	220	$15.4M	0	$0	0	$0
Town of Brook	59	$3.8M	0	$0	0	$0	0	$0
Town of Goodland	1	$0.2M	0	$0	0	$0	0	$0
Town of Kentland	0	$0	0	$0	0	$0	0	$0
Town of Morocco	0	$0	0	$0	0	$0	0	$0
Town of Mount Ayr	0	$0	0	$0	0	$0	0	$0
Total	**60**	**$4.0M**	**220**	**$15.4M**	**0**	**$0**	**0**	**$0**

Utilizing the same GIS information and process, critical infrastructure within each of the Special Flood Hazard Areas (SFHA) in Newton County was assessed and are included in **Table 15**. These buildings are included in the overall number of structures and damage estimate information provided in Table 14.

Table 15 Critical Infrastructure in SFHA in Newton County

Community	Floodway	1% AEP	0.2% AEP
Newton County	George Ade (Health/Shelter)	Siren (1) Sumava Resorts Improvement Club (Shelter)	
Town of Brook			
Town of Goodland			
Town of Kentland			
Town of Morocco			
Town of Mount Ayr			

Utilizing the information in Table 3-14 regarding the number of structures within each SFHA, it is also important to note the number of flood insurance policies within each area in Newton County. **Table 16** 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 16 Number of Structures in the SFHA and Number of Flood Insurance Policies

COMMUNITY	# STRUCTURES IN SFHA	# POLICIES
Newton County	220	55
Town of Brook	59	12
Town of Goodland	1	2
Town of Kentland	0	3
Town of Morocco	0	
Town of Mount Ayr	0	
Total	**280**	**72**

Future Considerations

As the municipalities within Newton County continue to grow in population, it can be anticipated that the number of critical and non-critical infrastructure will also increase accordingly. Within Newton County, it is strongly encouraged that new schools, 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 infrastructures 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. Since the previous planning effort, no significant development has occurred within the flood zones of Newton County.

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.

Figure 19 Fire Engine in Flood Waters

Indirect effects of flooding may include increased emergency response times due to flooded or redirected streets (**Figure 19**), 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 Newton 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

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 or levee 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/levee failure, when combined, may certainly result in catastrophic damages.

In a similar fashion, a snowstorm 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 20**), 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 20 Damaging Hail on Vehicles

In Newton County, the NCDC has recorded 22 hailstorms and 34 thunderstorms/windstorms between January 2010 and April 2020. The largest recorded hailstone was 2.75 inch in diameter and occurred on August 9, 2012 near Morocco. The average diameter hailstone occurring throughout Newton County is 1.2 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 Newton County, NCDC reports 22 instances between January 2010 and April 2020 where top wind speeds were greater than 60 mph.

Total NCDC recorded damages for hailstorms, thunderstorms, and windstorms throughout Newton County are $64.0K in property damages, no additional crop damages, one injury, and no deaths 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 Newton County. Even in instances where monetary damages were reported, narrative descriptions of the event rarely extended beyond reports of damages to broken tree limbs, downed power lines, or roof damages.

During the June 2013 event near Roselawn, a motorist was trapped in a vehicle resulting in injuries. During this event, multiple power lines, trees and limbs were blown down along Route 55 between 500N and 800N. In June 2015 a roof was blown from a residential structure near Meridian Road in Morocco causing approximately $20K in property damages. More recently in June 2019, several communities were impacted by storms and large limbs were blown from trees in Mount Ayr, Kentland, and Goodland.

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

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 anywhere throughout Newton County is "Highly 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 (for storms anticipated to result in damages) and the duration is also expected to last less than six hours.

Indicative of a regional hazard, the probability, magnitude, warning time, and duration of a hailstorm, thunderstorm, or windstorm are expected to be similar throughout the county. These events are highly unpredictable, and the occurrences are distributed through the county, sometimes impacting one community more often or more severely than another. Therefore, the CPRI values reflect the distributed risk and associated priority for a hailstorm, thunderstorm, or windstorm. A summary is provided in **Table 17**.

Table 17 CPRI for Hailstorm, Thunderstorm, and Windstorm

	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Highly Likely	Significant	< 6 Hours	< 6 Hours	Severe
Town of Brook	Highly Likely	Significant	< 6 Hours	< 6 Hours	Severe
Town of Goodland	Highly Likely	Significant	< 6 Hours	< 6 Hours	Severe
Town of Kentland	Highly Likely	Significant	< 6 Hours	< 6 Hours	Severe
Town of Morocco	Highly Likely	Significant	< 6 Hours	< 6 Hours	Severe
Town of Mount Ayr	Highly Likely	Significant	< 6 Hours	< 6 Hours	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. The magnitude is anticipated to be similar based on the number of critical infrastructure and populations of each of the municipalities, or "Significant".

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 Newton 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 21 Home Damaged During Windstorm

Due to the unpredictability of this hazard all critical infrastructure and non-critical structures in Newton 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 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 that shown in **Figure 21**, are common.

Future Considerations

As the populations of the communities in Newton County continue to grow, it can be anticipated that the number of critical and non-critical structures will also increase. 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 or flying debris, 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 Newton 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. A similar concern due to the potential precipitation would be dam failure. 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.

The risk of social losses also increases during a hailstorm, thunderstorm, or windstorm, as these hazards often 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 because 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 Newton County was discussed by the Planning Committee. To the knowledge of the Planning Committee, there are no Karst areas or underground mining operations within Newton County. In light of this, to date, there has not been any landslides or subsidence events in Newton County.

