WABASH COUNTY
MULTI-HAZARD MITIGATION PLAN

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Prepared for:

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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. In **Figure i** each phase in the Emergency Management Lifecycle; Mitigate, Prepare, Respond, and Recover has a description of the phase as well as a time frame within the disaster cycle. Although each of the phases is visually tied to a specific time period within the life cycle of the disaster, mitigation can take place throughout much of the disaster life cycle. The Wabash County Multi-Hazard Mitigation Plan (MHMP) update focuses on the mitigation activities that may be implemented throughout the disaster life cycle.

Figure i: Disaster Life Cycle

According to FEMA, mitigation is most effective when it is 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.

The overall goals of the Wabash County MHMP, which align closely with the State of Indiana MHMP, are:

- Lessen the impacts of disasters and enhance community resilience
- Minimize the loss of life and injuries caused by disasters
- Promote mitigation activities both prior to and following a disaster

To achieve the stated goals the community strategy includes the following:

1. Lessen the impacts of disasters and enhance community resilience by:
    a. Supporting resilience opportunities within the community
    b. Incorporating the MHMP into local ordinances, local planning efforts, and the community comprehensive plans
    c. Evaluating and strengthening collaboration among organizations
    d. Making sure critical and essential facilities can withstand disasters
    e. Supporting the National Flood Insurance Program (NFIP)
    f. Identifying opportunities to reduce repetitive loss incidents

2. Minimize the loss of life and injuries caused by disasters by:
    a. Improving warning systems for the residents
    b. Developing public awareness and outreach programs
    c. Improving shelter availability
    d. Developing a program of affordable housing that is resilient to flooding
    e. Improving education and training for emergency personnel and officials
    f. Developing ways to provide education, awareness, and warning of disasters to all members of the community

3. Promote mitigation activities prior to and following a disaster by:
    a. Ensuring better communication between federal, state, and local officials
    b. Seizing opportunities to buy out properties, floodproof buildings, or improve building codes
    c. Conducting new studies and/or research opportunities to reduce impacts from disasters and prepare for future events anticipating the impacts of our changing climate
    d. Conducting outreach efforts to educate community members about the risks and hazards in their area as well as encouraging the implementation of a variety of mitigation actions

For NFIP communities to be eligible for future mitigation funds, they must either adopt 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. The following are incorporated communities that have provided information, attended meetings, and participated in the planning process, the planning process used to update the Wabash County MHMP satisfies the requirements of a multi-jurisdictional plan.

- Wabash County
- Town of LaFontaine
- Town of North Manchester
- City of Wabash
- Town of Lagro
- Town of Roann

During planning committee meetings, those in attendance revisited the latest edition of the Wabash County MHMP and identified new critical facilities and local hazards; reviewed the State's mitigation goals and updated the local mitigation goals; reviewed the most recent local hazard data, vulnerability assessment, and maps; evaluated the effectiveness of existing mitigation measures and identified new mitigation projects; and reviewed materials for public participation. Keeping in mind the ever-changing climate, the committee also examined the needs of underserved populations that may be more vulnerable to the impacts of the listed hazards. Meetings were conducted with key groups such as city planners, health department specialists, representatives of organizations serving the underserved populations and various emergency responders. Their information has been incorporated into this MHMP update. This plan update will examine each of the hazards with data from the past six years, where possible.

The review of hazards and risks is based on the methodology described in the Local Mitigation Planning Policy Guide FP 206-21-0002, effective April 19, 2023. The plan identifies the hazards assessed, the nature of each hazard including historic occurrences, vulnerabilities, and the relationship to other hazards. Using a ranking tool known as the Calculated Risk Priority Index (CPRI), the planning committee scored each of the hazards. **Table** i lists the hazards in the plan and the ranking of each. The CPRI scores reflect the hazards of most concern by the planning committee members.

Table i: CPRI Ranking for All Hazards

Hazard	2025 Rank	CPRI Score
Flood	1	3.34
Winter Storms and Ice	2	3.29
Hailstorm, Thunderstorm, and Windstorm	3	3.25
Hazardous Material Incident	4	3.20
Drought	5	3.08
Tornado	6	2.94
Extreme Temperatures	7	2.65

Hazard	2025 Rank	CPRI Score
Fires and Wildfire	8	2.27
Earthquake	9	2.05
Landslide, Land Subsidence, and Fluvial Erosion	10	1.91
Dam and Levee Failure	11	1.54

The plan concludes with a discussion about mitigation actions. The MHMP lists a variety of mitigation actions the planning committee members would like to accomplish within the next five years to enhance the resilience of Wabash County. In addition, it celebrates the mitigation successes from the previous MHMP plans and community actions which contribute to mitigating the various risks and hazards identified.

Lastly, this MHMP is a living document which has a five-year life span. During the next five years, Wabash County and the incorporated communities that adopt this plan will work to complete the mitigation actions as well as regularly noting items for the next plan update. The county EMA and planning committee members will also use tools contained in the appendices, or similar documents, to track progress, and note changes that may impact community resilience.

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, shown in **Figure 1** includes four phases:

Figure 1: Disaster Life Cycle

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)

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 critical and essential facilities)

The Wabash 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 is 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.

The following chapters will address the planning process used to complete the updating of the existing MHMP, basic community information to orient the reader to the county and the incorporated communities, a discussion of nine natural and two manmade hazards detailing their recent occurrence and risks posed to the county , a discussion of the mitigation strategy, outline of the implementation plan and a discussion of how the plan will be maintained. Images and tables in **bold** are linked within the document as well as being linked in the table of contents. By clicking on these bolded features while holding the control key, the document will automatically move to item identified in the bold text.

CHAPTER 2: PLANNING PROCESS

REQUIREMENT 44 CFR 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 years in order to continue to be eligible for mitigation project grant funding.

According to the Code of Federal Regulations (44 CFR §201.1(b)), the purpose of mitigation planning is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources.

A FEMA-approved MHMP is required to apply for and/or receive project grants under the Building Resilient Infrastructure and Communities (BRIC), Hazard Mitigation Grant Program (HMGP), and Flood Mitigation Assistance (FMA). Additional detailed studies may need to be completed prior to applying for these grants even though this plan meets the requirements of Disaster Mitigation Act (DMA) 2000 and eligibility requirements of the above listed grant programs. Acronyms and initializations referenced throughout this plan are contained in **Appendix 1**.

The NFIP requires participating communities to adopt either their own MHMP or participate in the development of a multi-jurisdictional MHMP to be eligible for future mitigation funds. 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. Local jurisdictions are required to review, revise, and resubmit the MHMP every five years. The 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 update may validate the information in the previously approved MHMP or may be a major rewrite depending on community needs and planning guidance. 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 Wabash County MHMP update is a multi-jurisdictional planning effort led by the Wabash County Emergency Management Agency (EMA). This plan was prepared in partnership with Wabash County (referred to in this document as county) and the city of Wabash and towns of LaFontaine, Lagro, North Manchester, and Roann (referred to in this document as towns).

Representatives from these communities attended the committee meetings, providing valuable information about their community, reviewing, and commenting on the draft MHMP, and assisting with local adoption of the updated plan. As each of the jurisdictions had an equal opportunity for participation and representation in the planning process, the process used to update the Wabash County MHMP satisfies the requirements of DMA 2000 in which multi-jurisdictional plans may be accepted.

The Community Rating Service (CRS) program is a voluntary incentive program that recognizes and encourages community floodplain activities that exceed the minimum NFIP requirements. As a result, flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions that meet the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote education and awareness of flood insurance. Savings on flood insurance premiums are proportional to the points assigned to various activities. A minimum of 500 points is required to be a participating community within the CRS program and receive a 5% flood insurance

Figure 2: NFIP/CRS

premium discount. Class 10, or communities with 0-499 points, are non-participating communities and do not receive a discount on flood insurance. This MHMP is estimated to contribute 292 points toward participation in the CRS. Throughout this plan, activities that could count toward CRS points are identified with the NFIP/CRS logo (**Figure 2**). **Appendix 2** breaks down how this MHMP can contribute toward participation in the CRS.

2.1 SCHEDULE

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 Wabash County MHMP update began when IDHS notified the county of the FEMA grant award and availability of grant funds. Wabash County and IDHS signed a grant agreement for MHMP funding on June 17, 2024, and Wabash County hired Christopher B. Burke Engineering, LLC (Burke) on March 16, 2026, to assist the county with the update process. The MHMP update process began once the grant agreement was signed and it took three months to prepare the MHMP for submission to IDHS and FEMA for review. This does not include the MHMP review period by IDHS and FEMA and the adoption period by Wabash County and incorporated communities.

2.2 PLANNING COMMITTEE AND INTERESTED PARTIES INVOLVEMENT

In March 2026, the EMA began to compile a list of planning committee members to guide the MHMP update planning process. Committee members were contacted through their personal contact info and were relayed information on the meeting time and location. These individuals were specifically invited to serve on the committee because they were knowledgeable of local hazards; had been involved in hazard mitigation activities; had the tools necessary to reduce the impact of future hazard events; and/or served as a representative on the prior planning committee in 2019. The surrounding counties of Fulton, Grant, Huntington, Kosciusko, Miami, and Whitley were invited to attend the committee meetings and were given an opportunity to provide input and feedback to the plan throughout the planning process and during draft review. A representative from the Miami County EMA attended and participated in the meetings. **Table 1** lists the individuals that actively participated on the committee and the entity they represented.

Table 1: Wabash County MHMP Planning Committee

Name	Agency	Title	Community Representing
Sandy Beeks	Wabash County Central Dispatch	Director	Wabash County
Kristie Bone	Town of Lagro	Treasurer	Lagro
Robert Brown	Wabash County EMA	Assistant Director	Wabash County
Dustin Drake	IDHS	District Liaison	Neighboring County
Tyler Guenin	Wabash County Sheriff's Office	Chief Deputy	Wabash County
Tracie Hensley	Town of LaFontaine	Deputy Clerk	LaFontaine
Jennifer Hicks	Wabash County Plan Commission	Assistant Director	Wabash County
R. Sam Hipskind	Wabash City Schools	School Resource Officer	Wabash
Shelley Hipskind	City of Wabash	Mayor's Assistant	Wabash
Herb Hunt	Miami County EMA	Director	Neighboring County
Ella Hunter	Wabash County Sheriff's Office	Deputy	Wabash County

Name	Agency	Title	Community Representing
Andrew King	Town of Lagro Water and Sewer Dept.	Superintendent	Lagro
Cam Kissinger	North Manchester Fire Dept.	Chief	North Manchester
Rachel Landis	Wabash County Health Dept.	Environmental Health Specialist	Wabash County
Rich Mofield	Wabash County Health Dept.	Administrator	Wabash County
Jason Mooney	Wabash Police Dept.	Chief	Wabash
Andy Oswalt	City of Wabash Fire Dept.	Chief	Wabash
John Pionke	Wabash Municipal Airport	Assistant Manager	Wabash County
Larry Rensberger	Town of Roann Fire Dept.	Chief	Roann
Scott Richardson	City of Wabash Street Dept.	Street Commissioner	Wabash
Eric Ryggs	Wabash County Sheriff's Office	Sergeant	Wabash County
Branden See	Wabash County Surveyor's Dept.	Assistant	Wabash County
Ryan Smith	Wabash County Highway Dept.	Superintendent	Wabash County
Christ Straub	Wabash County Health Dept.	Environmental Health Specialist	Wabash County
Keith Walters	Wabash County EMA	Director	Wabash County
Maureen Zinn	Wabash County Central Dispatch	Dispatcher	Wabash County

Members of the committee participated in the MHMP update through various committee meetings as well as outside group meetings where mitigation opportunities are supported or addressed. During the MHMP committee meetings, the committee:

- Reviewed the State's mitigation goals and updated the local mitigation goals
- Reviewed the most recent local hazard data, vulnerability assessment, and maps
- Evaluated and ranked the hazards based on probability of occurrence, impact, warning time, and duration of the hazard event
- Revisited existing (in the prior MHMP) critical and essential facilities and identified new critical and essential facilities and local hazards
- 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 3**. Members of the committee also reviewed a draft MHMP, provided comments and suggestions, and assisted with adoption of the Wabash County MHMP update.

2.3 PUBLIC INVOLVEMENT

The Wabash County EMA Director kept the public up to date about the planning process by regularly reporting on the planning effort at public commissioner's meetings, LEPC meetings, and other events. A draft of the Wabash County MHMP update was posted to the Wabash County Indiana Emergency Management Agency Website for public review and comment. A media release indicating the posting of the draft MHMP and the ability to comment was submitted for release. No comments or corrections were received from the public or the committee **(This highlight will be updated after the period of review)**. The media release, web page posting, and any comments received are included in **Appendix 4**.

As previously mentioned, neighboring EMAs were invited to review the draft plan during the period of public review and comment. No comments or corrections were received from the neighboring EMAs. **(This highlight will be updated after the period of review.)**

2.4 PLANS, STUDIES, REPORTS, AND TECHNICAL INFORMATION

Requirement 201.6(c)(1)

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

During the development of the Wabash 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 from the time of the development of the previous Wabash County MHMP, and to assist the committee in developing potential mitigation measures to reduce the social, physical, and economic losses associated with hazards affecting Wabash County.

This planning effort included the review of community specific plans and studies for incorporation in this plan update. For the purposes of this planning effort, the following materials (among others) were discussed and utilized:

- MHMP Wabash County (2019)
- Wabash County Comprehensive Plan (2022)
- Wabash County Strategic Investment Plan (2024)
- Wabash County GIS data
- Wabash County Zoning Ordinance (2024)
- City of Wabash Ordinances
- Ordinances for the towns of LaFontaine, Lagro, North Manchester, and Roann
- Flood Insurance Rate Maps and Flood Insurance Studies – FEMA and INFIP

The above plans and ordinances target many of the same issues and plans included in this report. The MHMP has and continues to be used to inform decision makers during preparation of various documents in the county. This MHMP planning effort sought to use existing plans to inform the planning committee about mitigation actions that would support the community development, as outlined in the comprehensive plan, and to support and/or enhance existing ordinances. The Wabash County Building Department has jurisdiction over all unincorporated areas of the county and over the towns of LaFontaine, Lagro, and Roann.

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; NFIP Participation; DNR listed Dams and associated records; Dam Breach Inundation App; and IN Floodplain Information Portal
- Indiana Department of Natural Resources, Other Divisions – Mining Records
- Indiana Geologic Survey and Water – Earthquakes in Indiana; Liquefaction Potential Map: Karst Regions and Maps of Karst locations
- Indiana Geographic Information Office - IndianaMap
- Indiana Department of Homeland Security – Current Fire and Building Code Information

- FEMA, Region V – Repetitive loss structure counts and insurance payments and FIRM Maps and Flood Studies
- Midwest Regional Climate Center – Climate Trends; County specific climate reports
- National Weather Service – Confirmation of Winter Storm Severity Index (WSSI) tool; local storm reports; weather event photos

The CRS program credits NFIP communities with a maximum of 170 points: up to 15 points for organizing a planning committee composed of staff from various departments; up to 120 points for involving the public in the planning process; and up to 35 points for coordinating among other agencies and departments to resolve common problems relating to flooding and other known natural hazards.

CHAPTER 3: DATA GATHERING

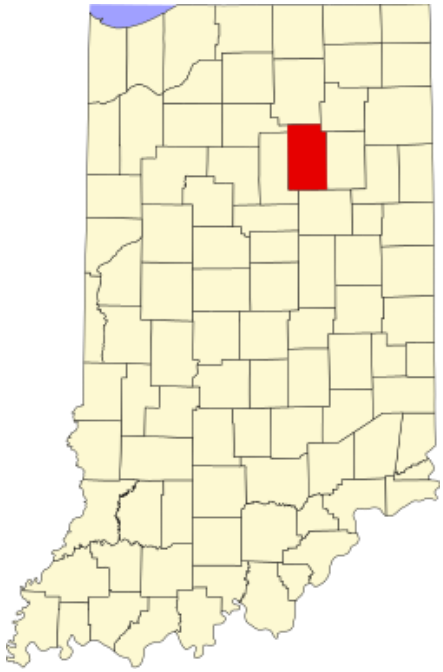


Figure 3: Wabash County Location

Wabash County, established in 1832, is named in reference to the Wabash River. The white limestone river bottom, now covered by sediment and debris, evoked the Indian name Wabashike, meaning "pure white" and the French name Ouabache. The county is transected by three rivers, Eel River to the north, Wabash River crossing the midline of the county and the Mississinewa River in the south. Each river provides ample opportunities for recreation and wildlife habitat.

Wabash Couty is strategically located between Ft. Wayne and Indianapolis with plenty of cultural amenities and scenic landscapes. Despite having a county population that is shrinking an average of 0.5% each year, the county is working to attract new businesses and housing in the community. Nearly 17.5% of the population work in manufacturing and roughly 10.5% work in retail trade compared to only 4.5% working on a farm.

Within Wabash County, over 11% of the county workforce commutes out of the county to work. Additionally, over 9% of the workforce commutes into the county for work. Disaster events such as flooding and winter weather can create several cascading impacts for the commuting workforce. Some of these cascading impacts include increased travel times for citizens and emergency vehicles, increased potential for hazardous materials incidents as roadway conditions worsen, and potentially life-threatening scenarios as floods impact roadways.

According to Stats Indiana, Wabash County, like many other rural counties within Indiana, has an aging population. The county has a lower percentage (52%) of the population who are newborn to 44 years of age when compared to the rest of Indiana (59%). The county has higher percentages of older adults and seniors (48%) than the Indiana state average (41%). This can be a challenge for the county as there may be a dwindling workforce and not enough people to take care of the older generations.

The land in Wabash County is mainly low and flat with the largest use being agriculture (69% crops and less than 1% pasture and hay). The total area of Wabash County is 421.0 mi^2 of which 8.5 mi^2 (2%) is water. The county is divided into seven townships, and the city of Wabash serves as the county seat. The location of the county within the State of Indiana is identified in **Figure 3**. The top 10 employers within Wabash County according to Grow Wabash are:

Top 10 Employers Within Wabash County

1. Ford Meter Box Co Inc (Wabash)
2. MPS Egg Farm (North Manchester)
3. Metropolitan School District (Wabash)
4. Parkview Wabash Hospital (Wabash)
5. Manchester University (North Manchester)
6. Living Essentials (Wabash)
7. Gebhart Holdings (Wabash)
8. QC Communications (Wabash)
9. Wabash Castings (Wabash)
10. Paper Works, Industries (Wabash)

3.1 CRITICAL AND ESSENTIAL FACILITIES

REQUIREMENT §201.6(c)(2)(ii)(A):

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

Critical facilities, critical infrastructure, and essential facilities are the assets, systems, and networks, whether physical or virtual, so vital to 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.

Figure 4: Parkview Wabash Hospital

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.

Utilizing information from the Wabash County EMA and GIS Department alongside FEMA data, **Table 2** shows the 243 critical and essential facilities for the MHMP update. Facilities that serve multiple facility types have been counted in accordance with their primary function. Additionally, there may be insufficient data to accurately list all critical and essential facilities in the county. **Figure 4** shows the Parkview Wabash Hospital which is considered one of the critical facilities.

Table 2: Critical and Essential Facilities

Facility Type	#	Facility Type	#	Facility Type	#
Airport	1	Jail	1	School	20
Dam	2	Large Employer Facility	9	Shelter	10
Daycare Facility	22	Law Enforcement	6	Tier II Facility	45
EMA	1	Mobile Home Park	10	University	1
Fire Station	12	Outdoor Warning Siren	12	Wastewater Treatment Plant	9
Government Building	14	Public Well	25	Water Tower	6
Group Home	8	Radio Station	2	Water Treatment Facility	8
Healthcare	10	Retirement Home/Nursing Center	9		

Information provided by the EMA, Wabash County GIS, and the MHMP planning committee members was utilized to identify the types and locations of critical and essential facilities throughout Wabash County. Draft maps were provided to the planning committee and EMA, along with the planning committee for their review and all comments were incorporated into the maps and associated databases.