The Committee determined the probability of a landslide or subsidence occurring in Newton County is "Unlikely" resulting in potentially "Negligible" damages. Currently, the Committee feels that the warning time is anticipated to be greater than 24 hours as an event is not anticipated to occur. Similarly, the duration is expected to last less than six hours as it is not anticipated to occur at all. 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 18.**

Table 18 CPRI for Landslide/Land Subsidence

	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Unlikely	Negligible	> 24 Hours	< 6 Hours	Low
Town of Brook	Unlikely	Negligible	> 24 Hours	< 6 Hours	Low
Town of Goodland	Unlikely	Negligible	> 24 Hours	< 6 Hours	Low
Town of Kentland	Unlikely	Negligible	> 24 Hours	< 6 Hours	Low
Town of Morocco	Unlikely	Negligible	> 24 Hours	< 6 Hours	Low
Town of Mount Ayr	Unlikely	Negligible	> 24 Hours	< 6 Hours	Low

Landslide/Subsidence: Assessing Vulnerability

Newton County, without the presence of Karst geology or underground mines, is at a low risk of land subsidence or sink holes; "Unlikely" according to the Planning Committee with "Negligible" magnitude estimates. Fluvial erosion, or erosion and failures along water courses, were considered within the flood discussion.

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 Newton 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

Due to the unpredictability of this hazard all critical infrastructure and non-critical structures in Newton 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.

Future Considerations

As the populations of the communities in Newton 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 and mining 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 or levee 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 events 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

Figure 22 Funnel Cloud During a Lightning Storm at Night

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 22** Tornadoes occur most frequently in the United States east of the Rocky Mountains. Tornadoes in Indiana generally come from the south through the east.

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.

Figure 23 Tornado Damages in Brook

Tornado: Recent Occurrences

The classification of tornadoes utilizes the Enhanced Fujita Scale of tornado intensity and damages, described in **Table 19**. 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, Newton County has experienced six tornadoes (4-EF0, 1-EF1, 1 undetermined), between January 2010 and April 2020.

Local reports from the EMA indicated an August 2020 EF0 resulted in localized damages in an area near Brook at the intersection of US 41 and CR 1000 S (**Figure 23)** . Several patches of circular crop damage, portions of the barn roof removed, and the barn doors

were blown outward were included in the damage assessment. No reports of injuries or damages to other properties were included.

Table 19 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

The NCDC reports approximately $325K in property damages for the events. In November 2013, the Town of Goodland experienced an EF0 tornado which resulted in the destruction of several grain bins and scaffolding causing approximately $250K in property damages. From there the tornado traveled into Jasper County. In May 2011, an EF2 affected Mount Ayr as a 150-pound auger was lifted and moved 150 yards and a grain bin was moved 200 yards. An approximate $50K in damages is associated with the event. No injuries or deaths were reported for any events.

The Committee estimated the probability of a tornado occurring in Newton County would be "Possible" to "Likely" and the magnitude and severity of such an event to be "Significant" throughout the county. Representatives from Goodland and throughout the county agreed that Goodland experiences more weather-related events, thus a higher probability. As with many hazardous events, the Committee anticipated a short warning time of typically less than six hours, and a short duration, also less than six hours. The summary is shown in **Table 20**.

Table 20 CPRI for Tornado

	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Possible	Significant	< 6 Hours	< 6 Hours	Elevated
Town of Brook	Possible	Significant	< 6 Hours	< 6 Hours	Elevated
Town of Goodland	Likely	Significant	< 6 Hours	< 6 Hours	Elevated
Town of Kentland	Possible	Significant	< 6 Hours	< 6 Hours	Elevated
Town of Morocco	Possible	Significant	< 6 Hours	< 6 Hours	Elevated
Town of Mount Ayr	Possible	Significant	< 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 Newton County is "Possible" (within the next five years) to "Likely" (within the next three 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 Newton County that would be vulnerable to a tornado. Direct and indirect effects from a tornado may include:

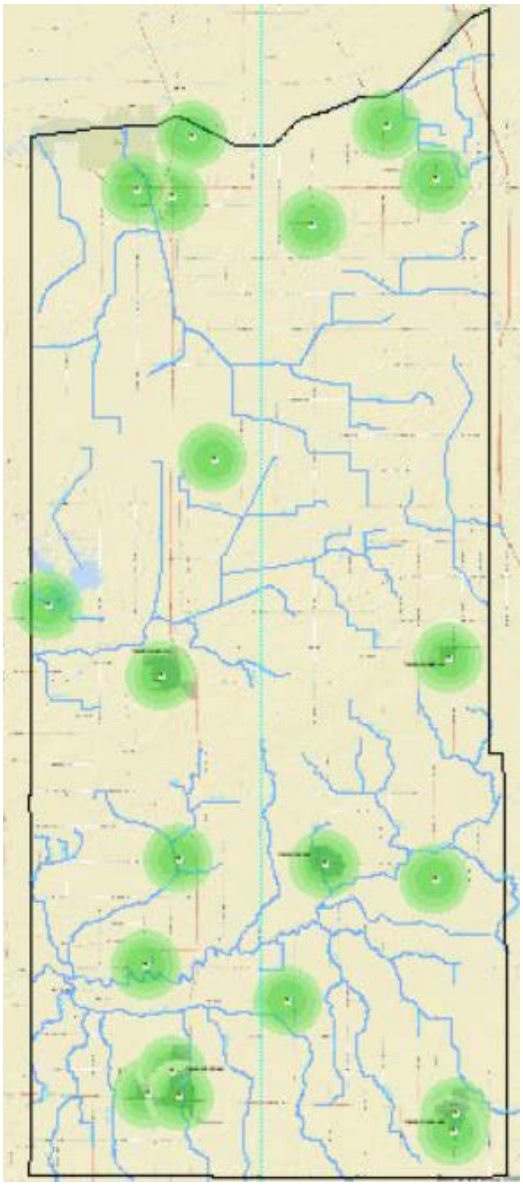


Figure 24 Newton County Outdoor Warning Sirens

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 EF2 intensity tornado traveled through portions of the county, Brook, and Kentland. 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% of the structures would be 50% damaged, and 40% of the structures would sustain 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 theoretically lower wind speed. **Table 21** provides summary data for the hypothetical tornado, which is identified on Exhibit 3.

Table 21 Summary of Hypothetical Tornado Damages

	Zone 1		Zone 2		Zone 3		Total	
	#	$	#	$	#	$	#	$
County	2	$0.2M	3	$0.5M	3	$0.5M	**8**	**$1.2M**
Brook	78	$5.2M	60	$3.9M	62	$4.0M	**200**	**$13.1M**
Kentland	110	$7.0M	0	$0	0	$0	**110**	**$7.0M**

Totals	**190**	**$12.4M**	**63**	**$4.4M**	**65**	**$4.5M**	**318**	**$21.3M**

Future Considerations

Within Newton 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 (green circles) are provided in **Figure 24.**

While it can be anticipated that new construction associated with development may be stronger than older or existing construction, most of Newton 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 Newton 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 they are 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 and 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 defined as one that drops 4 or more inches of snow during a 12-hour period, or 6 or more inches during a 24-hour span. An ice storm occurs when freezing rain falls from clouds and freezes immediately on impact. All winter storms make driving and walking extremely hazardous. The aftermath of a winter storm can affect a community or region for days, weeks, and even months.

Figure 25 Ice Covered Power Lines

Storm effects such as extreme cold, flooding, and snow and ice accumulation (**Figure 25**) 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. 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 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 Newton County. Such conditions can result in substantial personal and property damage, even death.

Winter Storm & Ice: Recent Occurrences

Since January 2010, the NCDC has recorded six heavy snow events, six winter storms, three winter weather events, and two blizzards. NCDC reports did not include information related to monetary damages, injuries, or deaths associated with any of the events. Narrative descriptions indicated poor travel conditions, power outages and debris associated with similar events.

A recently recorded winter storm event occurred on January 13, 2019. Snowfalls in the region ranged from six to seven inches with the heaviest amounts recorded in the Goodland area at 7.8 inches. An event a few days earlier on December 29, 2018 included reports of freezing drizzle and a light glaze of ice on many roads resulting in numerous accidents on roadways.

Between February 24 and February 25, 2016 near blizzard conditions began in Mount Ayr in the evening with heavy snow and near visibility. A State of Emergency was declared for Newton County as numerous motorists were stranded and needed rescued from vehicles. In addition to these poor conditions, many residents were also without electricity.

The probability, magnitude, warning times, and duration of a snowstorm or ice storm causing disruption to residents and businesses in Newton County, as determined by the Planning Committee, is expected to be mostly consistent throughout the county and communities. It is "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" damages due to the remoteness of some areas and the amount of critical facilities in others. 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 be greater than one week. A summary is shown in **Table 22**.

Table 22 CPRI for Winter Storm and Ice

	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Brook	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Goodland	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Kentland	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Morocco	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Mount Ayr	Likely	Significant	> 24 Hours	> 1 Week	Elevated

The Planning Committee determined that the probability for a snowstorm or ice storm to occur in Newton County and many of the communities within is "Likely" or will occur within the next three years. Based on historical data and the experience of the Planning Committee, snowstorms are common within Newton County and will continue to be a regular occurrence.

Winter Storm & Ice: Assessing Vulnerability

A snowstorm typically affects a large regional area with potential for physical, economic, and/or social losses. Direct and indirect effects of a snowstorm or ice storm within Newton 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 snowstorm, 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 snowstorm and ice storm incidents.

Figure 26 Travel Impacted During Snowstorm

For planning purposes, information collected in snowstorms 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 Newton County communities. For example, a March 2003 snowstorm in Denver, Colorado dropped approximately 31 inches of snow and caused an estimated $34M in total damages. In addition, a February 2003 winter storm dropped an estimated 15-20 inches of snow in parts of Ohio. The Federal and Ohio Emergency Management Agencies and U.S. Small Business Administration surveyed damaged areas and issued a preliminary assessment of $17M in disaster related costs. These costs included snow and debris removal, emergency loss prevention measures, and public utilities repair. The agencies found over 300 homes and businesses either damaged or destroyed in 6 counties. Snowstorms and blizzards also make road travel difficult and dangerous, as in **Figure 26.**

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 closed 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, winter storms generally 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 snowstorms 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. These hazard events will typically affect the entire county as a whole, perhaps multiple counties, and therefore all development, current and future, will be at risk for damages associated with snow and ice storms.

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 three 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 27 Flooding Caused by Snow Melt

Winter storms and ice storms can lead to flooding as the precipitation melts and enters local receiving waters. This increased volume of water on already saturated, or still frozen ground can quickly result in flood-related damages to structures and properties (**Figure 27**) as well as within the stream or river channel. The increased flooding may then lead to a dam or levee 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 Newton County, or where open areas are more susceptible to snow drifts on 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 / Levee Failure

Dam/Levee 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.