Exhibit 1 illustrates the critical and essential facilities identified throughout the unincorporated Wabash County and the individual municipalities. **Appendix 5** lists the critical and essential facilities in Wabash County by category. Non-critical facilities include residential, industrial, commercial, and other structures not meeting the definition of a critical facility and are not required for a community to function. The development of this MHMP focused only on critical and essential structures; non-critical and essential structures are neither mapped nor listed.

3.2 COMMUNITY CAPACITY

REQUIREMENT §201.6(c)(3):

The plan shall document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs.

The Indiana Fire Prevention and Building Safety Commission is tasked with the establishment and maintenance of fire and building safety codes throughout the state. The commission is also responsible for reviewing variance requests, code modification proposals, and orders enforcing the fire and building safety law. Only the commission is permitted to adopt codes for the state thus prohibiting local communities from adopting codes other than those adopted by the state. All jurisdictions of the state are required to follow the state adopted fire safety and building laws.

The State of Indiana is presently working with subject matter experts to update the current fire and building safety codes to more recent International Code Council versions. Due to the hearing and adoptions processes this is a multi-year effort. It is hoped that within the next five years updated fire safety and building codes will be adopted to assist the community in becoming more resilient.

Local building officials serve as the local authority for building construction matters within their jurisdiction. Within Wabash County, the county building commissioner administers the building codes and zoning ordinances for the county and the towns of LaFontaine, Lagro and Roann. **Appendix 6** lists the local building official as well as other key positions in each jurisdiction. Additionally, Wabash County, the city of Wabash, and the towns of LaFontaine, Lagro, North Manchester and Roann have established local floodplain ordinances which were all adopted in 2013. The local floodplain administrators in the city of Wabash and the towns of LaFontaine, Lagro, and Roann may want to consider updating the flood ordinances to the current model language, restricting, and promoting safer development within the floodplain.

Due to the small population of Lagro and Roann, community capacity for new projects is limited and there may be activities which are shared with the county. Additionally, some authorities may be shared between one person or may not be directly addressed.

Most Wabash County communities, including the county, have ordinances relevant to open burning, floodplain regulations, stormwater, subdivisions, and zoning. Many of the communities within Wabash County have most if not all the same ordinances as the county. Community leaders take advantage of grant funding to help address non-budgeted activities. The planning committee identified multiple community-wide needs that will be addressed in **Chapter 5**. As needs for capacity building are identified, the communities and their leadership work together to ensure the challenges are addressed.

CHAPTER 4: 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 Wabash County and the communities within is based on the methodology described in the Local Mitigation Planning Handbook published by FEMA in 2023 and is incorporated into the following sections:

Section 4.1: Hazard Identification lists the natural, technological, and political hazards selected by the planning committee as having the greatest direct and indirect impact on the county as well as the system used to rank and prioritize the hazards.

Section 4.2: 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 4.3: 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 the hazards.

4.1 HAZARD IDENTIFICATION

4.1.1 HAZARD SELECTION

The MHMP planning committee reviewed the list of natural and technological hazards in the 2019 Wabash County MHMP and discussed recent events and the potential for future hazard events. The committee identified those hazards which affected Wabash County and each community selecting the hazards to study in detail as part of this planning effort. As shown in **Table 3**, these hazards include dam and levee failure; drought; earthquake; extreme temperatures; fires and wildfire; flooding; hailstorm, thunderstorm, and windstorm; hazardous material incident; landslide, land subsidence, and fluvial erosion; winter storms and ice; and tornado. Since the COVID pandemic, the Health Department continues to develop plans and policies to better respond to and reduce the spread of both routine human disease-causing organisms as well as zoonotic diseases and changes in that field.

Table 3: Hazards Selected

Type of Hazard	List of Hazards	MHMP	
		2019	2026
Natural	Drought	Yes	Yes
	Earthquake	Yes	Yes
	Extreme Temperatures	Yes	Yes
	Fires and Wildfire	Yes	Yes
	Flood	Yes	Yes
	Hailstorm, Thunderstorm, and Windstorm	Yes	Yes
	Landslide, Land Subsidence, and Fluvial Erosion	Yes	Yes
	Winter Storms and Ice	Yes	Yes
	Tornado	Yes	Yes
Technological	Dam and Levee Failure	Yes	Yes
	Hazardous Material Incident	Yes	Yes

4.1.2 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 CPRI. The CPRI 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 communication, simple graphical scales are used.

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.

Magnitude / Severity:

Magnitude/severity is defined by the extent of the injuries, shutdown of critical and essential facilities, 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 and essential facilities 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 and essential facilities 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 and essential facilities 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 and essential facilities shut down of one month or more OR more than 50% property damaged OR average response duration of less than one month

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

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

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 incorporated community in Wabash County, and then a weighted CPRI value was computed based on the population size of each community. **Table 4** 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 4: Determination of Weighted Value for Communities

Community	Population (2024)	% of Total Population	Weighted Value
Wabash County (w/o incorporated communities)	13,679	44.4%	0.444
City of Wabash	10,275	33.4%	0.334
Town of LaFontaine	802	2.6%	0.026
Town of Lagro	348	1.1%	0.011
Town of North Manchester	5,237	17.0%	0.170
Town of Roann	436	1.4%	0.014
Total	**30,777**	**100.0%**	**1.000**

4.2 HAZARD PROFILES

The hazards studied for this report are not equally threatening to all communities throughout Wabash 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 damage in different communities.

In the past six years Indiana has had four FEMA disaster declarations and two FEMA Emergency Declarations. Wabash County was included in two disaster declarations and both FEMA Emergency Declarations. In addition, the US Small Business Administration (SBA) had disaster declarations for 35 Indiana events. Of all these events in Indiana, Wabash County was included in one SBA declaration. **Appendix 7** lists FEMA disaster declarations, FEMA emergency declarations, and SBA declarations with the county's name emboldened.

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 and essential facilities and the implications to future land use decisions and anticipated development trends. Impacts on specific populations of communities are also addressed within this section
- **Relationship to Other Hazards** explores the influence one hazard may have upon another

4.2.1 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 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.

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 5 from the U.S. Drought Monitor, describes the rationale to classify the severity of droughts.

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	• Crops or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages and/or restrictions
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

Figure 5: U.S. Drought Monitor Classification Descriptions

Location

As rain patterns change there are periodic times when the county is deemed "Abnormally Dry" or D0. Most of these instances are resolved quickly as sufficient rain arrives and the soil rehydrates. On occasion, the rain is insufficient to address the dryness and weather conditions cause the soil to further dry out, stressing crops and reducing lake levels. Drought may occur in all climactic zones, but its characteristics vary significantly from one region to another. Although

drought declarations may be made for portions of the county, the entire county is vulnerable to the impacts of drought.

Extent and History

Drought is a temporary aberration and is different from aridity, which is restricted to low rainfall regions. **Figure 6**, developed based on data gathered from the U.S. Drought Monitor, shows the distribution of weeks in drought over the January 1, 2019, through December 31, 2025, period.

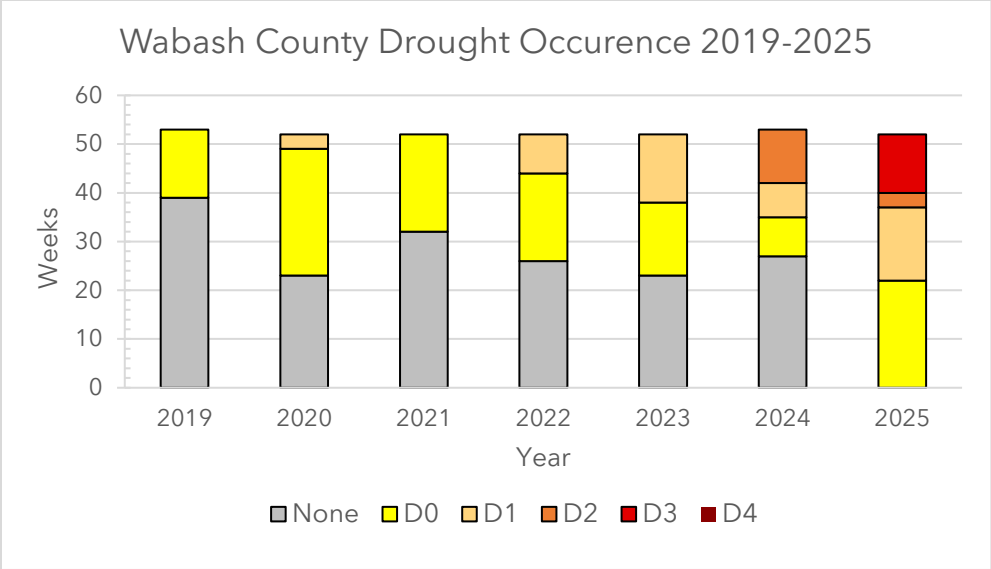


Figure 6: Wabash County Drought Occurrence 2019-2025

Probability

The planning committee, utilizing the CPRI, determined the overall risk of drought throughout Wabash County is "Severe." The impact of drought was determined to be slightly elevated for the city of Wabash and the towns of LaFontaine, Lagro, North Manchester, and Roann due to the possible impacts on residents as water wells are affected. The committee agreed that a drought is "Highly Likely" to occur within the next year. The magnitude of drought is anticipated to be "Limited" for the cities and towns as people could be impacted. Wabash County anticipated the magnitude to be "Significant" as the vast agricultural areas could be greatly impacted by a drought. 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 CPRI summary for drought is shown in **Appendix 8**.

According to the National Drought Mitigation Center, scientists have difficulty predicting droughts more than one month in advance due to 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.

Vulnerability

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

Direct Effects

Figure 7: Crop Failure Caused by Drought

- Urban, developed areas, and local wildlife areas may experience revenue losses from decreased tourism; landscaping companies, golf courses revenue losses due to lack of growth and plant death; restrictions on industry cooling and processing demands; reduced incomes for businesses dependent on crop yields, and increased potential for fires
- Rural areas within the county may experience revenue losses from reductions in decreased livestock and crop yields as well as increased incidence of field fires (**Figure 7**)
- Loss of tree canopy due to increased susceptibility to pests and diseases
- Citizens served by drinking water wells or surface water supplies may be impacted during low water periods and may require drilling of deeper wells or loss of water service for a period

Indirect Effects:

- Loss of income of employees from businesses and industry affected; loss of revenue to support services (food service and suppliers)
- Loss of revenue from recreational or tourism sectors associated with reservoirs, streams, and other open water venues
- Lower yields from domestic gardens increase the demand for purchasing produce and increase domestic water usage for landscaping
- Increased demand for emergency responders and firefighting resources due to grass fires and increased medical calls for people having respiratory issues because of increased dust amounts
- Drought conditions could make it more difficult for the underserved population as many of them do not have air conditioning, which makes breathing more difficult and air quality conditions can become compromised

Potential Impacts

It is difficult to estimate the potential losses associated with a drought for Wabash 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 2023, Wabash County produced approximately 16.1M bushels of corn and 5.1M bushels of soybeans, as reported by the United States Department of Agriculture (USDA) National Agricultural Statistics Service. Using national averages of $4.26 per bushel of corn and $11.11 per bushel of soybeans, the estimated total crop receipts for 2023 would be $125.2M. 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 $62.6M-$107.7M; depending on the crop produced and the market demand.

Future Conditions

Climate change has a significant role in the drought conditions. **Figure 8** charts the annual maximum temperatures and shows trends utilizing data from the National Centers for Environmental Information (NCEI). The NCEI is an organization within the National Oceanic Atmospheric Administration (NOAA) that is responsible for studying and archiving the data that NOAA collects. Additionally, the NCEI provides storm event information for all states, territories, and counties covering roughly 50 event types.

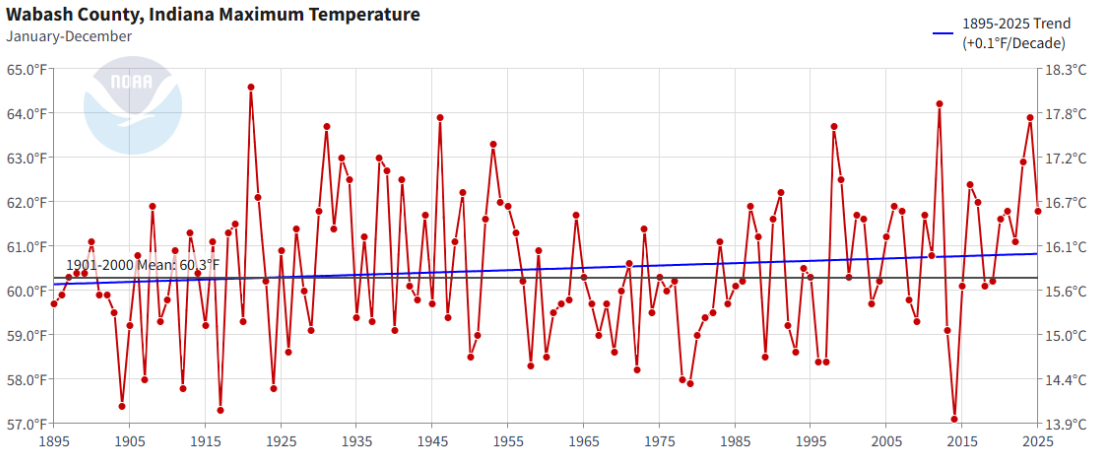


Figure 8: Annual Maximum Temperatures from 1895 - 2025

According to the 2022 NCEI State Climate Summary for Indiana the following observations have been observed based upon climate change:

- The average temperature has risen almost 2°F since the middle of the 19th century
- Temperatures in the 21st century have been higher than any other historical period with the exception of the early 1930s Dust Bowl era

This is also verified in the Indiana Climate Change Impacts Assessment report from Purdue University. "This assessment documents that significant changes in Indiana's climate have been underway for over a century, with the largest changes occurring in the past few decades." The authors wrote, "These projections generally suggest that the trends that are already occurring will continue, and the rates of these changes will accelerate. They indicate that Indiana's climate will warm dramatically in the coming decades, particularly in summer. Both the number of hot days and the hottest temperatures of the year are projected to increase markedly."

The assessment also notes that seasonal shifts in precipitation 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.

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 brush and rangeland 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.

4.2.2 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. Earthquakes strike suddenly, without warning. 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.

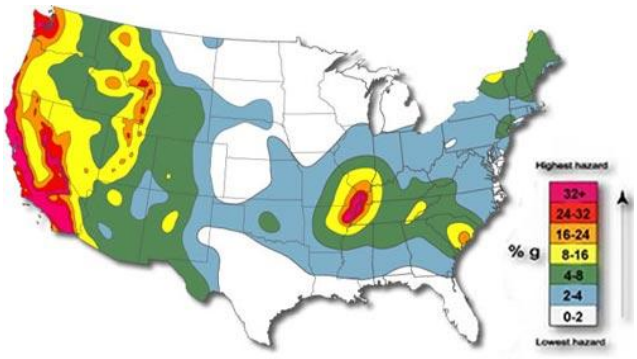


Figure 9: Earthquake Risk Areas in the U.S.

Location

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. Several smaller historic faults are located throughout the state of Indiana.

Extent and History

Earthquakes are a rare occurrence in Wabash County, with the exception of an event on August 28, 1899, when a 3.31 quake struck near Wabash, IN. Historical records indicate little if any damage was reported from the event and no further events have taken place in the county since 1899. **Figure 10** shows the earthquake of August 1899 near the city of Wabash, IN

More recently, four earthquakes with epicenters in Indiana and Ohio and magnitudes greater than 2.5 have taken place near Wabash County. On December 30, 2010, near Greentown in Howard County, a magnitude 3.8 was

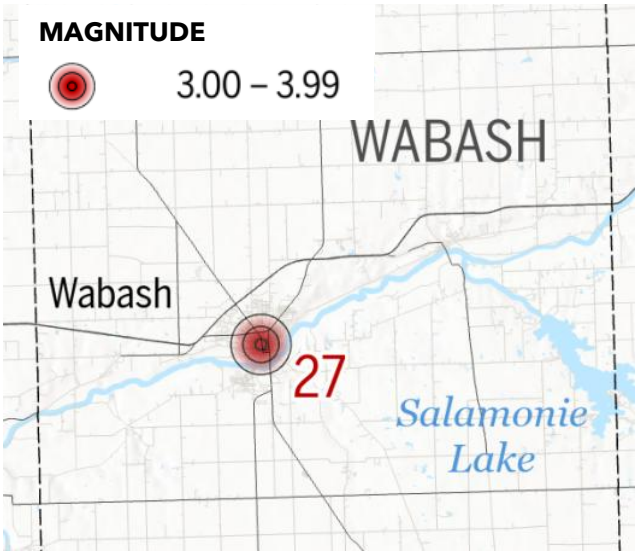


Figure 10: Wabash County Historical Earthquake

recorded. On January 26, 2026, LaGrange County experienced an M3. 0 on January 26, 2012. The two most recent nearby earthquakes had epicenters in Convoy, OH in Van Wert County (June 12, 2015, at M2.6), and near Hicksville, OH in Defiance County on December 29, 2024, at magnitude 2.9. No damage or injuries were reported in the NCEI or by local news sources for any of the listed earthquakes.

Additionally, some soils in Indiana are highly susceptible to liquefaction during earthquake conditions. Liquification occurs when water saturated soils temporarily lose their strength and act like a fluid. This process can trigger landslides, cause buildings to sink into the ground, and can destroy roads and bridges. Much of Wabash County, according to the Indiana Geological and Water Survey, has a moderate liquefaction potential. (**Figure 11**).

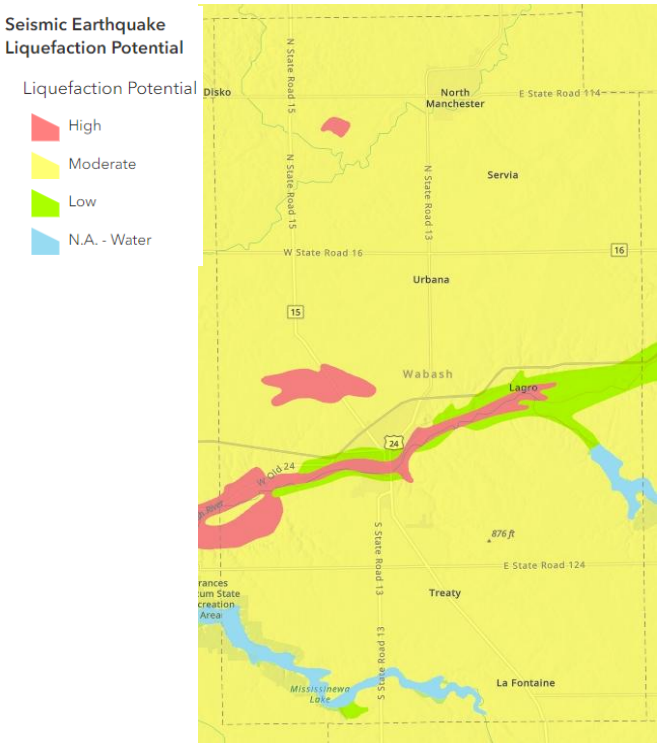


Figure 11: Wabash County Liquefaction Potential Areas

Probability

Based on historical earthquake data, local knowledge of previous earthquakes, and that Wabash County has not recently been directly impacted by an earthquake, the committee determined that the probability of an earthquake occurring in Wabash County or any of the communities is "Unlikely." Should an earthquake occur, the impacts associated with this hazard are anticipated to be "Significant" for all communities. The committee anticipated this level of damage due to the number of buildings in the city of Wabash and the greater numbers of poorly constructed buildings and structures in the county and towns. The committee members anticipate the warning time for an earthquake to be less than six hours and the duration to also be less than six hours. A CPRI summary for earthquakes is shown in **Appendix 8**.