A levee is a flood control structure designed to hold water away from a building. Levees protect buildings from flooding as well as from the force of water, from scour at the foundation, and from impacts of floating debris. The principle causes of levee failure are like those associated with dam failure and include overtopping, surface erosion, internal erosion, and slides within the levee embankment or the foundation walls. Levees are designed to protect against a particular flood level and may be overtopped in a more severe event. When a levee system fails or is overtopped, the result can be catastrophic and often more damaging that if the levee were not there, due to increased elevation differences and water velocity. The water flowing through the breach continues to erode the levee and increase the size of the breach until it is repaired or water levels on the two side of the levee have equalized.

Dam/Levee Failure: Recent Occurrences

Within Newton County, there are no DNR-regulated High Hazard dams. There is one Significant Hazard dam, the JC Murphey Lake Dam, shown on Exhibit 2 and in **Figure 28**. There have been no recorded dam failures within Newton County.

Figure 28 JC Murphey Lake Dam

According to the National Levee Database (NLD) managed by the USACE, there are ten levee systems which provide protection for portions of Newton County along the Kankakee River (**Figure 29**). Currently, none of the systems are accredited and recognized on the FIRM as providing protection for the 1% AEP flood. The levee systems identified have been installed as protection for agricultural lands and crop production. There have been no reported levee failures within Newton County within this reporting period.

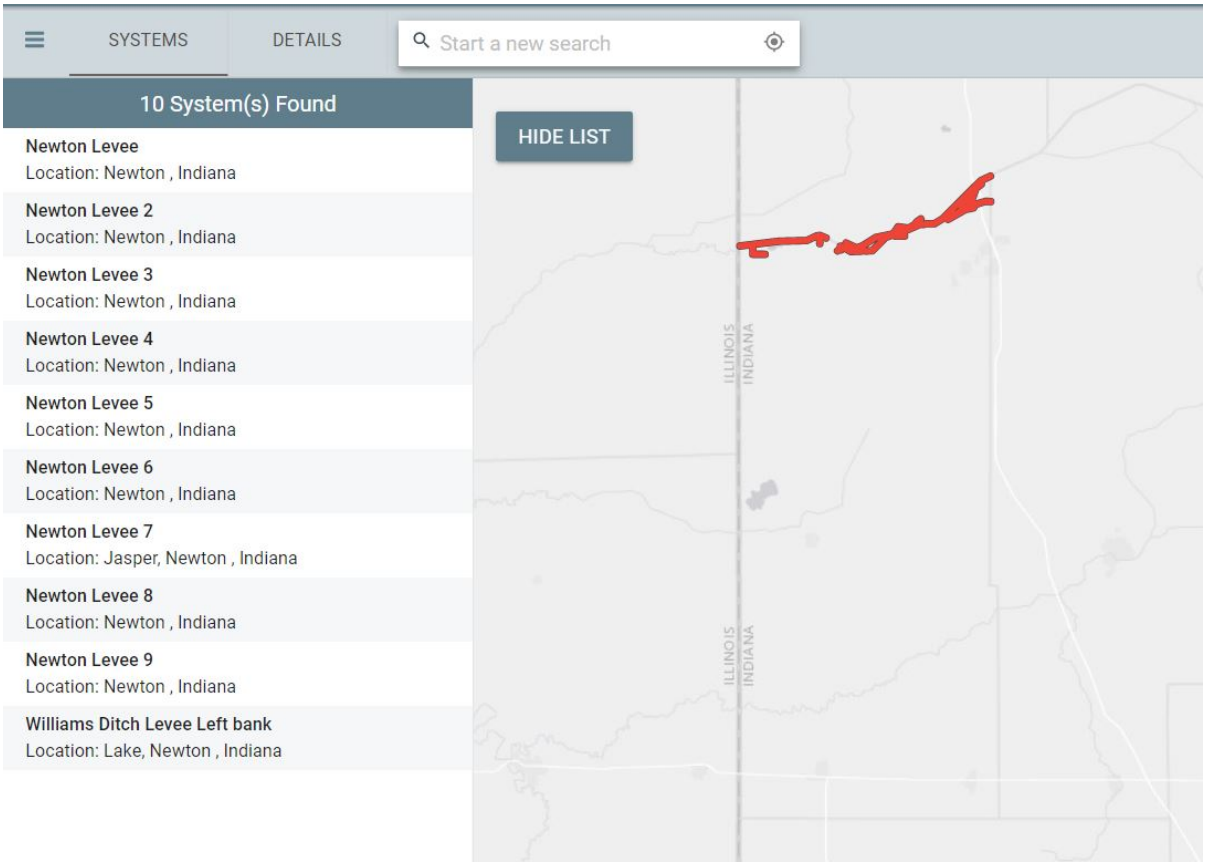


Figure 29 NLD Levee Systems in Newton County

Based on the information provided to them and their local knowledge, experience, and expertise, the Committee determined the probability of a dam or levee failure is "Highly Likely" in those areas where a dam or levee exists (the unincorporated areas), or in areas anticipated to be directly impacted by a dam or levee breach. In areas of the county without a dam or levee, or those not anticipated to be affected by a breach, the probability, according to the Planning Committee, was also determined to be "Unlikely". With similar regard, the magnitude ranges from "Critical" (areas within the potential inundation area) to "Negligible" (areas not anticipated to be within the inundation area) damages. For a dam or levee 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 greater than one week. **Table 23** provides a summary of the Planning Committee's expectations during a dam or levee failure.