Vulnerability

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

Direct Effects:

- Urban areas may experience more damage due to the number of structures, the multi-story nature of the structures, and critical and essential facilities (fire houses, cell phone towers, health care facilities) located in these areas.
- Rural areas may experience losses associated with agricultural structures such as barns and silos
- Bridges, buried utilities (gas lines, water lines, pipelines), and other infrastructure may be affected throughout the county and municipalities

- The homeless or underserved population will need to be checked, especially if they seek shelter under bridges or structures that are not stable

Indirect Effects:

- Wabash County may be called upon to 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 or originating at locations beyond the damaged areas, but that would have to be re-routed to avoid damaged areas

Potential Impacts

To determine the losses associated with an earthquake, the Hazards US Multi-Hazard (HAZUS-MH) software was utilized in the Wabash County MHMP update. HAZUS-MH is a nationally standardized risk modeling methodology which identifies areas with an elevated risk for natural hazards and estimates physical, economic, and social impacts of earthquakes, hurricanes, floods, and tsunamis. For this plan, an arbitrary earthquake scenario placed a magnitude 5.0 within the county.

Per the HAZUS-MH scenario noted above the following impacts are anticipated:

- Total economic losses to be near $1.08B with moderate damage to approximately 2,700 buildings, which is more than 17% of the buildings, of which 169 are anticipated to be damaged beyond repair.
- There are 37 critical and essential facilities (one hospital, 17 schools, one Emergency Operation Center (EOC), five police stations, and 13 fire stations) with 16 facilities having at least 50% or more damage and 10 facilities with functionality of greater than 50% on day one.
- The highway would have zero bridges, zero road segments, and zero bridges with reduced functionality on day one, and zero highway segments and tunnels with moderate damage.
- All other transportation segments (railways, buses, and ports) would be expected to remain undamaged besides one airport facility which would likely sustain moderate damage.
- Nine of the utilities (two potable water, seven wastewater, zero natural gas, one oil systems, zero electrical power, and five communication) would sustain moderate damage. One wastewater utility and three communications utilities would have greater than 50% functionality. There would be 208 water leaks, 104 wastewater leaks, 36 natural gas leaks and 52 water breaks, 26 wastewater breaks, and nine natural gas breaks.
- There would be 218K tons of debris generated of which 41% would be brick/wood and the remaining would be reinforced concrete/steel. It would take 8,720 truckloads (at 25 tons/truck) to clean up all debris caused by the earthquake.
- The model estimates 251 households displaced and 128 people will seek temporary shelter.
- Residential occupancies would be anticipated to sustain the largest level of damage, representing 36% of total damages.
- No fires due to the earthquake were anticipated.

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. As businesses are damaged or destroyed many will be forced to close until repairs have been made. These closures often generate economic losses that can affect the business, their employees, the local jurisdiction, and Indiana. The HAZUS-MH scenario anticipates $161M in income losses due to interruptions from the earthquake.

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 Conditions

Committee members discussed a carbon sequestration facility that at the time of this planning effort is being built in Wabash County. According to Massachusetts Institute of Technology's Climate Portal, carbon sequestration has caused earthquakes at early testing sites but is largely dependent on the type of geology that the carbon dioxide is being injected into. The bedrock geology of Wabash County consists of soft to medium-hard rocks such as argillaceous dolomite, dolomite, and limestone. Carbon sequestration is more likely to cause earthquakes in harder geological formations as, "hard rocks—like granite, for example—are hard and brittle, making them prone to break when liquid is injected into them." With Wabash County's soft to medium-hardness rocks, it can be anticipated that earthquakes would be less likely to occur. Carbon sequestration facilities should monitor ground conditions to identify signs of an earthquake before they occur.

While the occurrence of an earthquake in or near to Wabash 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, Wabash County should continue to provide education and outreach regarding earthquakes and earthquake insurance along with education and outreach for other hazards. As the county and the communities within grow and develop, the proper considerations for the potential of an earthquake to occur may help to mitigate social, physical, or economic losses in the future.

It can be anticipated that while all structures in Wabash County will remain at risk of earthquake damage and effects, new construction or redevelopment may reduce the overall risks. As redevelopment or growth occurs, the new construction may be significantly sturdier. Further, as blighted, or abandoned areas are addressed, those communities and the county are less susceptible to economic and physical damage associated with earthquakes. Since the last planning effort, no significant development has occurred within the county.

Relationship to Other Hazards

Hazardous materials incidents may occur because of damage to material storage containers or transportation vehicles involved in road crashes or train derailments. Further, dam failures, flash floods, landslides, or levee breaks may occur following an earthquake or associated aftershocks due to the shifting of the soil in these hazard areas. These types of related hazards may have greater impacts on Wabash County communities than the earthquake itself. It is not expected that earthquakes will be caused by other hazards studied within this plan.

4.2.3 EXTREME TEMPERATURES

Overview

Extreme Heat

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. 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.

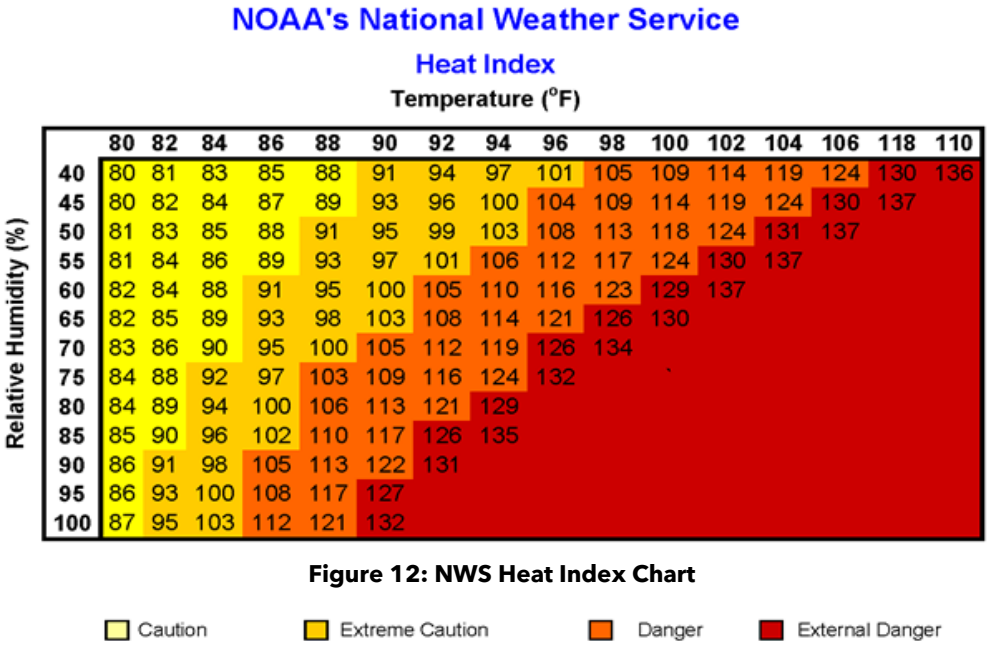


Figure 12: NWS Heat Index Chart

The NWS has three levels of excessive heat notifications:

1. A heat advisory means that temperatures of at least 100°F or heat index values of at least 105°F are expected
2. An excessive heat watch means that heat index values are expected to reach or exceed 110°F and not fall below 75°F for at least a 48-hour period
3. An excessive heat warning means that heat index values are expected to reach or exceed 110°F and not fall below 75°F for at least a 48-hour period, beginning in the next 24 hours. A warning may also be issued for extended periods with afternoon heat index values of 105°F-110°F

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, high winds, particularly with very hot, dry air, can also be extremely hazardous.

As **Figure 13** indicates, there are four cautionary categories associated with varying heat index temperatures. Each category provides a heat index range along with effects on the human body. People with underlying health issues, the very old or very young, may be impacted at lower temperatures since their systems are less likely to be able to compensate for the heat and humidity.

Additionally, as later discussed in **Section 4.3.9** (Winter Storms and Ice), over time the minimum temperature in the county is increasing. This increase will exacerbate any heat as it lessens the cooling capacity of the nighttime. This may put more stress on people at night as they will not be able to cool off as much.

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Figure 13: Extreme Heat Effects by Heat Index

Extreme Cold

Temperature (F)

Wind Speed (MHP)	30	25	20	15	10	5	0	-5	-10	-15	-20	-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
Frostbite Occurs in 120 minutes or less							Frostbite occurs in 30 minutes or less					
Frostbite occurs in 10 minutes or less							Frostbite occurs in 5 minutes or less					

Figure 14: Wind Chill Guide

Extreme cold is defined as a temporary, yet sustained, period of extremely low temperatures. The jet stream winds are strongest during the winter months when continental temperature extremes are greatest. When the jet stream pulls arctic cold air masses over portions of the United States, temperatures can drop below 0° F for one week or more. Sustained extreme cold poses a physical danger to all individuals in a community and can affect infrastructure function as well.

In addition to strictly cold temperatures, the wind chill temperature (WCT) must also be considered when planning for extreme temperatures. The WCT, 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 14** identifies the Wind Chill Guide and how the same ambient temperature may feel vastly different in varying wind speeds.

Extent and History

The effects of extreme temperatures extend across large regions, typically affecting several counties, or states, during a single event. According to the NCEI for the period of January 1, 2019, to December 31, 2025, there were no excess heat events and three extreme cold/wind chill events.

A list of the events that have occurred within Wabash County from January 1, 2019, through December 31, 2025, and their reported location, property damages, crop damages, injuries, and deaths are included in **Appendix 9**.

On January 19, 2019, an arctic front brought sub-zero temperatures and wind gusts of 40 to 50 mph. This combination led recorded wind chills to be as low as -40°F. No damage or losses associated with the prolonged cold temperatures or heat events were reported by NCEI. On January 14, 2024, single digit temperatures and 20 mph winds combined to produce a recorded -31°F in the city of Wabash. Committee members recalled many shorter-term events of extreme cold and heat that do not meet the NWS's definition of extreme temperatures. While shorter-term events are expected to cause less health impacts, they may still have effects on the population.

Probability

It is difficult to predict the probability that an extreme temperature event will affect Wabash County residents within any given year. However, based on historic knowledge and information provided by the community representatives, an extreme temperature event is "Likely" (likely within the next three years) to occur within the county and if an event did occur, it is anticipated to result in "Limited" damages depending on the potential effects to people and livestock. Committee members also anticipate a warning time of 12 to 24 hours and a duration of greater than one week. **Appendix 8** identifies the CPRI for extreme temperatures both heat and cold events for all communities in Wabash County.

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 of being impacted during these conditions.

By assessing the demographics of Wabash County, a better understanding of the relative risk that extreme temperatures may pose to certain populations can be gained.

- 22.7% of the county's population is over 65 years of age
- 5.4% of the population is below the age of five
- 10.7% of the population is living below the poverty rate

People within these demographic categories are more susceptible to social or health related impacts associated with extreme heat (**Figure 15**). Families below the poverty line are less likely to have functioning air conditioning in their homes. Because of high energy costs those who do have air conditioning may be less likely to use the units in a way to benefit their health and well-being. The same factors are key when looking at heating sources in cold temperatures (**Figure 16**). Elderly people and those living below the poverty line are more likely to rely on alternative heating sources because of the cost of energy. These alternative heating sources are frequently the cause of carbon monoxide poisoning and/or house fires.

Figure 15: Extreme Cold

Within Wabash County, direct and indirect effects from a prolonged 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. Health risks can range from heat exhaustion or mild hypothermia to death due to heat stroke, amputations due to frost bite or death due to severe hypothermia

Figure 16: Extreme Heat

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 direct damage is not typically associated with buildings but instead with populations and people. Indirect damage such as water damage due to frozen pipes is not well documented as many property owners will not report such breaks to their insurance unless the damage is significant. Therefore, accurate estimates are not possible to calculate or model.

Indirect effects:

- Increased expenses for facilities such as healthcare or emergency services due to the increased number of calls and people seeking assistance
- 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.
- Energy suppliers may experience demand peaks during the hottest and/or coldest portions of the day.
- Extreme cold indirect effects include pipes freezing resulting in loss of access to water for industrial processes as well as personal hygiene, sanitation and hydration of livestock and people. These effects may disproportionately impact vulnerable populations (elderly people and children) within Wabash County

Future Considerations

As 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, and/or as local economies are stressed, such programs may become more necessary to protect the county's at-risk populations. Additionally, the increase in the number of unsheltered homeless in the area calls for innovative approaches to addressing heating and cooling needs after traditional business hours when this population is particularly susceptible.

The Indiana Climate Change Impacts 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. Increasing greenspaces within the cities and towns not only provide benefits of stormwater control, carbon sequestration, and air pollution filtration, but also are great for reducing the energy from the sun reaching the ground surface, thus cooling the area. Future community planning should include the incorporation of heat tolerant green infrastructure to lessen the impacts of extreme heat upon the community.

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 developments 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. Since the last planning effort, there has not been significant residential or commercial development within the county.

Relationship to Other Hazards

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

4.2.4 FIRES AND WILDFIRE

Overview

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 lightning; 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. Weather conditions can 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 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 and/or alternative heating 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 because high-rise fires hinder the ability of rescue workers to fight the fire, reach impacted building occupants, and evacuate impacted occupants. These operations can be complicated as the height of the structure increases and the occupancy changes within the structure. Rescue efforts are more complicated when people with disabilities are involved with structure fires. Lastly, structural collapse is another concern associated with high-rise fires especially when people are 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.

Combating a structure fire and or wildfire is extremely dangerous. If weather conditions change suddenly, the fire may change course and/or increase in strength potentially overtaking neighboring structures and firefighters, causing severe injury or death. Fires can travel at speeds greater than 45 mph. Members of the homeless community, hunters or campers may also be in the area of the fires with no means to escape. Fire response capabilities are limited by the ever-dwindling number of volunteer firefighters able to respond, especially during "normal working hours." This further increases the risks for first responders and community members alike.

Extent and History

According to the NCEI there have been zero reported wildfire events for the period of January 1, 2019, to December 31, 2025. Committee members did not recall examples of locally significant wildfire events.

High winds and dry conditions allow small grass fires to grow into much larger incidents. **Figure 17** shows the impacts of just such a wildfire from Lake County where over 300 acres were burned before the fire could be extinguished. On April 2, 2021, a fire started with no apparent cause which required emergency response from multiple fire stations and the US Forest Service. The fire burned for two days before being fully contained. Additionally, structure fires can cause wildfires and brush fires most commonly through a process called spotting. This occurs when burning particles, embers, or firebrands, are carried by the wind to start new fires elsewhere. Although Indiana has a very low to relatively low risk of wildfires according to the FEMA National

Risk Index, damage to structures, contents, crops, forests, and vehicles is significant for each municipality on an annual basis. Additionally, wildfires can cause long-term issues such as environmental damage and chronic illnesses. These effects, according to the United States Geological Service (USGS), cause the annual cost of wildfires in the US to be $425B.

Figure 17: Wildfire at the Indiana Dunes National Park

The NCEI does not report structure fires; therefore, local sources were utilized to provide information regarding residential and business fires. Residential fires have been the most common fire hazard affecting Wabash County in the last several years. Information provided in **Table 5** highlights the number of fire calls to which local fire departments responded during the time period January 2020 through December 2025. The number of fire calls can provide insight into ongoing trends within the county and should be examined periodically to prepare for the future. Committee members recalled a large structure fire that occurred at the Hi-Grade Egg farms on December 7, 2024. Around 9:00 pm a fire began just outside of North Manchester. The fire appeared to be extinguished an hour and a half later but relit around 2:00 am on December 8. The fire required responses from almost all Wabash County fire departments and fire departments from Kosciusko, Miami, Huntington, and Whitley Counties. According to local news sources, over a 1M chickens died (around 40% of the total chickens).

Table 5: Wabash County Fire Calls

Department	2020	2021	2022	2023	2024	2025
City of Wabash Fire Department	3,149	3,436	3,270	3,253	3,445	3,420
Chester Twp. Fire Department	213	257	224	236	249	277
LaFontaine-Liberty Vol. Fire Dept.	71	106	141	127	144	157
Lagro Fire Department	164	199	214	195	178	202
Noble Township Vol. Fire Dept.	377	331	362	368	370	403
North Manchester Vol. Fire Dept	591	654	745	812	875	964
Pleasant Township. Fire Dept.	318	313	369	293	311	297
Roann Volunteer Fire Dept. Inc.	90	108	88	106	117	107
Urbana Comm. Vol. Fire Dept.	100	83	78	77	102	90
Total	**5,073**	**5,487**	**5,491**	**5,467**	**5,791**	**5,917**

Probability

The planning committee determined the probability of a fire occurring within the county to be "Possible" (likely to occur within the next five years) in Wabash County, the city of Wabash, and the towns of North Manchester and Roann. The towns of LaFontaine and Lagro anticipated the probability to be "Unlikely" (to occur within the next 10 years) due to fewer structures and more open areas in the towns. The magnitude is expected to be "Significant" in the city of Wabash due to the density and greater number of structures. Wabash County and the towns of North Manchester and Roann estimated the magnitude to be "Limited." The towns of LaFontaine and Lagro anticipated the damages from a fire or wildfire to be "Negligible." All communities anticipated the warning time for a fire or wildfire would be less than six hours and the duration

to also be less than six hours. **Appendix 8** identifies the CPRI rankings for fires and wildfire in Wabash County.

Assessing Vulnerability

Physical, economic, and/or social losses impact not only the property owner whose property was damaged by the fire, but also the community. Typically, a structural fire is limited to one or two structures, as the fire response focuses on extinguishment as well as containment thus preventing the fire from spreading to neighboring structures as seen in **Figure 18**. This type of action works to reduce the magnitude and severity. Nonetheless, the loss of or damage to historic structures, town squares, etc. takes a toll on the community spirit as well as the financial and physical loss.

Figure 18: Local Structure Fire in Wabash County

Wabash County has over 16K acres of state managed lands, such as Mississinewa Lake including Francis Slocum State Recreation Area, Pearson Mill State Recreation Area, Red Bridge State Recreation Area, Salamonie River State Forest, and a portion of Salamonie Lake. These areas are a common gathering place and include campgrounds, picnic shelters, and trails for hiking, and horseback riding. Special consideration should be given to these areas since visitors may not be familiar with the area. Additionally, IDNR will occasionally utilize prescribed burns on these areas to prevent much larger, uncontrolled fires from occurring.

A large portion of the county is rural, which is also susceptible to brush and/or crop fires, especially in times of drought. Since agriculture is a large source of income for the community, field fires, especially during harvest season, or barn fires after crops have been stored have an immense impact.

Direct and indirect effects of fires and wildfires within Wabash County may include:

Direct Effects:

- Loss of structures (residential, high-rise buildings, as well as agricultural)
- Loss of vital equipment (industrial and agricultural)
- Loss of forests
- Loss of natural resources and wildlife

Indirect Effects:

- Loss of revenue as businesses may be closed
- Loss of revenue from reduced tourist activities in the county including Wabash County's managed lands
- Increased emergency response times based on safety of roads
- Loss of income if dependent on crop production or timber harvest

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 essential facilities, critical infrastructure, and non-critical structures 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 community growth increases, the need to respond to fire will remain an important municipal effort. As new construction or re-development occurs, especially new or existing critical and essential facilities, it is important to ensure that these new structures are equipped to deal with the potential risks associated with this hazard. Those may include increased risk for wooden or flammable outer structures and potential lengthy power outages. With the adverse impacts of extreme temperatures and drought upon the heavily forested areas, consideration must be given to mitigating fire risks for structures that are built in the rural areas to limit losses should a wildland fire take place.

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 house 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.

Firefighting responses can be slowed due to the limited numbers of volunteers available at various times of the day. Increasing numbers of people working outside of the community in which they reside limits volunteer presence to outside of normal working hours. Recruitment initiatives will need to be considered as the firefighting needs and staffing levels change.

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 related to cropland or natural resource areas.

Relationship to Other Hazards

Fires may certainly result in a hazardous materials incident if storage structures are within the path of the fire. 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 either alone or associated with a thunderstorm. Typical wind speeds during a thunderstorm may also exacerbate the impacts from any ignitions from the lightning.

4.2.5 FLOOD

Overview

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, or 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.

The traditional benchmark for riverine or coastal flooding is a 1% Annual Exceedance Probability (AEP), formerly known as 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 during any given event. In other words, the regulatory flood elevation has a 1% chance of being equaled, or exceeded, in any given event and it could occur more than once in a relatively brief time period. The area impacted by the 1% AEP flood event is called the Special Flood Hazard Area (SFHA).

Log and ice jam flooding is a concern for the more populated areas. Although log jams can occur at any time of the year, ice jams are predominantly and early or late winter occurrence when air temperature rises after freezing temperatures which allow lake and river ice to form. Flooding occurs when pieces of ice either jam up against stationary sheets of ice or against structures in the river such as bridge pylons. The jammed ice can form a dam causing water levels behind it to rise causing localized flooding and pushing large pieces of ice out of the stream. The greatest challenge with ice jams is the lack of good science to predict when the jams will form and where jam formation is likely. With the variations in temperatures in late winter and early spring ice jams are becoming more common. Log jams, like ice jams, accumulate in low flow areas and near bridges and similar structures located in the stream, causing water levels to rise. Bridges and culverts are most frequently impacted since water flow is easily blocked at these locations forcing water outside of the riverbanks into neighborhoods and businesses.

Extent and History

Figure 19: Indiana Flash Flood from 2023

According to the NCEI for the period of January 1, 2019, to December 31, 2025, there have been zero flash floods and one traditional riverine flood. The riverine flood was reported on May 5, 2019, resulting in the loss of one life. A 22-year-old Indianapolis resident was driving through Wabash County on County Road 925 south with her son when they drove past a high-water sign and became stuck east of State Road 13. The woman was able to free herself from the vehicle but, was unable to free her son from the car. Planning committee members did not mention any additional floods. Any floods that did occur could have caused property or crop damage and may have resulted in injuries or deaths. **Appendix 9** provides the NCEI information regarding floods that have been reported in the county.

Flash floods can be more dangerous than riverine floods due to their rapid speed and onset. **Figure 19** shows how flash floods can surprise people and increase the potential for injuries and deaths.

In Wabash County there are four primary waterways:

- Eel River
- Mississinewa River
- Salamonie River
- Wabash River

The county is situated in four drainage basins; the northern portion is located within the Eel River; the center portion of the county includes the Wabash and Salamonie River basins and the southwestern portion is located in the Mississinewa River basin. There are 29 major waterways in Wabash County including Bachelor Creek, Lagro Creek, Treaty Creek, and Wheeler Creek. **Appendix 10** lists the major waterways and stream gages in Wabash County.

Figure 20: Stream Gage Locations in Wabash County

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's National Water Prediction Service (NWPS) 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 Wabash County, there are three USGS river gages (Eel River at North Manchester, Salamonie River at Dora, IN and Wabash River at Wabash, IN) shown in **Figure 20**. A lake gage is located near the dam at Salamonie Lake. This gage reflects the lake level behind the dam and can be used to determine local lake flooding during and after rain events. **Table 6** provides information regarding the county's gages.

Table 6: Wabash County USGS Gages

Site Number	Site Name	Flood Levels				Crests	
		Major	Moderate	Minor	Action	Recent	Historic
03328000	Eel River at North Manchester	16Ft.	14Ft.	11Ft.	9Ft.	11.22Ft. 2021	17.50Ft. 1913
03324450	Salamonie Lake					764.20Ft 2021	793.39Ft 2015
03324500	Salamonie River at Dora	17Ft.	14Ft.	11Ft.		8.51Ft. 2021	11.74Ft. 2015
03325000	Wabash River at Wabash	23Ft.	19Ft.	14Ft.	10Ft.	14.12Ft. 2021	28.70Ft. 1913

A watershed management plan (WMP) is a strategy for achieving water quality goals by characterizing the watershed, setting goals and actions steps, and developing an implementation plan to address documented problems. Ultimately, the purpose of the WMP is to guide resource managers, watershed coordinators, policy makers, community organizations, and other relevant stakeholders in restoring and protecting the waterbodies within a given watershed. According to Indiana Department of Environmental Management's (IDEM) WMP website, there are seven plans that cover portions of Wabash County:

- Eel River (Middle) 9-90
- Salamonie River (Lower) WMP 3-9
- Treaty Creek-Wabash River WMP
- Upper Middle Eel River WMP 6-3
- Upper Wabash Phase III Update (2025)
- Wabash River (Upper), Phase III WMP 25874
- Wabash River (Upper) Phase II WMP 3-5

Appendix 6 lists which watershed management plans apply to which jurisdiction. In addition, a revised Total Maximum Daily Load (TMDL) report was completed for the Wabash River watershed in January 2006. A TMDL establishes waste load allocations for point sources, nonpoint sources, and natural sources for section 303(d) impaired waters. These plans assist local governments with improving their waterbody(s)/watershed(s) to remove them from the list of impaired waters.

Flood insurance is key for flood recovery. Any property having received two insurance claims paid for flood damage 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 one-third of the country's flood insurance payments. The FEMA reports use the terms loss and claim synonymously in the reports. **Table 7** identifies the number of repetitive loss properties, the occupancy type, and total number of claims in Wabash County per community, as provided by FEMA.

Table 7: Repetitive Loss Properties and Claims

Community	# Repetitive Loss Properties	Number of Claims			
		Occupancy Type			Total # of Claims
		Residence	Business	Non-Residential	
Wabash County	4	4	0	0	8
City of Wabash	0	0	0	0	0
Town of LaFontaine	0	0	0	0	0
Town of Lagro	0	0	0	0	0
Town of North Manchester	0	0	0	0	0
Town of Roann	0	0	0	0	0
TOTAL	**4**	**4**	**0**	**0**	**8**

There have been eight total claims made for damage associated with flooding in Wabash County since 1978 resulting in $176K in payments. **Table 8** further indicates the current premiums, and coverage totals for individual communities.

Table 8: Insurance Premiums and Coverage

Community	Flood Insurance Premiums	Flood Insurance Coverage
Wabash County	$29K	$4.27M
City of Wabash	$107K	$7.36M
Town of LaFontaine	$0	$0
Town of Lagro	$369	$0.04M
Town of North Manchester	$20K	$3.23M
Town of Roann	$0	$0
TOTAL	**$156K**	**$14.90M**

Probability

As determined by the committee, the probability of riverine based flooding occurring in Wabash County is "Highly Likely." The town of Roann anticipated the probability to be "Possible" due to only a small area of the town in located in the floodplain. The town also anticipated the magnitude to be "Negligible" due very limited construction within the floodplains. Wabash County and the towns of LaFontaine and Lagro rated the magnitude as "Limited" as there is sparse infrastructure in these areas. The city of Wabash and the town of North Manchester anticipated the magnitude to be "Significant" due to higher populations and more development. The committee anticipated varying warning times due to the nature of waterways close to the municipality and some communities located closer to the headwaters than others. The towns of LaFontaine and Roann anticipated warning times of less than six hours, Wabash County, and the towns of North Manchester and Roann anticipated six to 12 hours of warning, and the city of Wabash anticipated 12 to 24 hours or warning. All communities anticipated the duration to be greater than one week. A summary of the flooding CPRI is shown in **Appendix 8**.

Assessing Vulnerability

Flood events may affect substantial portions of Wabash County at one time as river systems and areas with limited drainage cover much of the county and the incorporated communities. With an increase in high volume rain events, the low-lying roads within the county are vulnerable to frequent inundation isolating and/or restricting access to some parts of the county. The average annual rainfall for Wabash County, according to NCEI, is 37.52 in, furthermore NCEI shows the annual rainfall for the county is increasing by 0.26 in. per decade. **Figure 21** identifies precipitation trends from 1895 to 2025.

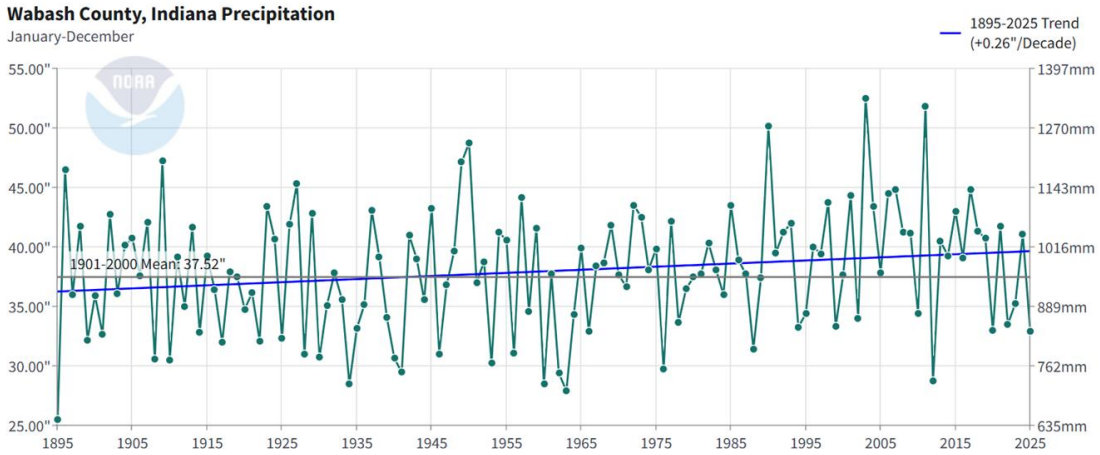


Figure 21: Annual Precipitation from 1895 - 2025

Planning committee members have identified frequently flooded roads within Wabash County. The Wabash County EMA and Highway department may consider inspecting these areas and installing warning signs or reconstructing roads to prevent flooding.

- 100 South (Salamonie Dam Road) between 650 East and 750 East
- 100 South east of State Road 115 for one-tenth of a mile
- 100 West south of 925 South to 1000 South
- 1050 South east one mile
- 200 South between 750 East and 800 East
- 200 West between 700 North and 800 North
- 300 East between 300 North and 400 North
- 325 East south of Liberty Mills on the Eel River
- 400 North east of 100 East for approximately 1/4 mile
- 400 South between 475 West and 400 West and between S.R. 13 and S.R. 15
- 50 East south of 1000 South to 1050 South
- 50 South between 65 East and 750 East
- 500 South between 700 East and 800 East
- 700 East north of 500 South
- 700 South between S.R. 13 and 300 West
- 700 West south of 700 South
- 700 West south of Old U.S. 24 and north of Cooper Road
- 800 South west of 650 West
- 925 South east of S.R. 13 for half a mile
- Division Road between 600 East and 750 East
- Low-lying areas in and around Lagro
- Low-lying areas in and around Richvalley
- Old Slocum Trail between 600 West and 800 West
- Old U.S. 24 between Wabash and Lagro
- Pearson Mill Boat State Recreation Area at the south end of 400 South
- S.R. 124 east of 600 East
- South Bruner Road south of 1100 South100 East north of 1200 South

NFIP floodplain maps are used to understand flood risk and to determine requirements for flood insurance and construction. The NFIP floodplain map titles for Wabash County are provided in **Appendix 6**. An overview of the current aggregated FEMA flood maps is provided within **Figure 22**. A similar map of the Wabash County floodplains including critical and essential facilities is available in **Exhibit 2**.

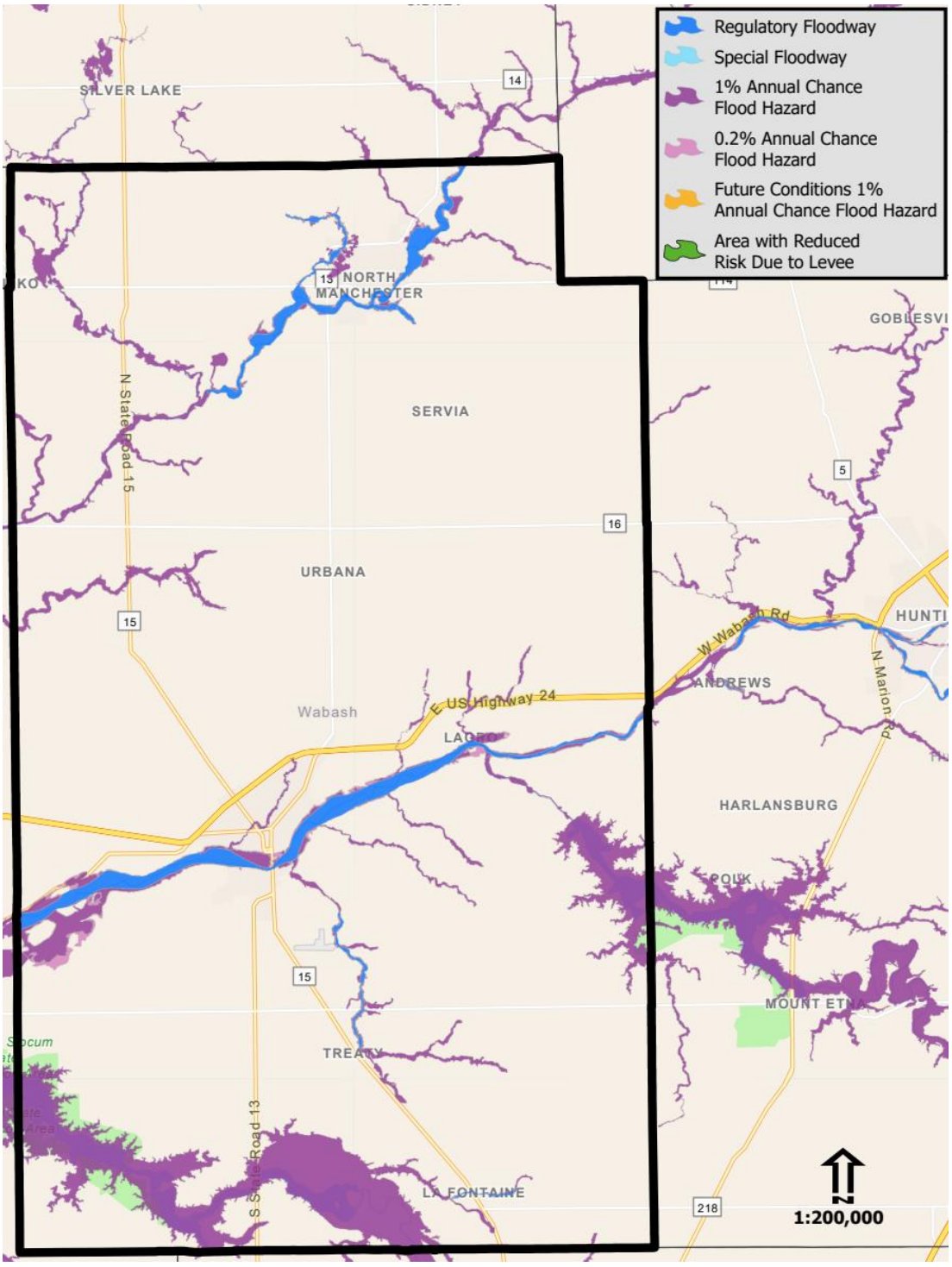


Figure 22: Wabash County NFIP Flood Map Effective 9/18/2013

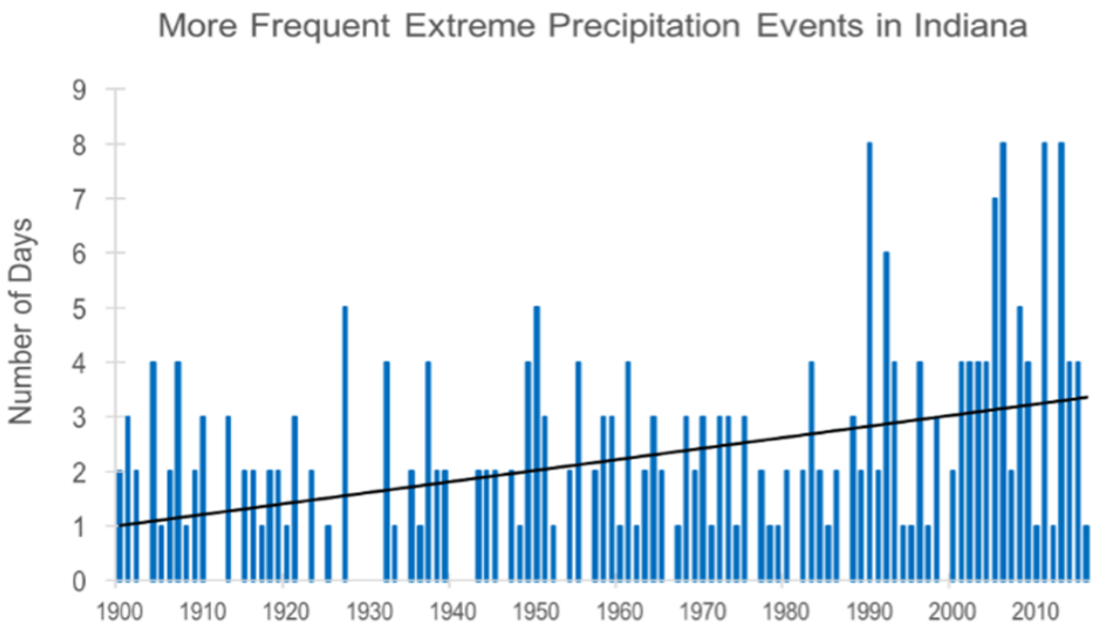


Figure 23: Extreme Precipitation Events in Indiana

Purdue University's Indiana Climate Change Impacts Assessment Report analyzed the increased frequency of short duration high volume rain events, also known as extreme precipitation events, in Indiana. According to the report, an extreme rain event occurs when more than 0.86 in. of rain falls in one day. Since 1900, the number of days per year with extreme rain has been increasing by 0.2 days per decade on average. The northwestern part of the state has experienced the largest increase at a rate of about 0.4 days per decade. Other counties in the northern portion of the state, including Wabash County, are experiencing similar trends at slightly lesser quantities. Most of the increase has occurred since 1990. In **Figure 23** the trend line shows an increase in the number of days where the rainfall exceeds 99th percentile. This ever-increasing trend is resulting in more frequent flash flood and overland flood events.

Indiana has experienced an increase in the number of rain events, especially extreme rain events, while the overall duration of rain has decreased. This has led to Indiana receiving more rain in shorter amounts of time.

The assessment also found that the annual average precipitation rates for Indiana have increased by 4.2 in. in the northeast portion of the state and 8.1 in. in the southeast portion of the state since 1895 (**Figure 24**). In the report, the authors wrote, "This assessment documents that significant changes in Indiana's climate have been underway for over a century, with the largest changes occurring in the past few decades." These projections suggest that the trends that are already occurring will continue, and the rates of these changes will accelerate.