Table 23 CPRI for Dam/Levee Failure

	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Brook	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Goodland	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Kentland	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Morocco	Likely	Significant	> 24 Hours	> 1 Week	Elevated
Town of Mount Ayr	Likely	Significant	> 24 Hours	> 1 Week	Elevated

Dam/Levee Failure: Assessing Vulnerability

The actual magnitude and extent of damages due to a dam or levee 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. Due to the conditions beyond the control of the dam or levee owner or engineer, there may be unforeseen structural problems, natural forces, mistakes in operation, negligence, or vandalism that may cause a structure to fail.

Within Newton County, direct and indirect effects from a dam or levee 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, and 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

Estimating Potential Losses

It is preferred that High Hazard dams have Incident and Emergency Action Plans (IEAP) developed. These plans have detailed potential dam failure inundation areas identified along with at-risk structures identified. As there are no High Hazard dams within Newton County, there are no IEAPs developed and potential inundation mapping has not been established. The actual magnitude and extent of

damages depend on the type of dam break, the volume of water that is released, and the width of the floodplain valley to accommodate the dam break flood wave.

As discussed earlier, there are ten levee systems in Newton County, none of which are accredited through FEMA. FEMA accredits levees as providing adequate risk reduction on the FIRM if the certification and adopted operation and maintenance plan provided by the levee owner are confirmed to be adequate. This accreditation process is not a standard of safety; it only affects insurance and building requirements for the areas protected by the levee.

Table 24 provides overview information of each of the levee systems noted in the NLD as relevant for Newton County Indiana. The primary purpose of each of these systems is to protect agricultural lands and crop production. No municipalities within Newton County are provided flood protection by the levee systems and no critical infrastructure are anticipated to be impacted should a levee breech.

Table 24 Newton County Indiana Levee Systems

Levee System	NLD Risk	People at Risk	# Structures / $ Value	Miles
Newton Levee	Not Screened	6	5 / $798K	5.2
Newton Levee 2	Not Screened	0	0 / $0	2.76
Newton Levee 3	Not Screened	6	4 / $914K	0.4
Newton Levee 4	Not Screened	8	14 / $2.6M	2.27
Newton Levee 5	Not Screened	0	0 / $0	0.46
Newton Levee 6	Not Screened	1	2/$338K	4.18
Newton Levee 7	Not Screened	2	2/$338K	2.44
Newton Levee 8	Not Screened	0	0 / $0	1.49
Newton Levee 9	Not Screened	0	0 / $0	2.35

Future Considerations

As areas near existing dams and levees 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 and levee failure inundation areas. Also, flood-free access should be provided for these facilities. Large areas of new development have not yet occurred downstream of the high hazard dams in Newton 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 area. This is a good suggestion even for Significant Hazard dams as well.

In regard to levee structures, a document similar to the IEAP for dams should be prepared levees, the Flood Warning and Emergency Evacuation Plan, FWEEP. Along with the development of the FWEEP, it is important that recommendations from studies completed along the Kankakee River be implemented to provide additional protection, especially in areas where interior drainage remains the primary concern. This will continue to reduce risk in these areas, as well as provide additional protections to existing structures and potentially allow additional acres to be used in economic development projects.

Dam/Levee Failure: Relationship to Other Hazards

With the potentially large volumes and velocities of water released during a breach, it can be expected that such a failure would lead to flooding within the inundation areas downstream of the dam and behind the levee. Nearby bridges and roads are also in danger of being destroyed or damaged due to a dam failure. 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 or levee 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 30 Drums of Potentially Hazardous Waste

As materials are mobilized for treatment, disposal, or transport to another facility, all infrastructure, facilities, and residences near the transportation routes are at an elevated risk of being affected by a hazardous materials release. Often these releases can cause serious harm to Newton County and its residents if proper and immediate actions are not taken. Most releases are the result of human error or improper storage (**Figure 30**), 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 numerous small and moderately sized 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 "Likely" within any area of the county due to the number of facilities and transportation routes within and through these municipalities. "Critical" damages are anticipated to result from an incident no matter the location of the event. As with hazards of this nature, a short warning time of less than six hours and a duration of less than one day is anticipated in the event of a hazardous materials incident. A summary is shown in **Table 25**.

Table 25 CPRI For Hazardous Materials Incident

	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI
Newton County	Likely	Critical	< 6 Hours	< 1 Day	Severe
Town of Brook	Likely	Critical	< 6 Hours	< 1 Day	Severe
Town of Goodland	Likely	Critical	< 6 Hours	< 1 Day	Severe
Town of Kentland	Likely	Critical	< 6 Hours	< 1 Day	Severe
Town of Morocco	Likely	Critical	< 6 Hours	< 1 Day	Severe
Town of Mount Ayr	Likely	Critical	< 6 Hours	< 1 Day	Severe

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

Hazardous Materials Incident: Assessing Vulnerability

Within Newton 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 reconstruction 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

Figure 31 Fuel Tanker Fire

While the possibility of an incident occurring may be likely, the vulnerability of Newton 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), creating chemical inventories of local industries and businesses, and reporting materials necessary for compliance.

In Newton County, nearly 25 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 and the response it would require, and to better prevent serious effects 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 generated.

Future Considerations

Additional facilities, both critical and non-critical in nature may be affected if a hazardous materials release were to occur along a transportation route. Several routes including railways, Interstate 65; US Highway 24, 41, 52; State Routes 10, 14, 16, 55, 71, and 114 are traveled by carriers of hazardous materials.