Wabash County does not have a USGS flood inundation map library for any of the gages in the county. However, NOAA's National Water Prediction Services will soon be providing flood inundation mapping for the area. Once available in

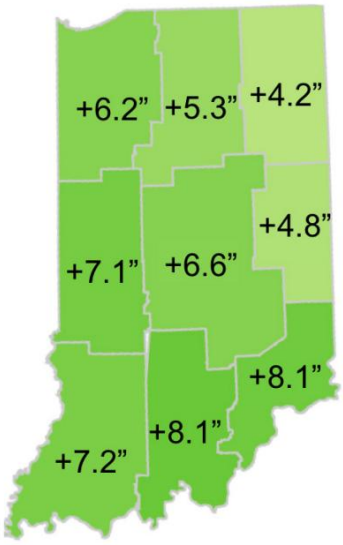


Figure 24: Annual Average Precipitation Rise from 1895 to 2019

October 2026, this map library may be utilized to predict areas of flooding within the county based on various forecasted rain conditions.

As outlined in **Table 9**, Wabash County, the city of Wabash, and the towns of LaFontaine, Lago, North Manchester, and Roann as well as Wabash County participate in the NFIP.

Table 9: Wabash County NFIP Participation

ID	Community Name	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Regular-Emergency Program Date
180266	Wabash County	12/27/1974	8/19/1986	9/18/2013	8/19/1986
180271	City of Wabash	6/7/1974	1/18/1984	9/18/2013	1/18/1984
180267	Town of LaFontaine	4/12/1974	4/17/1987	9/18/2013	4/17/1987
180268	Town of Lagro	5/24/1974	6/18/1987	9/18/2013	6/18/1987
180269	Town of North Manchester	12/21/1973	8/19/1985	9/18/2013	8/19/1985
180270	Town of Roann		11/19/1997	9/18/2013	5/4/1988

No communities within Wabash County participate in the CRS program. The program entitles those residents in SFHA to receive a discount on their flood insurance premiums based on the community participation in floodplain management practices that exceed the minimum requirements of NFIP. These practices and the community's participation could reduce future potential flood damage and encourage efficient floodplain management.

Within Wabash County, direct and indirect effects of a flood event may include:

Direct Effects:

- Decreased income and value of properties and contents due to damage by increased water
- Increased costs associated with additional response personnel, evacuations, and sheltering needs
- Increased potential impacts to infrastructure and buildings located within the SFHA
- Increased cleanup costs for more frequent flash flood impacts
- Decreased productivity of land due to loss of topsoil and deposition of sand from flood inundation of farm fields
- Loss of topsoil and deposition of sand due to flood inundation of farm fields

Indirect Effects:

- Increased response times for emergency personnel when roads are impassable
- Increased costs associated with personnel conducting evacuations in needed areas
- Increased risk of explosions and other hazards associated with floating propane tanks or other debris
- Increased economic loss associated with missed work or school due to closures or recovery activities
- Decreased revenue due to cancellation of special events in impacted areas or water related activities that become too dangerous due to high water
- Increased expenditures for debris removal costs and return local drainage to normal function
- Difficulty notifying the underserved populations which may not have access to radio, television, or social media of evacuations

Estimating Potential Losses

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

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 Wabash 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. Structure values were calculated using the 2021 FEMA HAZUS Inventory Technical Manual and considered the value of the building and the contents of the building. Occasionally, some counties will have buildings that have not been classified and are therefore considered "unclassified." There were only six unclassified structures, all within the unincorporated areas of the county. In the case of unclassified structures, the actual damage from a flood would be greater than the estimates in this section.

To estimate anticipated damages associated with each flood zone in Wabash County and the 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 10** identifies the estimated losses associated with structures in the floodway, the 1% AEP outside of the floodway, and the 0.2% AEP outside the 1% AEP areas by community within Wabash County. Tables 10 through 12 only show communities with structures within the flood hazard layers, all others are omitted.

Table 10: Wabash County Building Inventory Using Best Available Data

Location	Floodway		1% AEP Outside of Floodway		0.2% AEP Outside of 1% AEP Boundaries	
	#	$	#	$	#	$
Wabash County	148	$24.0M	455	$72.1M	18	$2.4M
City of Wabash	22	$3.1M	166	$15.8M	16	$2.2M
Town of LaFontaine	13	$1.2M	0	$0	0	$0
Town of Lagro	0	$0	4	$0.4M	0	$0
Town of North Manchester	67	$6.5M	60	$5.5M	16	$1.7M
Town of Roann	0	$0	2	$0.2M	0	$0
TOTAL	**250**	**$34.8M**	**687**	**$94.0M**	**50**	**$6.2M**

Utilizing the same GIS information and process, critical and essential facilities within each of the flood hazard areas in Wabash County was assessed and are included in **Table 11**. These buildings are included in the overall number of structures and damage estimate information provided in **Table 10**.

Table 11: Critical and Essential Facilities Within the Flood Zones

Community	Floodway	1% AEP Outside of Floodway	0.2% AEP Outside of 1% AEP and Floodway
Wabash County	Whites Treatment Plant	Salamonie Dam, Southwood Elementary Well, and Southwood Elementary School	
City of Wabash		Arc Of Wabash County, Outdoor Warning Siren, PaperWorks, Pathfinder Home, Wabash WWTP, and YMCA Shelter	Keystone Cooperative
Town of North Manchester		Outdoor Warning Siren	

Using the information in Error! Reference source not found. regarding the number of structures within each of the flood hazard areas, it is also important to note the number of flood insurance policies within each area in Wabash County. **Table 12** provides the comparison between the number of structures in the 1% AEP 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 12: Structures in the 1% AEP and Number of Flood Insurance Policies

Community	# Structures in 1% AEP (including Floodway)	# Policies
Wabash County	603	21
City of Wabash	188	35
Town of LaFontaine	13	2
Town of Lagro	4	1
Town of North Manchester	127	20
Total	**935**	**79**

Future Considerations

As the municipalities within Wabash County grow in population and redevelop, it can be anticipated that the number of critical and non-critical facilities will also increase accordingly. Wabash County, the city of Wabash and all the incorporated towns adopted the current flood ordinance together in 2013. However, Wabash County has since updated their floodplain ordinance in March 2026. The municipalities should update the ordinance to the newer model floodplain ordinance to continue restricting construction in the areas of highest risk. **Table 13** is a compilation of the most recent ordinance dates for each community.

Table 13: Most Recent Ordinance Dates for Each Community

Community	Date Floodplain Ordinance Adopted
Wabash County	3/16/2026
City of Wabash	9/18/2013
Town of LaFontaine	8/22/2013
Town of Lagro	8/22/2013
Town of North Manchester	5/6/2026
Town of Roann	8/22/2013

All communities discourage critical and essential facilities such as schools, medical facilities, community centers, municipal buildings, and other critical infrastructure from being located within the 1% AEP floodplain. New structures must also be protected to that level along with flood-free access to reduce the risk of damage caused by flooding and to ensure that these critical and essential facilities 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. This would also include studying the Best Available Data Layer and inundation areas mapped through the development of the Indiana Floodplain Portal as well as studies of all the streams with one mi^2 or drainage area or greater (**Figure 25**).

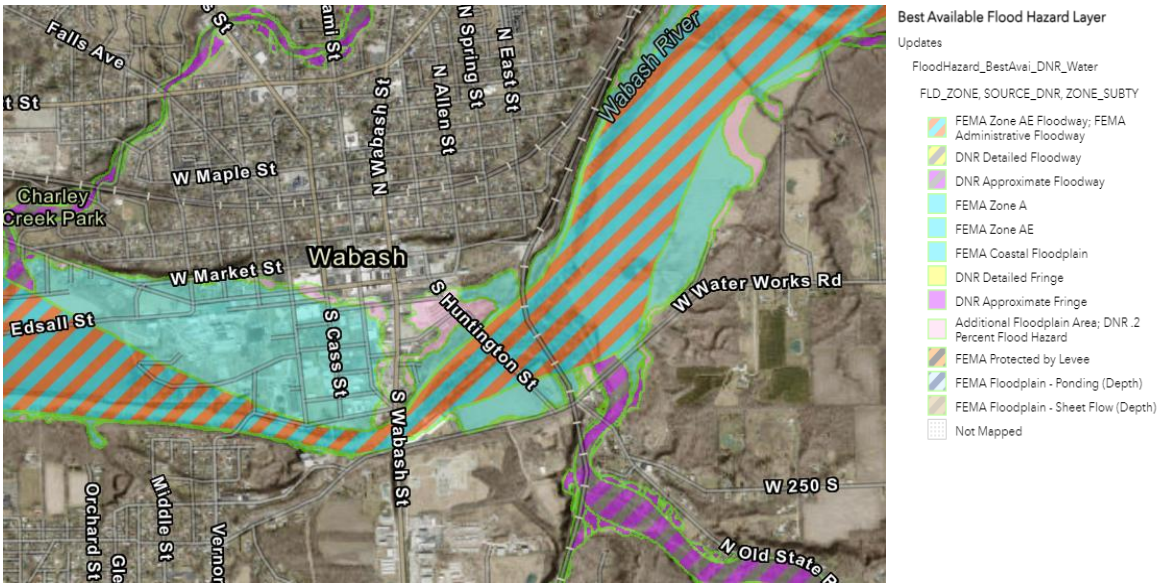


Figure 25: Sample of Flood Designated Areas Around the City of Wabash

It is important to inform owners and occupants of residences and businesses within the known hazard areas, such as delineated or approximated flood zones and fluvial erosion hazard (FEH) areas, of 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 Impacts 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 monetary value of damage is expected to increase in the area unless additional measures, such as those discussed later in **Chapter 5** of this report, are implemented.

Indirect effects of flooding may include increased emergency response times due to flooded or redirected streets, the danger of dislodged and floating propane tanks causing explosions, and the need for additional personnel to conduct the necessary evacuations. Additional effects may include sheltering needs for those evacuated, and the loss of income or revenue related to business interruptions. Several communities within Wabash County host special events near or on the rivers and waterways. These special events may have to be cancelled or postponed due to flooding or high-water levels.

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 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 damage associated with the release.

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

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, especially when the ground is still frozen or saturated. Ice jams near bridges and culverts may also result in flooding of localized areas and potentially damage the bridge or culvert itself.

Repeated flooding may also create impacts associated with landslides along riverbanks and bluff areas. As floodwaters travel through the systems, the natural process of fluvial erosion may be exacerbated due to saturated shorelines and increased volumes and velocities of the floodwater. As these processes are increased, structures and infrastructure located on bluffs or in proximity to the river may be at risk.

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

4.2.6 HAILSTORM, THUNDERSTORM, AND WINDSTORM

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 become too heavy, they fall to the ground as hail. Hail size ranges from smaller than a pea to as large as a softball, and can be very destructive to buildings, vehicles, and crops. Even small hail can cause considerable 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 lightning is one of the by-products of the initial storm. Although most lightning victims survive, people struck by lightning often report a variety of long-term, debilitating symptoms. Other associated dangers of thunderstorms included tornadoes, high 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.

Extent and History

In Wabash County, the NCEI indicates 10 hail events and 23 thunderstorm/windstorm events from January 1, 2019, to December 31, 2025.

According to the MRCC hail is considered severe if a thunderstorm produces hail stones larger than one inch in diameter, or larger than the size of a quarter. During an event on June 18, 2021, 1.5 in diameter hail was reported. No damage or injuries were reported with this event. For the 10 hailstorms during the planning window, $4.5K property damage was reported. No deaths, injuries, or crop damage were reported.

Significant windstorms are characterized by the top wind speeds achieved during the incident. Such high wind events characteristically occur in conjunction with thunderstorms and have historically occurred year-round with the greatest frequency and damage occurring in May, June, and August. Within Wabash County, NCEI reports six instances where top wind speeds were 60 mph or greater. Of the 23 total reports of thunderstorms and high wind events 16 different days had reported events. Of those instances, there were no reports of injuries or deaths, and no reports of crop damage. However, there was a reported $262K in property damage with most of the damage occurring during the May 7, 2024 event that reported winds of 74mph where $125K in property damages were caused after winds ripped a roof off of a home and damaged two other homes. Additionally, a different event in North Manchester on May 7, 2024, resulted in $35K in property damages after a barn was destroyed by 61mph winds. Many event reports included in the NCEI did not provide descriptive information on the social, physical, and economic losses resulting from individual storms specific to Wabash County. In local storm reports at the NWS, where damages were reported, narrative descriptions of the event rarely extended beyond reports of damage to broken tree limbs, downed power lines, or roof damage.

The ever-changing climate has impacted the frequency of hailstorms, thunderstorms, and windstorms. Based on information published by NOAA, the average intensity of rain is increasing while the duration of rain events is decreasing. With these circumstances extreme events will be increasing because there will be more rain in a shorter time period. **Appendix 9** provides the NCEI information regarding hailstorms, thunderstorms, and windstorms that have been reported within the county.

Probability

The committee determined the probability of a hailstorm, thunderstorm, or windstorm occurring anywhere throughout Wabash County is "Highly Likely" and will typically affect broad portions of the county at one time resulting in potentially "Significant" damages. Committee members agreed on the damages as the county and more rural towns could have higher crop damages but, the city and towns could have higher personal property damages. Committee members agreed that the warning time was six to 12 hours and the duration would be less than six hours. As advancements in technologies such as weather radar systems and broadcast alerts are continually made, the warning time for such incidents may increase.

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 throughout 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 CPRI summary for hailstorms, thunderstorms, and windstorms is provided in **Appendix 8**.

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 on very limited areas or may affect broader areas. However, based on NCEI 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.

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 Wabash County, direct and indirect effects from a hailstorm, thunderstorm, or windstorm may include:

Direct Effects:

- Damage to infrastructure (power lines)
- Damage to individual properties (homes, cars)
- Physical injuries may be experienced by those unable to find shelter during storm events, such as homeless people, hikers, and outdoor workers

Indirect Effects:

- Downed power lines due to falling tree limbs as seen in **Figure 26**
- Losses associated with power outages
- Damage sustained from blowing debris
- Cancellation or interruption of special events

Estimating Potential Losses

Figure 26: Damage from High Winds during a Thunderstorm

Due to the unpredictability of this hazard all critical and essential facilities and non-critical structures in Wabash 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 and essential facilities or non-critical structures that would be vulnerable to damage. 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 damage 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 damage from hailstorms, thunderstorms, and windstorms if not properly anchored to the ground. Homeless individuals and families who have alternative means of sheltering may experience greater losses since the stability of tents and alternative structures does not withstand the damaging forces of the storms.

Future Considerations

As the population of the communities in Wabash County develops and redevelops, it can be anticipated that the number of structures will also increase. To reduce the vulnerability for damage resulting from a hailstorm, thunderstorm, or windstorm, measures such as proper anchoring are vital. This includes not only roof anchors but also mobile home anchors. Proper tree maintenance, and burial of power lines should be completed. Adoption and enforcement of the current international building codes is key to ensuring structures can withstand the power of wind and hailstorms. 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, damage resulting from prolonged power outages, and damage to structures or property because of debris. In larger urban areas, damage to homeless encampments resulting in loss of personal property and potential injuries are also a concern during storms.

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 60 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 Wabash 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 place debris near spillways, blocking the emergency drainage mechanism for the dams. High winds may also lead to structural damage to a dam or may cause damage to nearby trees or other structures, leading to indirect damage.

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, emergency medical services (EMS), and police) to pass through affected areas or people may be directly injured because of falling or flying debris.

4.2.7 LANDSLIDE, LAND SUBSIDENCE, AND FLUVIAL EROSION

Overview

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 contribute to subsidence: compaction of aquifer systems, drainage and subsequent oxidation of organic soils, and dissolution and collapse of susceptible rocks.

Another important consideration is FEH. This represents the risk associated with natural stream movements and losses associated with buildings and infrastructure. In some cases, this may be represented by a gradual movement of a stream across a farm field. In other, more extreme instances, homes or other infrastructure may be lost as steep riverbanks or bluffs sluff into the water below.

Extent, History, and Location

USGS shows the locations of highly mobile streams or streams whose position changes over time as they carve out the earth surrounding them. Development along the banks of these waterways could be susceptible to erosion should the river transition to an actively migrating stream. IndianaMap also shows the FEH along smaller waterways within Wabash County. The FEH maps show that all waterways within Wabash County are relatively stationary, meaning they may migrate, but it will likely be limited to the floodway.

The National Park Service says, "karst is a type of landscape where the dissolving of the bedrock has created sinkholes, sinking streams, caves, springs, and other characteristic features." These areas can be dangerous to people and infrastructure as they can develop quickly and leave large holes in the ground. IndianaMap shows that there is no known karst geology within the county.

IndianaMap shows that there are no underground mining operations within the county. However, committee members recalled an underground mine near Richvalley that has since been abandoned and partially filled with water. According to committee members, this mine travels under the Wabash River. Underground mining operations can occasionally lead to landslides and land

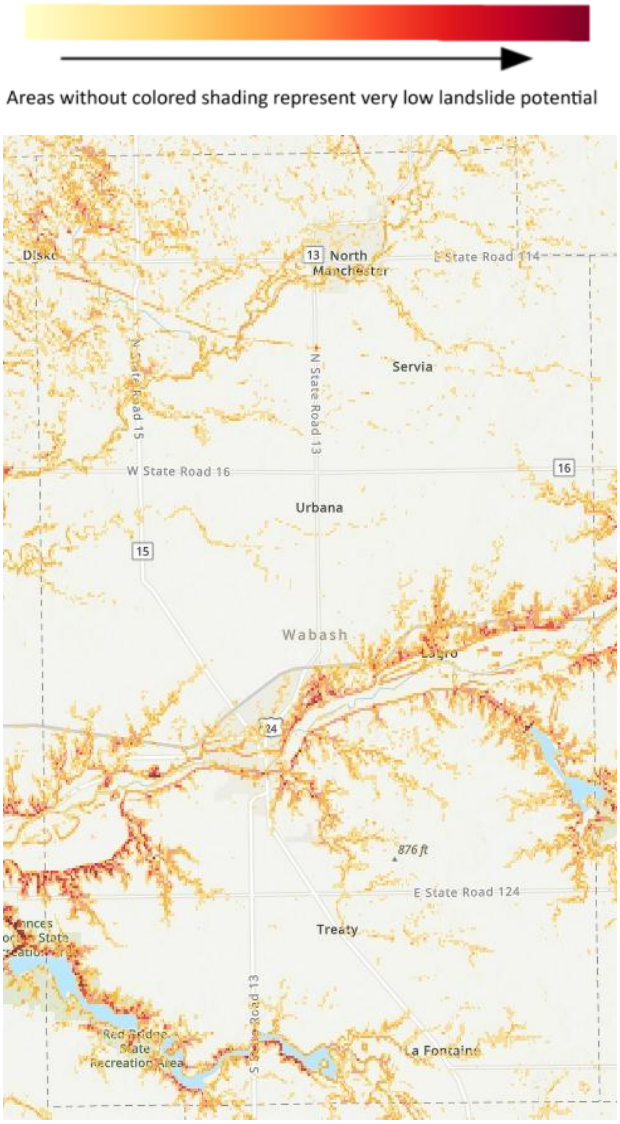


Figure 27: Landslide Susceptibility in Wabash County

subsidence as voids, or areas where materials were excavated, are left. This can cause the ground above them to collapse leading to a landslide or land subsidence.