By restricting development within the known hazardous materials facility buffer zones, future losses associated with a hazardous materials release can be reduced. Critical 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.

Many facilities constructed within close proximity to a hazardous materials facility are similar due to local zoning ordinances. This reduces the risk and vulnerability of some populations. However, there are several 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 ignites 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 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 Newton 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 26 summarizes the CPRI values for the various hazards studied within this MHMP.

- The hazard that ranked as "Low" is Land Subsidence.
- "Elevated" risks included Earthquake; Tornado; Winter Storm and Ice.
- "Severe" risks include Drought; Extreme Temperature; Fire; Flood; Hail, Thunder, and Windstorm; Dam/Levee Failure; Hazardous Materials Incident

Table 26 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/Levee Failure	
	Hazardous Materials Incident	

It can be important to understand the cause and effect relationship between the hazards selected by the Committee. **Table 27** 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 27 Hazard Relationship Table

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

As a method of better identifying the potential relationships between hazards, the community exhibits can be referenced to indicate the proximity of one or more known hazard areas such as the delineated floodplains and the locations of EHS facilities. For this reason, many of the communities in Newton County 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 a facility experiencing a hazardous materials incident. These areas may also be at a greater risk of a dam or breach

Future development in areas where multiple known hazard areas (dam failure inundation 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 Newton 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 2010 Newton County MHMP and determined that each of these remain valid and effective. In summary, the overall goal of the Newton 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 the federal treasury in terms of reduced hazard-related expenditures. This study found that every $1 spent on mitigation efforts resulted in an average of $4 savings for the community. The study also found that FEMA mitigation grants are cost-effective since they often lead to additional non-federally funded mitigation activities and have the greatest benefits in communities that have institutionalized hazard mitigation programs.

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 Newton County. Mitigation measures that were included in the 2010 Newton County MHMP are noted as such.

Emergency Services

- The County has developed a centralized system for testing the existing outdoor warning sirens.
- Stream gages are utilized for flood forecasting and flood warnings for various stream levels and along the Iroquois and Kankakee Rivers and Hunter Ditch.
- Many communities have developed snow removal routes to keep primary streets clean during and after snowstorms.
- Newton County, along with other District 1 counties, participate in annual training and drills related to sheltering in place. This includes responders and support teams for the Ingestion Pathway.

Natural Resource Protection

- Newton County is in good standing with the NFIP Program and has flood protection ordinances which meets or exceeds the minimum requirements.
- Current facility maps and response plans are on file for all Tier II HazMat facilities

Prevention

- Newton County utilizes a contract service provider for GIS data collection and maintenance which may be used independently and collectively in land use planning decisions and can be utilized in HAZUS-MH "what-if" scenarios.
- The Newton County LEPC provides routine training regarding the proper storage, transport, and disposal of hazardous materials.

Property Protection

- Recommendations from completed flood protections studies are implemented as funding becomes available *(2010 Measure)*

- Drainage system maintenance, including repair and replacement of broken tiles and culverts occurs routinely throughout the county. *(2010 Measure)*

Public Information

- Outreach materials and hazard preparedness materials are routinely provided within offices and agencies throughout Newton County, large public events, speaking opportunities within schools, etc. *(2010 Measure)*
- Each community participates in Blackboard notification systems during times of impending severe weather.
- The county utilizes approximately 150 high water signs which can be mobilized to inform motorists of flooded routes

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.

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 projects 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 28 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 entities, and potential funding sources, associated with each proposed practice. The proposed mitigation practices are listed in order of importance to Newton 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 5-10 years from final Plan adoption, and projects identified by the Committee to be of "low" local priority may be implemented within 10+ years from final Plan adoptions. However, depending on availability of funding, some proposed mitigation projects may take longer to implement.

As part of the process to identify potential mitigation projects, the Planning Committee weighed the benefit derived from each mitigation practice against the estimated cost of that practice. This basic benefit-cost ratio was based on experience and professional judgement and was utilized to identify the mitigation practices as 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 Newton County. The intent of this planning effort was to identify the hazards and the extent to which they affect Newton 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 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 97 points for setting goals to reduce the impact of flooding and other known natural hazards; identifying mitigation projects that include activities for prevention, property protection, natural resource protection, emergency services, structural control projects, and public information.

Table 28 Proposed Mitigation Measures

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 and/or upgrades in prioritized response vehicles and purchase and install as feasible 2. Establish procedures to evacuate the population in known hazard areas 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. Investigate reciprocal agreements between neighboring communities/counties for structural inspections following hazardous events 5. Establish a water rescue team in Newton County 6. Investigate most efficient and protected method to back up county and municipal records	☒ 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. Some departments have needed equipment, Fire/EMS struggle; Goodland not equipped 2. Evacuation procedures have been developed for hazmat incidents 3. Post event information is provided in varying degrees 4. Many communities have Mutual Aid for medical, fire, and police response efforts 6. Backup of records occurs in varied levels within each community **Proposed Enhancement –** 1. Inventory hardware/software needs to equip prioritized vehicles 2. Establish procedures to evacuate areas during floods 3. Create a more consistent reporting and documentation effort following hazard events 4. Investigate ability to enter into similar agreements for activities related to structural inspections or other activities following hazard events 5. Establish a county team for dive, swift water, and water rescues 6. Establish location of remote back up storage in accordance with COG/COOP outline	High *(data terminals, evacuations, recordkeeping,)* Moderate *(reciprocal agreements, water rescue team)* Low *(records back-up)*	High	EMA Sheriff Department Town Marshal *Brook, Goodland, Kentland, Morocco* Fire Departments *Brook, Goodland, Kentland, Lake Township, Lincoln Twp, Morocco* Highway Department IT Department *County* Building Department *County*	Existing Budget Grant
Power Backup Generators 1. Require power back-up generators in all critical facilities (existing and new) 2. 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 3. Secure a fuel reserve, or ensure contractual emergency provisions so critical infrastructure may run on power backup for extended periods of time 4. Investigate the potential to utilize wind or solar generators	☒ 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. Many critical facilities have generators or have added since the last plan 3. Some communities have verbal agreements for fuel supplies 4. A solar field exists within the county **Proposed Enhancements –** 1. Inventory and prioritize critical facilities in need of generators 2. Inventory generator capabilities and needs and prioritize within each community to determine needs for future purchases 3. Secure a fuel reserve via contract service agreement 4. Determine feasibility of replicating solar field elsewhere in the county or developing a wind powered generator for other facilities	High *(generators in critical facilities)* Moderate *(inventory)* Low *(fuel reserve, wind/ solar)*	Low	EMA Community Contacts *County, Brook, Goodland, Kentland, Morocco, Mount Ayr* Facility Owners	Existing Budget Grant