Lastly, USGS's US Landslide Inventory and Susceptibility shows areas of previous landslides and shows which areas are susceptible to landslides. **Figure 27** shows that waterways have a low to high susceptibility for landslides. High susceptibility areas should be investigated and development in these areas should be avoided.

Extent and History

To date there have been no known significant landslides, land subsidence, or fluvial erosion within the county. However, even some of the portions that have no known karst are considered at a relatively low risk for landslides according to the National Risk Index. The risk index considers expected annual loss as well as vulnerabilities by census tract and community resilience.

The risk index calculates expected annual loss by multiplying exposure (the representative value of buildings, population, or agriculture potentially exposed to landslides), annualized frequency (the frequency or probability of a landslide occurring), and historic loss ratio (represents the estimated percentage of exposed building value, population, or agriculture value expected to be lost due to landslide). The risk index expects an annual loss of $1.5K for Wabash County. With an estimated annual loss relatively low and most of the county's high landslide susceptibility located along waterways county officials may choose to focus on other hazards. County officials may want to investigate moderate and high landslide susceptibility areas not located along waterways to determine potential vulnerabilities.

Probability

The committee determined the probability of a landslide or subsidence occurring in the city of Wabash or the towns of LaFontaine, Lagro, or Roann is "Unlikely." Wabash County and the town of North Manchester anticipated the probability was "Possible" due to higher landslide susceptibility along the waterways. Any event is expected to result in potentially "Negligible" damages for the city of Wabash and the towns of LaFontaine, Lagro, and Roann. Wabash County and the town of North Manchester estimate that the magnitude would be "Limited" due to the presence of structures in areas where landslides are more likely to occur. Currently, the committee estimates that the warning time would be less than six hours. Similarly, the duration is anticipated to be less than six hours. A CPRI summary for landslides, land subsidence, and fluvial erosion is provided in **Appendix 8**.

Assessing Vulnerability

Within Wabash County, direct and indirect effects may include:

Direct Effects:

- Damages to infrastructure (power lines, roads, bridges)
- Damages to individual properties (homes, cars)
- Loss of cropland immediately adjacent to the rivers

Indirect Effects:

- Increased response time for emergency vehicles
- Losses associated with affected land (crop loss)
- Potential contamination of groundwater resources
- Loss of business due to roadway access and power loss

Estimating Potential Losses

According to the National Risk Index, expected annual losses have been calculated for the areas in Wabash County which are at risk of damage including temporary or permanent loss of function.

In addition, areas where FEH meander belt widths (FEH zones) have been identified, may be at a higher risk of property damage caused by such events. To prepare a community based basic "what-if" scenario, the Indiana FEH GIS layers were overlaid onto parcel data provided by the county. **Table 14** identifies the number of structures and potential damage within the FEH areas.

Table 14: Summary of Parcels and Critical and Essential Facilities in the FEH Zone

Community	Potential Damages		
	# Parcels	# Structures	# Critical and Essential Facilities
Wabash County	2,206	216	3
City of Wabash	301	117	2
Town of LaFontaine	35	20	0
Town of Lagro	35	2	0
Town of North Manchester	169	55	2
Town of Roann	2	2	0
Total	**2,748**	**413**	**7**

Future Considerations

As the populations of the communities in Wabash County grow, it can be anticipated that the number of critical and non-critical facilities will also increase. To reduce the vulnerability for damages resulting from a landslide or land subsidence, FEH area GIS layers along with the floodplain information should be integrated into the building permit or approval process. In recent years, no significant development has occurred within these areas of Wabash County. However, depending on the location, any development may increase the vulnerability to this hazard.

Although the county rivers are considered relatively stable, having little lateral movement annually, extreme precipitation events may cause erosion to take place in previously stable areas. Given this potential it is key the community continues to discourage construction of infrastructure and homes in the meander belt widths for each stream, such as the Eel River, Mississinewa River, Salamonie River, and Wabash River.

As future growth takes place, the indirect effects resulting from a landslide or land subsidence event can cause challenges for the community if transportation routes are damaged, and businesses must close due to access issues and loss of power. Cascading impacts in smaller counties can have long lasting effects on the local economy, community growth, health, and welfare.

Relationship to Other Hazards

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

flooding in areas previously not impacted by flood due to debris clogging drainage ways and loss of earthen berms near the waterways.

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.

4.2.8 TORNADO

Overview

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-blown debris. Tornado season is generally from 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% of all tornadoes strike between 3:00 pm and 9:00 pm but can occur at any time of day or night.

The classification of tornadoes utilizes the Enhanced Fujita Scale of tornado intensity and damage. 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 (**Table 15**).

Table 15: Enhanced Fujita Scale for Tornadoes

EF-Scale	Windspeed, mph	Character of Damage	Relative Frequency	Typical Damage
EF0	65-85	Light damage	29%	Shallow rooted trees blown over; damage to roofs, gutters, siding
EF1	86-110	Moderate damage	40%	Mobile homes overturned, roofs stripped, windows broken
EF2	111-135	Considerable damage	24%	Large trees snapped, light-object missiles generated, cars lifted
EF3	136-165	Severe damage	6%	Severe damage to large buildings, trains overturned
EF4	166-200	Devastating damage	2%	Whole houses destroyed; cars thrown
EF5	200+	Incredible damage	<1%	High-rise buildings significantly damaged, strong framed homes blown away

Extent, History, and Location

In Wabash County, the NCEI indicates one tornado occurred from January 1, 2019, to December 31, 2025. On May 27, 2019, North Manchester was stricken by an EF1 tornado. Damage surveys found tree damage and roof damage to a barn and a small shed also sustained significant damage. While property damages were described, the NCEI did not provide costs associated with the property damage. WANE 15, a local news station, discussed the three tornadoes that broke out in the region during Memorial Day in 2019. The North Manchester tornado was the smallest of the three and had "a peak wind speed of 90 mph, a path length of 2 miles, and a maximum width of 50 yards." It was also noted the roof and shed damage, and mentioned that a vehicle had been moved from the strong winds. No injuries, deaths, property damage amounts, or crop damage amounts were reported.

Committee members recalled a small tornado near LaFontaine. According to WANE 15, a very weak, likely EF 0, tornado developed along E 1100 S, east of S 600 E, on March 26, 2026. The tornado tore a portion of the roof off one building and damaged a barn and an empty hauler.

Additionally, multiple thunderstorm events described tornadoes in other counties produced from the same storms that caused high winds within Wabash County. There is always a chance of a tornado forming from a supercell storm which can also produce high thunderstorm winds and large hailstones. Tornadoes typically come with high damages to either property or crops and can result in injuries or deaths.

Probability

The committee estimated the probability of a tornado occurring in Wabash County would be "Likely" and the magnitude and severity of such an event to be "Significant." The town of Lagro estimated the probability to be "Possible" due to the towns smaller size. The overall risk index is "Elevated" throughout the county. 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 CPRI summary for tornadoes is shown in **appendix 8**.

The Indiana State Climate Office estimates that throughout Indiana, there is an average of 25 tornado touchdowns per year. Based on the number of tornado touchdowns previously reported through the NCEI and local weather agencies, the committee determined the risk from a tornado for all of Wabash County to be "Elevated."

Assessing Vulnerability

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

Direct Effects:

- Increase damage to older construction including residential and business structures, mobile homes, and accessory structures (pole barns, silos, and sheds)
- Damage to structures in the immediate pathway (businesses, residences, and warehouses)
- Loss of alternative housing stock nearby
- Damages to above ground utility lines and structures

Indirect Effects:

- Loss of revenue for affected businesses.
- Expenses related to community clean-up and debris removal from public rights of way and public facilities
- Inability for property owners to work while dealing with personal property damages from the tornado and debris removal 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

Estimating Potential Losses

Due to the unpredictability of this hazard, all critical and non-critical facilities 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 and the communities. 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 one is nearest the center of the tornado path, while Zone three is the farthest from the path and with a theoretically lower wind speed. **Table 16** provides summary data for the hypothetical tornado, which is identified on **Exhibit 3**. Tables 16-17 only include communities in the path of the tornado and structures not labeled as unclassified. No unclassified structures were present. The actual damage from a tornado along this path may be higher or lower depending on the exact route, wind speeds, and perhaps time of day.

Table 16: Summary of Hypothetical Tornado Damages

Community	Zone 1		Zone 2		Zone 3		Total	
	#	$	#	$	#	$	#	$
Wabash County	98	$8.5M	54	$4.7M	47	$4.0M	**199**	**$17.2M**
City of Wabash	18	$3.3M	1	$0.4M	0	$0	**19**	**$3.6M**
Total	**116**	**$11.8M**	**55**	**$5.1M**	**47**	**$4.0M**	**218**	**$20.9M**

Utilizing the same GIS information and process, critical and essential facilities within each of the hypothetical tornado zones were identified and are included in **Table 17**. These buildings are included in the above table showing the number of structures and damage estimate information.

Table 17: Critical and Essential Facilities Within Hypothetical Tornado

Community	Zone 1	Zone 2	Zone 3
Wabash County			
City Of Wabash	Bowen Center Healthcare	Kids First Daycare	St Bernard Catholic School, First UMC Shelter, and St Bernards Shelter

Future Considerations

The communities within Wabash County host numerous events each year in addition to the regular tourist attractions and outdoor recreation opportunities which attract thousands of guests. Due to this, it is imperative that the EMA place continued importance on the need to maintain their outdoor warning siren coverage and support alternative notification methods for people who are unable to hear the outdoor warning sirens or may not be tuned in to local media. Because of the dispersed population concentration, coverage is limited to the more densely populated portions of the county. The existing outdoor warning siren locations are identified in **Figure 28**.

While it can be anticipated that new construction associated with development may be stronger than older or existing construction, existing older structures, barns, pole buildings, silos, and mobile homes remain threatened by tornados. The unincorporated portions of the county will remain vulnerable, especially where the outdoor warning siren coverage is not present. It is impossible to predict the path of a tornado and therefore all current and future development will continue to be at risk for damage. Risks to the citizens of the county may be lessened through participation in mass notification programs, use of weather radios, and turning on the emergency alert feature on cell phones. Having multiple means of warning citizens, businesses and visitors about incoming weather events is critical to continued economic growth and well-being of the communities and the county.

According to NOAA, the number of tornado days, or days with at least one EF1 tornado occurs is decreasing. However, the number of large tornado outbreaks, days with at least 16 EF1 tornadoes, are increasing. Additionally, the number of tornadoes in spring are decreasing as the number of tornadoes in fall and winter are increasing. These shifts may make it more difficult for emergency responders to adequately respond during tornadoes as they may be overwhelmed with the extent of damage. Precautions such as multiple tornado outbreak training should be considered to prepare for these larger events.

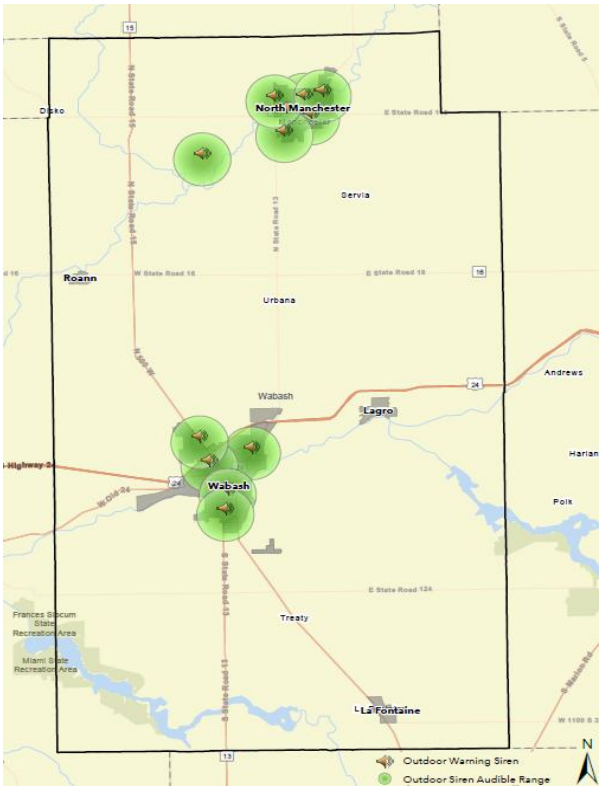


Figure 28: Outdoor Warning Siren Locations in Wabash County

Relationship to Other Hazards

Tornadoes may result in a hazardous material 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 damage 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 damage by clogging outlet structures or emergency spillways. 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, gas leaks, and substantial amounts of debris.

4.2.9 WINTER STORMS AND 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. Winter storms are typically accompanied by cold temperatures and blowing snow, which can severely reduce visibility. A winter storm is defined as one that drops four or more inches of snow during a 12-hour period, or six or more inches during a 24-hour span.

An ice storm occurs when freezing rain falls from clouds and freezes immediately on contact with a variety of surfaces. All winter storms make driving and walking extremely hazardous. The aftermath of a winter storm can affect a community or region for days, weeks, and even months.

Storm effects such as extreme cold, flooding, snow, and ice accumulation can cause hazardous conditions and hidden problems for people in the affected area. People can become stranded on the road or trapped at home, without utilities or other services, including food, water, and fuel supplies. The conditions may overwhelm the capabilities of a local jurisdiction. Winter storms are considered deceptive killers as they may indirectly cause transportation accidents, and injury and death resulting from exhaustion, overexertion, hypothermia and frostbite from wind chill, and asphyxiation. House fires occur more frequently in the winter due to the use of alternative heat sources, such as space heaters, and 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 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. In the event of a blizzard, a winter storm warning will be issued and include the details of the blizzard - that large amount of falling or blowing snow and sustained winds of at least 35 mph are expected for several hours.

Location

Winter storms are common in Wabash County and the surrounding region. Such conditions can result in substantial personal and property damage, even death. In the winter storm watches and warnings, the NWS uses the WSSI to discuss impacts and provide community members and leaders with a point of reference to better understand the potential impacts of the storm. **Figure 29** shows the description of the Indiana travel advisory levels. Some counties, particularly those with larger populations or urbanized areas, may want to utilize the NWS's WSSI tool as it provides more detailed information over the tool's five levels.

Indiana Travel Advisory Levels	
Advisory	**Routine travel or activities may be restricted in some areas due to hazardous conditions** • Drive with caution and avid affected areas if possible
Watch	**Conditions are threatening to public safety** • Only essential travel is recommended • Businesses and schools should implement emergency plans
Warning	**Conditions are extremely dangerous. Roads are closed or restricted to emergency personnel only** • Stay off the roads • Violating a travel warning may constitute a class B misdemeanor

Figure 29: Indiana Travel Advisory Levels

Figure 30 graphically indicates Wabash County's minimum temperature is warming at a rate of 0.3°F each decade since roughly 1895. This increase will likely result in the county experiencing less snow and more ice. This tradeoff is due to a greater likelihood of atmospheric temperatures being above freezing which will melt any snow and then refreeze the drops of rain resulting in freezing rain or sleet.

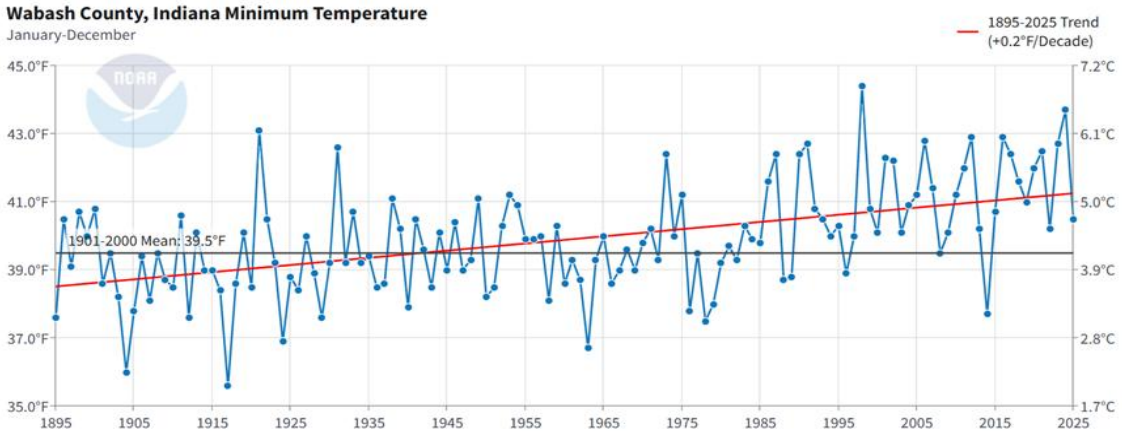


Figure 30: Wabash County Minimum Temperatures from 1895 to 2024

Extent and History

In Wabash County, the NCEI has recorded one heavy snow, zero ice storms, five winter storms, and eight winter weather events from January 1, 2019, to December 31, 2025.

The NCEI reports indicated no property damage, no additional crop damage and no injuries, or deaths associated with any of the events. Many narrative descriptions indicated poor travel conditions, numerous power outages and debris associated with the winter weather events. On January 1, 2021, periods of freezing rain led to ice accumulation of 0.1 to 0.2 in. across the county. On February 15, 2021, heavy snow resulted in 12 in. of snow reported in LaFontaine. Committee members recalled one ice storm and one lake-effect snow in 2026. During the ice storm, one committee member recalled how he fell when getting into his vehicle in the morning. While not a medical emergency in this case, some falls, especially in older populations, can be

cause to a medical emergency. **Appendix 9** provides the NCEI information regarding winter storms and ice that have been reported within the county.

Probability

The probability, magnitude, warning times, and duration of a snowstorm or ice storm causing disruption to residents and businesses in Wabash County, as determined by the planning committee, is expected to be mostly consistent throughout the county and communities. It is "Highly Likely" that this type of hazard will occur in the area and will typically affect the entire county, and possibly several surrounding counties at one time, resulting in primarily "Significant" damage. The town of LaFontaine anticipated the magnitude to be "Limited" due to the low population. The warning time is estimated to be 12 to 24 hours and the expected duration ranges from less than a week. A CPRI summary for winter storms and ice is shown in **Appendix 8**.

Based on historical data and the experience of the planning committee, snowstorms have become less common in Wabash County with the changing climate. However, ice storms bring more extensive challenges to the communities. Actions have been taken to mitigate many impacts from snow and ice storms. Lake effect snowstorms can be less predictable, depositing greater amounts of snow in a contiguous county and lesser amounts in Wabash County or the opposite. The committee considered only the larger, more detrimental events for this effort.

Assessing Vulnerability

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

Direct Effects:

- A higher number of businesses rely on the outside workforce and may experience loss of production as employees may not be able to get to work. The high number of residents traveling to other areas for work results in a loss of income due to the inability to reach their normal worksites
- Rural (county) roads may be impassable
- Increased expenses related to snow removal or brine/sand applications
- Weight of ice and wet snow impacts older structures roofs as well as powerlines
- Large ice and snow events interrupt economic activity within the community

Indirect Effects:

- Loss of revenue as businesses are closed
- Increased emergency response times based on safety of roads
- Loss of income if workers are unable to get to their place of employment
- Delayed impacts due to supply chain disruptions – products not received or shipped on time cause lost wages and revenues
- Cancellation of special events and reduced tourist activities impact the local economy

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 essential facilities, critical infrastructure, and non-critical facilities are at risk from snowstorm and ice storm incidents.

For planning purposes, information collected about 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 communities.

In December 2008, Allen County had a wintry combination of freezing rains, snow, and ice. This storm was the largest disaster for Indiana Michigan Power with 110K Allen County customers without power. One thousand six hundred (1.6K) additional crew members were brought in to restore electrical service to the county. According to the Journal Gazette $10M–$12M was spent to clean up the debris, make repairs and labor costs for this event.