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 at the local level through the CERT or similar program 2. Create bilingual notifications and hazard preparedness materials as well as purchase translators 3. Purchase mobile message boards to provide current hazard information 4. Coordinate with private building owners utilizing large dynamic message boards for business to use during hazard events 5. Improve outdoor warning siren coverage or complete software upgrades to alert populations of severe weather conditions 6. Install metal detectors at County Government Center and other potentially vulnerable public locations 7. Enhance police or security abilities with additional cameras at schools or large employers 8. Investigate and propose an ordinance to require developers to pay to install additional sirens for new developments or pay into siren fund as part of new developments 9. Encourage disaster readiness kits containing plastic sheeting and duct tape for windows, doors, and vents to be placed in all critical facilities	☒ 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. County has some residents trained; Goodland and Mount Ayr would benefit from trained residents 3. The county has access to mobile message boards through the District 4. Several facilities in the county operate dynamic message boards 5. Sirens provide coverage for most populated areas 7. Some school cameras are tied to 911 facility and can be monitored **Proposed Enhancements –** 1. Increase number of trained individuals in prioritized areas and provide training throughout the year. 2. Create and provide notifications and information in Spanish 3. Purchase message boards for use in Newton County 4. Coordinate with facility owners who operate dynamic message boards and provide them with prescripted messages to use during hazard events. 5. Additional sirens in unincorporated areas and software upgrades for existing sirens 6. Install metal detectors at County Government Center 7. Install additional cameras at schools and large employers 8. Propose and adopt an ordinance to have developers pay into a fund for additional outdoor warning sirens 9. Encourage readiness kits containing shelter in place materials for events related to potential radiological events	High *(CERT, bilingual notifications, mobile message boards, private message boards, sirens, metal detectors, cameras)* Moderate *(siren ordinance, readiness kits)*	High	Critical Facility Owners EMA CERT Message Board Owners Large Employers School Superintendents	Existing Budgets Grants
Safer Rooms and Community Shelters 1. Research incentives for private buildings with approved safe rooms 2. Develop temporary and/or long-term shelter agreements within the County. Potential for tiered levels of shelters, domestic animal shelters, etc., especially in small communities 3. Clearly advertise location of safe rooms and community shelters for large gatherings of people	☒ 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. Shelters locations are spaced throughout the county as available and as needed **Proposed Enhancement –** 1. Research incentives and provide to structures with approved safe rooms 2. Continue to evaluate shelter locations and needs throughout the county 3. Develop education materials for large gatherings	High *(incentives)* Moderate *(shelter agreements advertise for large gatherings)*	Low	EMA Large Gathering Liaisons Building Department *County* American Red Cross	Existing Budget

Mitigation Practice	Mitigation Strategy	Hazard Addressed	Status	Priority	Benefit-Cost Ratio	Responsible Entity	Funding Source
Building Protection 1. Protect existing critical facilities in floodplains *(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. George Ade Center, Sumava Resort Improvement Club, NIPSCO Substation, and Brook water tower are located in SFHA **Proposed Enhancements –** 1. Complete studies to determine needs to protect each facility and make improvements as able	High	Moderate	EMA Facility Owners	Grant Existing Budget
Flood Studies and Protection 1. Conduct detailed flood protection studies for problem areas and/or areas with repetitive flooding problems 2. Prepare a detailed Flood Response Plan to improve response and reduce losses from a flood event *(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. Studies have been completed for various areas throughout the county **Proposed Enhancements –** 1. Evaluate local areas with repetitive flooding and prepare county prioritized listing for additional studies 2. Prioritize areas in need of Flood Response Plan and develop team to prepare plan	High	Moderate	County Surveyor Engineering Departments *County* Floodplain Administrator *County*	Existing Budget Grant
Community Rating System 1. Investigate potential to 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. No communities currently participate in the CRS program **Proposed Enhancement –** 1. Participation from Newton County	Moderate	Moderate	Floodplain Administrator *County*	Existing Budget
Land Use Planning & Zoning 1. Incorporate hazard information, risk assessment, and hazard mitigation practices into the Comprehensive Land Use Plan and Development Review to better guide future growth and development	☐ 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. Update the Newton County Comprehensive Plan and include information related to hazards, more definitively outline higher risk areas and those that should be avoided for future development	Moderate	Moderate	Planning / Building Department *County*	Existing Budget