While the above example indicates 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 and essential facilities, it is important to ensure that these new structures are equipped to deal with the potential risks associated with this hazard. Those may include lengthy power outages and potentially impassable transportation routes, making it difficult to obtain supplies or for passage of response vehicles. These hazard events will typically affect the entire county, perhaps multiple counties, and therefore all developments, current and future, will be at risk for damage associated with snow and ice storms. In addition, there will be a need for additional warming shelters for the underserved populations to take refuge and get warm and safe respite for stranded commuters on their way to or from work. This not only includes daytime available spaces but also overnight accommodation as the winter storms are often accompanied by very cold temperatures and wind chills.

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.

Relationship to Other Hazards

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 damage to structures and properties as well as within the stream or river channel. Wabash County has an increased risk of flooding following heavy precipitation events. The increased flooding may then lead to a dam failure within the same area, further exacerbating the damage.

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 the county, or where open areas are more susceptible to snow drifts on roads, the possibility of a traffic related hazardous materials incident may increase due to road obstruction and lack of visibility.

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 homeless, the elderly or ill. Power outages in the winter are especially dangerous as families try to generate heat using alternative heat sources. Alternative heating sources may not be safely used or may be placed too close to combustible materials resulting in fires and burn injuries or death.

4.2.10 DAM AND 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.

Of the approximately 80K dams identified nationwide in the National Inventory of Dams (NID), the majority are privately owned. Each regulated 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 of regulated 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 severe 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.

In Indiana, not all dams are regulated. To be regulated by the IDNR, the dam must meet at least one of the following criteria:

- The dam has a drainage area of more than one mi^2
- The dam is 20 ft. in height or greater
- The dam impounds a volume of more than 100 acre-ft. of water

A dam's classification may be changed to a high-hazard classification through a successful petition by a downstream property owner. If this occurs, then the dam will also be regulated by IDNR. Federally owned and operated dams are not under IDNR's jurisdiction. Examples of Federally regulated dams include Federal Energy Regulatory Commission (FERC) and US Army Corps of Engineers (USACE) structures. Although regulations are similar, there are additional requirements based on the regulating agency.

A levee is a flood control structure engineered and 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, like those associated with dam failure, 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 during a more severe event. When a levee system fails or is overtopped, the result can be catastrophic and often more damaging than 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 increases the size of the breach until it is repaired or water levels on the two sides of the levee have equalized. The FEMA and USACE remind people living and working behind levees that there is always a residual risk when living or working in a facility located behind a levee. Levees reduce the risk of a flood, but do not completely eliminate that risk.

Location

Within Wabash County, there is one high hazard dam, one significant hazard dam and twelve low hazard dams, along with three unclassified dams listed in the IDNR dams list. The one high hazard dam, Salamonie Reservoir Dam is a federally owned and operated structure. Additionally, the J. Edward Roush Dam and the Mississinewa Lake Dam have been included in the table as they may have significant impacts on Wabash County. **Table 18** shows the structures listed on the NID.

Table 18: Wabash County Dams

State ID	Dam Name	Owner Types	Hazard Potential Classification	State Regulated Dam	IEAP Prepared
85-2	Eel River Dam (S.W. Edge North Manchester)	Local Government	Low	No	No
85-3	Eel River Dam (South of Laketon)	Private	Low	No	No
85-4	Eel River Dam (In-Channel) (Near Liberty Mills)	Unassigned	Low	No	No
85-5	Salamonie Reservoir Dam	Federal	High	No	Yes
85-6	Stockdale Mill Dam (in-Channel)	Private	Low	Yes	No
85-7	J. Chamberlain Pond Dam	Private	Not Rated	No	No
85-8	Hominy Ridge Lake Dam	State	Low	Yes	No
85-9	Johnson Heights Dam	Private	Low	Yes	No
85-10	Dean Gifford Pond	Private	Significant	No	No
85-11	Long Lake	Private	Low	No	No
85-12	Baer Pond	State	Not Rated	No	No
85-13	Dick Thomas Pond	Private	Low	No	No
85-14	B. McQuitty Lake Dam	Private	Low	No	No
85-15	George Barlow Pond	Private	Low	No	No
85-16	Eds Pond	Private	Not Rated	No	No
85-17	Lukens Lake	Private	Low	No	No
85-18	Mill Creek Dam (In-Channel)	Unassigned	Low	Yes	No
35-5	J. Edward Roush Lake Dam	Federal	High	No	Yes
52-5	Mississinewa Dam	Federal	High	No	Yes

According to the National Levee Database (NLD) managed by the USACE, there are no certified levee systems within Wabash County

The Indiana Silver Jackets team completed a survey of levee-like features also known as non-levee embankments. The non-levee embankments are not certified or engineered structures. They are earthen structures which act like levees, however, cannot protect the features behind the structures adequately. In fact, non-levee embankments impose lateral constraints on flood flows, reducing the floodplain storage capacity and increasing the flood velocity. These non-

levee embankments can cause stream erosion and downstream flooding. Some farms along the rivers and streams rely on these embankments to keep flood waters out of their fields. Non-levee embankments are discussed in the section because they are commonly mistaken to be "real" levees. People frequently build behind these structures with an expectation of safety, but these structures were never intended to provide such protection and their ability to hold back floodwater is unpredictable at best. Non-levee embankments can and often do restrict the movement of water to a certain limitation at which time the structure may fail without warning. The IDNR website houses the Non-Levee Embankment site which shows the non-levee

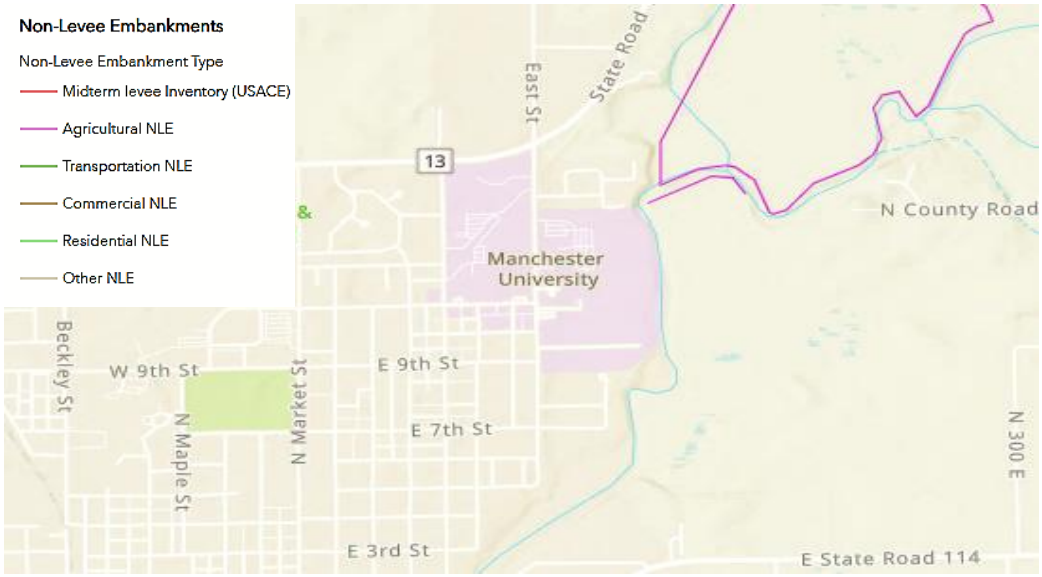


Figure 31: Sample of Non-Levee Embankments

embankments for Wabash County. **Figure 31** depicts a sample of the agricultural (purple) and transportation (dark green) non-levee embankments in the southeastern corner of the county.

Extent and History

According to multiple local news sources, there have not been any failure or partial failures of either the Mississinewa Lake Dam, the Roush Lake Dam, or the Salamonie Reservoir Dam in recent history. However, in 2015 record rains led to the Army Corp of Engineers releasing water from both the Roush Lake Dam and the Salamonie Reservoir Dam as they had reached capacity. Precautions were taken which included evacuating people living along River Road in the town of Andrews in Huntington County. From local new sources it does not appear that any evacuation took place in Wabash County. According to one planning committee member 7,500 ft^3 per second of water were being released from the Roush Lake Dam and 9,500 ft^3 per second of water were being released from the Salamonie Reservoir Dam. The maximum water release rate of the Salamonie Reservoir Dam is 9,500 ft^3 per second. Additionally, this was the first time the Roush Lake Dam and the Salamonie Reservoir Dam had both been at maximum capacity. A committee member recalled the Indiana Governor making a visit to the Salamonie Reservoir Dam during this time due to the severity of the situation. This situation required the Wabash County EMA to open EOC and a RedCross shelter for those affected by flooding.

Probability

Based on the information provided to them and their local knowledge, experience, and expertise, the committee determined the probability of a dam failure is "Unlikely" in all

communities as the USACE is responsible for the dam, perform routine inspections, and hold frequent trainings for the J. Edward Roush Dam, Mississinewa Lake Dam, and the Salamonie Reservoir Dam. The magnitude is anticipated to vary based on the distance from the dam. Wabash County and the town of LaFontaine expect negligible damages, the town of Lagro anticipated "Significant" damages and the city of Wabash anticipated "Critical" damages. The towns of North Manchester and Roann anticipated "Limited" damages primary due to the Eel River not being able to properly drain into the Wabash River. Wabash County, the city of Wabash, and the towns of LaFontaine, North Manchester, and Roann anticipate a warning time of greater than 24 hours. The town of Lagro anticipates a warning time of 12 to 24 hours due to proximity to the dam. **Appendix 8** provides a CPRI summary of the planning committee's expectations during a dam failure.

Assessing Vulnerability

The actual magnitude and extent of damage due to a dam or levee failure depends on the nature of the 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.

Incident and Emergency Action Plans (IEAPs) are now required for all high hazard dams by state law; however, these plans are not mandated for the low and significant hazard structures. Dam owners are, however, encouraged to prepare an IEAP to help identify whom to notify and what actions may need to take place in the event of an incident or emergency event affecting the dam. Additionally, these plans show at-risk structures that may be affected by a dam failure. All dam owners are encouraged to developed an IEAP.

Within Wabash County, direct and indirect effects from a dam failure may include:

Direct Effects:

- Loss of life and severe 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:

- Environmental damage includes altered landscapes, eroded soils, habitat destruction, and loss of wildlife from sudden releases of water
- Water quality impacts if contamination is in the water. This could potentially cause human health problems as well as fish and wildlife injury or death
- Increased response times due to damaged or re-routed transportation routes and/or bridges
- Long lasting economic impacts on the community due to business closures, and relocation of impacted property owners
- Economic impacts also include the cost of property damage, cleanup, and recovery
- Social impacts, such as displacement of people and disruption of communities

Estimating Potential Losses

The greatest dam or levee failure risk within Wabash County is a breach of the J. Edward Roush Dam, Mississinewa Lake Dam, or the Salamonie Reservoir Dam. A worst-case scenario breach of the Salamonie Reservoir Dam may inundate areas from Bluffton, IN, to Gibson County along the Wabash River. **Table 19** depicts three USACE breach scenarios for the Salamonie Reservoir Dam and the impacts each failure may have between Wells County and Gibson County.

Table 19: Salamonie Reservoir Dam Breach Scenarios

Salamonie Dam Scenarios	Daytime People at Risk	Nighttime People at Risk	Buildings At Risk	Economic Cost
Maximum High Pool Breach	39,745	43,942	18,337	$4.4B
Intermediate High Pool Breach	28,705	31,572	13,075	$3.2B
Normal High Pool Breach	2,466	3,300	1,694	$211.5M

Additionally, **Table 20** depicts three USACE breach scenarios for the J. Edward Roush Dam and the potential impacts the dam may have. Inundation areas for the J. Edward Roush Dam were unavailable at the time of this planning effort but there is a potential for many of the facilities located within the potential Salamonie Reservoir Dam inundation areas may also be affected by a failure of the J. Edward Roush Dam. The emergency management agency may want to review the inundation area when available to identify critical and essential facilities within the potential inundation areas.

Table 20: J. Edward Roush Dam Breach Scenarios

J. Edward Roush Dam Scenarios	Daytime People at Risk	Nighttime People at Risk	Buildings At Risk	Economic Cost
Maximum High Pool Breach	39,047	40,510	17,110	$4.5B
Intermediate High Pool Breach	26,701	28,457	12,703	$2.7B
Normal High Pool Breach	230	182	103	$9.5M

Additionally, **Table 21** depicts two USACE breach scenarios for the Mississinewa Lake Dam and the impact that both failures may have. A worst-case scenario breach of the Mississinewa Lake Dam may inundate areas from Wabash County to Knox County. Wabash County may be affected as the dam may cause a temporary river reversal.

Table 21: Mississinewa Lake Dam Breach Scenarios

Mississinewa Dam Scenarios	Daytime People at Risk	Nighttime People at Risk	Buildings At Risk	Economic Cost
Maximum High Pool Breach	25,332	38,337	Unavailable	$3.8B
Normal High Pool Breach	9,509	15,017	Unavailable	$620.7M

Utilizing GIS maps and orthoimagery, the infrastructure and other features of dams can be identified. This imagery will show properties that may be isolated due to the inundation of the roadways leading in and out of the area as well as those properties which would be inundated. **Table 22** provides the critical and essential facilities located within the maximum high pool breach for the Salamonie Reservoir Dam.

Table 22: Critical and Essential Facilities Within the Salamonie Reservoir Dam Inundation Area

Community	Critical and Essential Facilities
Wabash County	Austin Powder
City of Wabash	Arc Of Wabash County, Bulldog Battery Corp, Gebhart Holdings, Indiana-American Water Co, J.M. Reynolds Oil Co, Keystone Cooperative, Outdoor Warning Siren, PaperWorks, Pathfinder Home 1, Pathfinder Home 3, Speedway Gas, Verizon – Wabash Co, Wabash City Hall, Wabash County Sheriff, Wabash Waste Treatment Facility, and YMCA
Town of Lagro	Indiana Bell Telephone Company, Lagro Fire Station, Lagro Town Hall, and Public Well

Additionally, **Table 23** provides the critical and essential facilities located within the maximum high pool breach for the Mississinewa Lake Dam.

Table 23: Critical and Essential Facilities Within the Mississnewa Dam Inundation Area

Community	Critical and Essential Facilities
Wabash County	Austin Powder
City of Wabash	Arc Of Wabash County, Bulldog Battery Corp, Gebhart Holdings, Indiana-American Water Co, J.M. Reynolds Oil Co, Keystone Cooperative, Outdoor Warning Siren, PaperWorks, Pathfinder Home 1, Pathfinder Home 3, Speedway Gas, Wabash Waste Treatment Facility, and YMCA

Future Considerations

As areas near existing levees and dams continue to grow in population, it can be anticipated that the number of critical and non-critical facilities could 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 levee and dam failure inundation areas. Also, flood-free access should be provided for these facilities. Until development or re-development downstream of a dam is prohibited, those areas remain vulnerable to losses and damage associated with a failure of that structure.

Careful consideration should be given to any future development planned for the potential inundation area below Salamonie Reservoir dam or any other dam structure as it may increase the cost of maintaining these structures or increase the population downstream of the dam.

It is also particularly 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. Although not mandated, this is the best management practice for significant and low hazard dams as well.

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 and debris flow within the inundation areas downstream of the dam. 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. Entire roads may be undermined by the forces of the water and debris. Other infrastructure such as utility poles and lines may be damaged as the water and debris

flows along. Buried utility pipes may become exposed due to scouring; all of which may lead to utility failures within the area downstream of the dam failure.

Due to flood and debris flow damage, hazardous materials facilities and transportation routes may be damaged resulting in releases. If large propane gas tanks are located nearby, they may be torn from their mountings and would become part of the flowing debris as well as leaking their contents from the ruptured service lines.

4.2.11 HAZARDOUS MATERIAL INCIDENT

Overview

Hazardous materials are substances that pose a potential threat to life, health, property, and the environment if they are released. These releases create a serious hazard for workers, neighbors, and emergency response personnel. Emergency response to a release of hazardous material may require fire, safety and law enforcement, search and rescue, and hazardous materials response units.

As materials are transported 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 Wabash County and its residents if proper and immediate actions are not taken. Most releases are the result of human error or improper storage 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.

Location

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 SARA Title III Tier II facilities utilizing, storing, and/or manufacturing chemicals has decreased over the years as facilities reduce the amount hazardous materials on site. Both Tier II and other chemical facilities as well as businesses and industries rely on just in time delivery which results in an increase in the number of delivery vehicles transporting hazardous materials across the county. Major highways and transportation routes in Wabash County are shown in **Figure 32** and include:

- US Route 24
- State Roads 13 15, 16, 114, 115, 124, 218, and 524

Figure 32: Wabash County Transportation Map

Norfolk Southern Railroad has two major lines running through Wabash County. To mitigate against potential hazmat incidents, Wabash County has established a hazardous materials response team and has mutual aid hazardous materials response capabilities.

Extent and History

According to IDEM there were 36 reported hazardous materials spills in Wabash County from January 1, 2019, to December 31, 2025. **Table 24** shows the number of spills by community. In Indiana, all spills must be reported to IDEM on the spill's hotline. Two recent spills reported include one on October 6, 2021, where 6K gallons of sewage spilled in Wabash Conty southwest of North Manchester. During that same month on October 29, 2021, 800 gallons of aluminum sulfate spilled at the city of Wabash Wastewater Treatment Plant.

Table 24: Wabash County Hazardous Material Incidents

Community	2019	2020	2021	2022	2023	2024	2025	Total
Wabash County	1	4	6	5	4	7	6	**33**
City of Wabash	4	2	1	1	3	0	2	**13**
Town of LaFontaine	0	0	0	0	0	1	0	**1**
Town of Lagro	1	0	2	0	0	1	0	**4**
Town of North Manchester	1	5	0	2	1	0	0	**9**
Town of Roann	1	0	0	0	0	0	0	**1**
Total	**8**	**11**	**9**	**8**	**8**	**9**	**8**	**61**

Probability

According to the committee, the probability of a hazardous materials release or incident is "Highly Likely" to occur in all areas of the county. Damages are anticipated to be "Limited." As with hazards of this nature, a short warning time of less than six hours is expected. The duration would vary based on amount and type of material spilled but the county anticipated the average event to have a duration of less than one day. A CPRI summary for hazardous material incidents is shown in **Appendix 8**.

Vulnerability

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

Direct Effects:

- Acute or chronic health issues due to chemical exposure
- Closure of impacted railroad crossings
- Possible crop or livestock damage from chemical exposure
- Damage to infrastructure from leaks, accidents, or recovery operations
- Expense of decontamination and reconstruction of affected structures

Indirect Effects:

- Loss of revenue or production while testing, recovery, and/or reconstruction occurs
- Anxiety or stress related to the event
- Potential evacuation of neighboring structures or facilities
- Evacuation and/or relocation of homeless persons living in the impacted area
- Added expenses detouring traffic around incident location
- Expenses incurred due to response, testing, and cleaning of the affected areas

While the possibility of an incident occurring may be possible, the vulnerability of Wabash County has been lowered due to the enactment of 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 LEPC. This committee has the responsibility for preparing and implementing emergency response plans (ERP), cataloging Safety Data Sheets (SDS) formerly known as Material Safety Data Sheets (MSDS), creating chemical inventories of local industries and businesses, and reporting materials necessary for compliance.

In Wabash County, 45 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 on the community involved.