Mitigation Practice	Mitigation Strategy	Hazard Addressed	Status	Priority	Benefit-Cost Ratio	Responsible Entity	Funding Source
Transportation 1. Complete transportation survey to determine typical types and quantities of chemicals being transported throughout Newton County	☒ 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. Complete updated commodity flow study for Newton County focusing on Interstate 65, US Routes, and rail lines	Moderate	Moderate	Rail Owners INDOT Highway Department LEPC	Existing Budget Grant
Water Conservation 1. Research and adopt a water conservation ordinance and contingency plans to implement during water shortages	☒ 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. Review existing ordinances, and if needed, propose water conservation ordinance	Moderate	Low	EMA Planning Departments *County, Goodland*	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

Protect existing critical facilities in floodplains

- Review listing of critical facilities within floodplains
- Complete studies to determine localized flood depths
- Provide recommendations for protection measures for each structure
- Prioritize structures and implement recommendations as funding allows

5.2 EMERGENCY PREPAREDNESS AND WARNING

Improve disaster preparedness and emergency response at the local level through the CERT or similar program

- Develop annual training programs for existing volunteers
- Review geographic locations of existing volunteers and prioritize neighborhoods, regions, or large employers for recruitment based on areas not yet covered
- Provide announcement and press release to partner agencies to increase the reach of the information

Create bilingual notifications and hazard preparedness materials

- Develop a partnership with a neighboring University language department
- Provide existing notifications and hazard preparedness materials for translation (Spanish throughout the county)
- Post to municipal websites and provide to appropriate communities in print form

Purchase mobile message boards to provide current hazard information

- Inventory existing capabilities
- Determine needs based on areas where message boards need to be routinely deployed
- Secure funding and procure message boards
- Store message boards throughout the county

Coordinate with private building owners utilizing large dynamic message boards for business to use during hazard events

- Complete an assessment of existing large dynamic message boards at local businesses, schools, churches, etc.
- Contact owners or operators of boards to determine level of willingness or ability to provide altered messages in various situations
- Develop a list of willing participants and contact information

- Annually review contact information to ensure accuracy

Improve outdoor warning siren coverage or complete software upgrades to alert populations of severe weather conditions

- Review existing outdoor warning siren coverage
- Determine areas in need of primary or additional coverage
- Investigate potential funding sources and determine local level of interest
- Install additional outdoor warning sirens as feasible

Install metal detectors at County Government Center and other potentially vulnerable public locations

- Develop a list of vulnerable public locations, including the County Government Center
- Determine best detection equipment and hardware for each location
- Purchase and install equipment at prioritized locations

Enhance police or security abilities with additional cameras at schools or large employers

- Inventory existing cameras and surveillance equipment at each educational facility and large employer location
- Determine needs at each location and prioritize listing on a county-wide level
- Purchase and install equipment according to prioritized listing

5.3 EMERGENCY RESPONSE AND RECOVERY

Inventory needs for mobile data terminals and/or upgrades in prioritized response vehicles and purchase and install as feasible

- 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.

Establish procedures to evacuate the population in known hazard areas

- Determine protocols for when evacuations would be required and agency or municipal officials' roles and responsibilities during events
- Define evacuation routes, any facilities to where evacuated populations will be sent
- Provide information to affected populations, land and/or facility owners, and agency or municipal officials

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

5.4 FLOOD STUDIES AND PROTECTION

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

- Review listing of flood prone or problem areas and prioritize based on previous damages, at-risk populations, or potential for damage to critical infrastructure
- Secure funding, municipal bond, or funds from existing budgets to complete floodplain studies
- Update the Floodplain Prioritization Study to direct future analyses

Prepare a detailed Flood Response Plan to improve response and reduce losses from a flood event

- Work with municipal Floodplain Administrators to prioritize municipalities most at risk for flood damages
- Review existing plans or protocols within each community and surrounding area
- Secure funding needed and develop municipal specific Flood Response Plan

5.5 POWER BACK-UP GENERATORS

Require power back-up generators in all critical facilities (existing and new)

- Utilize listing of critical facilities and coordinate with facility owners or operators
- Determine presence or absence of generator, fuel capacity, and fuel reserve
- Determine if additional needs are required to ensure compatibility with generator
- Secure or allocate funding to make necessary purchases or facility adjustments to ensure functioning generators are present and operable

5.6 SAFER ROOMS AND COMMUNITY SHELTERS

Research incentives for private buildings with approved safe rooms

- Research incentives offered for safe rooms in other areas of Indiana or the United States
- Prioritize existing buildings suitable for safe rooms and work with building owners to develop plans for safe room additions
- Work with Planning and Building Department to propose local incentives to offer for proposed structures with safe rooms

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 Newton 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 incorporated 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 Newton 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 6** 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 infrastructure, 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 2025, 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 Newton 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 Newton County and to provide them an opportunity for review and comment of the draft

MHMP. A media release will be issued providing information related to the update, the planning process, and details of the public meeting.

6.2 INCORPORATION INTO EXISTING PLANNING MECHANISMS

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

Many of the mitigation practices identified as part of this planning process are ongoing with some enhancement needed. Where needed, modifications will be proposed to be made to each NFIP communities' planning documents and ordinances during the regularly scheduled update. Among other things, local planning documents and ordinances may include comprehensive plans, floodplain management plans, zoning ordinances, building codes, site development regulations, or permits. Modifications include discussions related to hazardous material facility buffers, floodplain areas, and 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 may 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 Newton 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 Newton County website.

Updates or modifications to the Newton 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.

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