Wabash County developed a Hazardous Materials Commodity Flow Study in 2020 to better understand the amount and type of hazardous materials that travel through the county. The plan was developed by studying placarded vehicles on US Route, US 24 alternative business route, and State Roads 13, 15, 16, 114, 124, and 218 for total of 160 hrs. The study identified seven of the nine DOT hazardous materials placards (no explosive or radioactive materials were found). Since 2009 the makeup of vehicles has shifted away from flammable liquids, oxidizers, and toxic/infectious substances and towards gases, corrosives, and Class 9 miscellaneous dangerous substances. Additionally, the overall hazardous materials score is 3.24 for Wabash County, up from 1.59 from 2009. This score estimates that a placarded vehicle travels into Wabash County every 18 mins. The commodity flow study may assist communities with planning for and responding to hazardous materials incidents.

Estimating Potential Losses

Figure 33: Hazardous Material Spill

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 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, such as in **Figure 33**. However, 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 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. Carriers of hazardous materials travel all of the state roads. As businesses and industries increase in the area, the increased use of these routes will increase the number of transportation related incidents.

By restricting development within the known hazardous materials facility buffer zones, future losses associated with a hazardous materials release can be reduced. Critical and essential facilities 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 reduced, lowering the risk for social losses, injuries, and potential deaths. Future construction of hazardous materials facilities should be located away from critical and essential facilities such as schools, medical facilities, municipal buildings, and daycares. Such construction would likely reduce the risk to highly populated buildings and populations with physical or social, emotional, or behavioral challenges or considerations such as children, the elderly, and medically fragile individuals.

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.

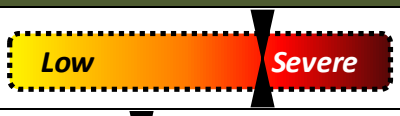
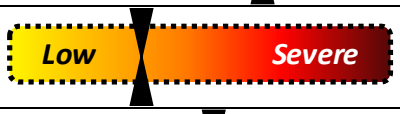
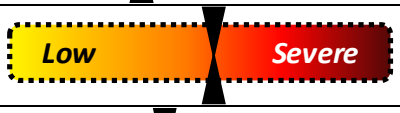
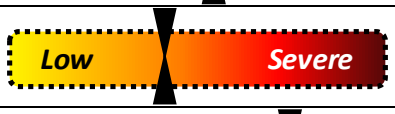
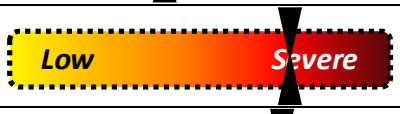
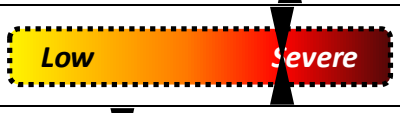
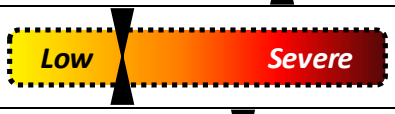
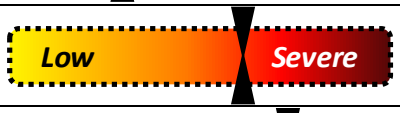
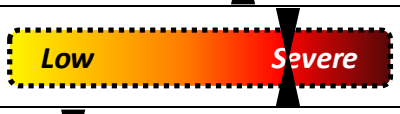
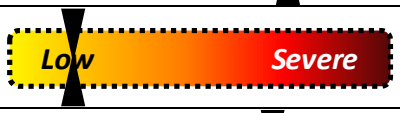
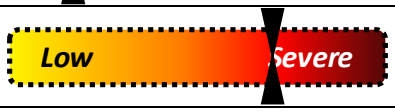
Relationship to Other Hazards

Dependent on the nature of the release, conditions may exist where a fire or spark ignites a flammable or explosive substance. As the fire spreads throughout the facility or the area, structural or property damage will increase. If the hazardous substances are in enclosed containers such as railroad tank cars, cylinders, other containers, or near heat generating events such as a fire, explosion becomes a risk as well. 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. Depending on the nature of the incident, further delays may take place until qualified hazardous materials responders with the appropriate response and monitoring equipment can be transported to the incident location. While this may increase structural losses, it may decrease social losses such as injuries or even deaths.

4.3 HAZARD SUMMARY

For the development of this MHMP, the committee utilized the CPRI method to prioritize the hazards which have affected Wabash 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 25** summarizes the CPRI values for the various hazards studied within this MHMP and their ranking.

Table 25: Combined CPRI and Ranking for Each Hazard

Type of Hazard	List of Hazards	Weighted Average CPRI	Ranking
Natural	Drought		3.08
	Earthquake		2.05
	Extreme Temperatures		2.65
	Fires and Wildfire		2.27
	Flood		3.34
	Hailstorm, Thunderstorm, and Windstorm		3.25
	Landslide, Land Subsidence, and Fluvial Erosion		1.91
	Tornado		2.94
	Winter Storms and Ice		3.29
Technological	Dam and Levee Failure		1.45
	Hazardous Material Incident		3.20

It is important to understand the cause-and-effect relationship between the hazards selected by the committee. **Table 26** 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 26: Hazard Reference Table

EFFECT → / CAUSE ↓	Drought	Earthquake	Extreme Temperatures	Fires and Wildfire	Flood	Hail, Thunder, and Wind	Landslide, Subsidence, and FEH	Tornado	Winter Storms and Ice	Dam and Levee Failure	HazMat Incident
Drought				X							
Earthquake				X			X			X	X
Extreme Temperatures											X
Fires and Wildfire											X
Flood							X			X	X
Hail, Thunder, and Wind				X	X		X			X	X
Landslide, Subsidence, and FEH					X					X	X
Tornado				X						X	X
Winter Storms and Ice					X					X	X
Dam and Levee Failure					X		X				X
HazMat Incident				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 Wabash 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 greater risk of a dam or non-levee embankment failure.

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, and essential facilities should not be constructed within these regions.

The ever-changing climate can also have a significant impact on these hazards. According to the NCEI State Climate Summary for Indiana the following observations have been observed based upon climate change:

- The global average temperatures have risen over 1.5°F since the beginning of the 20th Century. Temperatures in the 21st century have been higher than any other historical period with the exception of the early 1930s Dust Bowl era
- Indiana has experienced increases in the number and intensity of rain events while the individual duration of the rain events has been decreasing
- Extreme events are increasing, especially flooding

CHAPTER 5: MITIGATION STRATEGY

This chapter identifies the overall goal for the development and implementation of the Wabash County MHMP. A summary of existing and proposed mitigation practices discussed by the committee is also provided.

5.1 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 previous Wabash County MHMP and determined that the goals remain valid and effective. In summary, the overall goal of the Wabash 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. The three specific goals to achieve the overall goal of the plan are:

1) Lessen the impacts of disasters and enhance community resilience
2) Minimize the loss of life and injuries caused by disasters
3) Promote mitigation activities both prior to and following a disaster

5.2 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 earthquakes, wind, and floods. 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 (2019) 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 through federal grants, $6 is saved on disaster costs. In addition, it was determined that by adopting all the building codes put forth in the 2015 International Code, $11 can be saved for every $1 invested. Lastly, 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

5.2.1 EXISTING MITIGATION PRACTICES

As part of this planning effort, committee members were provided a copy of the prior MHMP's mitigation actions. Committee members reviewed those actions and were asked to consider any and all other mitigation actions based on the hazards discussed in the first meeting. At the second planning committee meeting, the committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements, as well as suggesting new practices. The committee also examined practices employed by neighboring communities assessing the viability of those actions within Wabash County. The following is a summary of existing hazard mitigation practices within Wabash County. Mitigation measures that were included in the previous Wabash County MHMP are noted as such. **Appendix 11** lists the former mitigation actions included in the previous MHMP and their status.

Emergency Services

- The county has outdoor warning sirens which cover almost all incorporated areas of the city of Wabash and the town of North Manchester and maintains them in operational condition. The outdoor warning sirens are regularly assessed using a newly installed centralized system
- Three stream gages, one lake gage, maps, and alerts are utilized for flood monitoring, forecasting, and flood warnings for the various streams in the county
- Wabash County, the city of Wabash, and the towns of LaFontaine, Lagro, Roann, and North Manchester continue to participate in the NFIP
- The townships of Chester, Lagro, and Pleasant have mapped dry hydrants which may be utilized by emergency responders to prevent and put out fires
- Wabash County utilizes CodeRed and IPAWS for emergency alerts to residents
- Wabash County is an NWS StormReady Community
- The Wabash County Highway Department, the city of Wabash Street Department, and the town of North Manchester have developed snow removal routes to prevent accidents and residents from becoming disconnected
- The Wabash Fire Department upgraded vehicles and acquired level 3a vests
- The Wabash County Sheriff's Office hired more staff and built a new jail

- The Wabash County EMA has developed an Emergency Support Function (ESF) role to assist during disasters

Natural Resource Protection

- The town of North Manchester participates in the Tree City USA program to protect the areas community trees, establish tree growth, and raise awareness of the importance of trees
- The county has seven IDEM WMPs for the Eel River, Salamonia River, or Wabash River to assist in protecting their watersheds.

Prevention

- Some critical and essential facilities have installed inertial valves to prevent explosions or major leaks during an earthquake
- The Wabash County EMA, Wabash City Hall, all volunteer fire departments, and nursing homes have power back-up generators to prevent closures during a disaster
- The Wabash County Solid Waste Management District hosts two household hazardous waste collection days annually
- The Wabash City YMCA, which serves as a shelter, has been designed to prevent major flood damages
- The Wabash County EMA has established two EOCs, one brick and mortar and one mobile, to centralize the response during a disaster
- Wabash County has developed a hazardous materials commodity flow study to better understand and respond to hazardous material incidents
- Emergency alerts and evacuations for hazardous material incidents are reviewed annually in accordance with the county hazmat plan

Property Protection

- Wabash County, the city of Wabash, and the towns of LaFontaine, Lagro, and North Manchester have floodplain ordinances which establish measures to protect homes within floodplains from flooding damages
- The city of Wabash has improved drainage throughout the city since 2015 to prevent flood damages

Public Information

- The county utilized CodeRed and IPAWS for emergency alerts which are sent to the public
- The Wabash County EMA has hazard literature available in both English and Spanish and regularly educates the public on the possibility of hazards occurring and explains adequate response and recovery actions that should be taken when a hazard occurs

Structural Control

- Wabash County, the city of Wabash, and the towns of LaFontaine, Lagro, Roann, and North Manchester have adopted floodplain ordinances that established provisions to prevent critical and essential facilities from being built within floodplains
- Wabash County has established a 75 ft. setback requirement for all structures built near waterways without detailed studies

5.2.2 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 27 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, and responsible entities. Because of the large number of funding opportunities, **Appendix 12** lists potential funding sources. The proposed mitigation practices were assigned a priority by the planning committee. Projects identified to be of "high" local priority may be implemented within five years from final plan adoption. Projects identified to be of "moderate" local priority may be implemented within five-ten 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 adoption. 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 Wabash County. The intent of this planning effort was to identify the hazards and the extent to which they affect the county and to determine what type of mitigation strategies or practices may be undertaken to mitigate these hazards. A FEMA-approved MHMP is required to apply for and/or receive project grants under BRIC, HMGP, 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. **Chapter 6** 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 (2 points); identifying mitigation projects that include activities for prevention, property protection, natural resource protection, emergency services, structural control projects, and public information (up to 95 points).

Table 27: Proposed Mitigation Measures

Mitigation Practice	Prior Plan or New	Mitigation Strategy	Hazard Addressed	Status / Proposed Enhancements	Priority	Benefit-Cost Ratio	Responsible Entity
Emergency Preparedness and Warning							
1. Explore utilizing CodeRed or IPAWS for geolocated emergency alerts	New	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☐ Structural Control	All Hazards	Explore single-day event sign-ups for community events and tourists	High	High to Moderate	Wabash County Central Dispatch EMA
2. Create a Wabash County Community Organizations Active in Disasters (COAD) group to assist in emergency preparedness and response efforts	Prior		All Hazards	Conduct outreach to organizations with potential for COAD participation	High		EMA
3. Identify and meet fire and police department needs throughout Wabash County	Prior		All Hazards	Fire departments noted needing additional staff, training, and equipment such as devices capable of viewing the county GIS address verification system	High – fire		Wabash County Central Dispatch Wabash County Fire and Police Departments EMA
				Police departments noted needing additional staff and equipment such as a new dash cam system, tasers, and vests. School Resource Officer's noted needing equipment	Moderate – police		
4. Install a wind resistant roof on the Wabash County Judicial Building	New		Hailstorms, Thunderstorms, and Windstorms; Tornado	Identify funding sources for the purchase and installation	Moderate		EMA City of Wabash
5. Purchase mobile electronic messaging boards and develop protocol for local interactions to provide current hazard information	Prior		All Hazards	EMA needs two more mobile message boards to meet the needs of Wabash County	Moderate		EMA
6. Improve outdoor warning siren coverage to alert population of severe weather conditions	Prior		Hailstorms, Thunderstorms, and Windstorms; Tornado	Roann is the only community that has prioritized purchasing an outdoor warning siren	Low		Town of Roann Wabash County Central Dispatch EMA
				Test the outdoor warning siren in the unincorporated community of Laketon			
Emergency Response and Recovery							
1. Review and update procedures to alert and evacuate populations (especially special needs populations) in known hazard areas, SFHAs, and dam failure areas	Prior	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☐ Property Protection ☒ Public Information ☐ Structural Control	Flood; Landslide, Land Subsidence, and Fluvial Erosion; Dam and Levee Failure; Hazardous Material Incidents	Explore creating a special needs database to send first responders to in the event of a disaster	High	High	Wabash County Central Dispatch Wabash County Plan Commission EMA
2. Increase water rescue and diving capabilities of fire departments in Wabash County	Prior		Flood	Identify current fire department capabilities	High		Fire Departments of Wabash County EMA

Mitigation Practice	Prior Plan or New	Mitigation Strategy	Hazard Addressed	Status / Proposed Enhancements	Priority	Benefit-Cost Ratio	Responsible Entity
3. Purchase sandbags for use in blocking or redirecting floodwaters	Prior		Flood	Investigate sources of sandbags for use during a flood	High		EMA
4. Construct a new brick and mortar EOC	Prior		All Hazards	Upgrade communications in mobile EOC to 800 MHz. Purchase two additional communication towers for Wabash County	High		EMA Wabash County Central Dispatch
5. Develop and implement a voluntary immunization program for all emergency responders, inspection staff, and families	Prior		All Hazards	Investigate current county program and expand to potentially include family members of staff, greater offering of immunizations, and more city/county/town staff	Moderate		Wabash County Health Department EMA
6. Purchase additional snow removal and pre-treatment supplies	Prior		Winter Storms and Ice; Hazardous Material Incidents	Explore funding sources for maintenance, repairs, and salt	Moderate		Wabash County Highway Department City of Wabash Street Department EMA
Power Back-up Generators							
1. Secure a fuel reserve for critical and essential facilities so they may run on power back-up for extended periods of time	Prior	☒ Emergency Services ☐ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☐ Public Information ☐ Structural Control	All Hazards	Review contract language to prioritize fuel deliveries to county and municipalities in the event of a disaster	High	Moderate	EMA
2. Investigate the potential to utilize solar generators where appropriate			All Hazards	Install solar panel on Wabash city Police Department, Wabash city Fire Department, and Wabash City Wastewater Treatment Plant	Moderate		Critical and Essential Facilities Leaders EMA
3. Inventory, prioritize, and retrofit public facilities and/or critical and essential facilities with appropriate wiring and electrical capabilities for utilizing a large generator for power backup			All Hazards	Investigate power backup generators in LaFontaine Explore generators on the Wabash City WWTP and the schools of Wabash County	Moderate		Town of LaFontaine City of Wabash EMA
Safe Rooms and Community Shelters							
1. Inventory and prioritize listing of public facilities which may serve as effective shelters if hardened	Prior	☒ Emergency Services ☐ Nat. Res. Protection ☐ Prevention ☐ Property Protection ☒ Public Information ☒ Structural Control	Earthquake; Extreme Temperatures; Fires and Wildfire; Flood; Hailstorm, Thunderstorm, and Windstorm; Landslide, Land Subsidence, and Fluvial Erosion; Tornado; Winter Storms and Ice; Dam and Levee Failure; Hazardous Material Incident	Review the list of Red Cross Shelters within Wabash County Explore utilizing churches and schools to serve community needs	High	Moderate	EMA Wabash County Building Department

Mitigation Practice	Prior Plan or New	Mitigation Strategy	Hazard Addressed	Status / Proposed Enhancements	Priority	Benefit-Cost Ratio	Responsible Entity
2. Clearly advertise location of safe rooms and/or community shelters for large gatherings of people (football games, 4H fair, etc.)	Prior		All Hazards	Explore utilizing geolocated emergency alerts or QR Code programs to inform residents and tourists of safe room and community shelter locations	High		EMA Wabash County School Departments
3. Provide possible incentives for (private) buildings with approved safe rooms	Prior		All Hazards	Provide incentives for approved safe rooms	Low		EMA Wabash County Building Department
4. Establish shelters in recreational and mobile home parks	Prior		Earthquake; Extreme Temperatures; Fires and Wildfire; Flood; Hailstorm, Thunderstorm, and Windstorm; Landslide, Land Subsidence, and Fluvial Erosion; Tornado; Winter Storms and Ice; Dam and Levee Failure; Hazardous Material Incident	Explore potential incentives for the creation of approved shelters within mobile home parks	Low		EMA Wabash County Building Department
Building Protection							
1. Install additional dry hydrants throughout the county	Prior	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☐ Public Information ☒ Structural Control	Fires and Wildfire	Develop a GIS layer with locations of dry hydrants for use by emergency responders	High	Moderate	Wabash County Building Department EMA
2. Protect existing critical and essential facilities in floodplains	Prior		Flood	Contact critical and essential facilities located within floodplains	Low		Wabash County Building Department EMA
3. Relocate, buyout, or floodproof (non-residential) existing, non-critical facilities subject to repetitive flooding	Prior		Flood	Investigate and prioritize existing, non-residential, non-critical facilities subject to repetitive flooding	Low		Wabash County Building Department Wabash County Floodplain Administrators EMA
4. Install inertial valves in critical facilities	Prior		Earthquake	Identify facilities with inertial valves and prioritize new facilities	Low		Wabash County Building Department EMA
CRS							
1. Explore joining the CRS program	Prior	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☐ Structural Control	Flood	Estimated CRS class 9 savings as 12/2025 could be $1.4K for Wabash County, $5.4K for the city of Wabash, $93 for the town of LaFontaine, $18 for the town of Lagro, and $1.1K for the town of North Manchester	Moderate	High	Wabash County Floodplain Administrators EMA

Mitigation Practice	Prior Plan or New	Mitigation Strategy	Hazard Addressed	Status / Proposed Enhancements	Priority	Benefit-Cost Ratio	Responsible Entity
Floodplain Management							
1. Complete a Watershed Plan or Stormwater Master Plan	Prior	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	Flood	Prioritize areas for watershed plan or stormwater master plan development	Moderate	Moderate	Wabash County Surveyors Department Wabash County Floodplain Administrators EMA
2. Reconstruct intersections to alleviate damages associated with flood impacts			Flood	Prioritize listing of roadways to reconstruct	Moderate		Wabash County Highway Department City of Wabash Street Department EMA
Geographical Information Systems							
1. Train GIS staff in HAZUS-MH to quantitatively estimate losses in "what if scenarios" and continue to use the most recent GIS data in land use planning efforts	Prior	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☐ Structural Control	Earthquake; Flood; Tornado; and Dam and Levee Failure	Identify staff to be trained in HAZUS-MH scenarios	Moderate	Moderate	Wabash County Surveyor's Office EMA
Management of High Hazard Dams							
1. Review regular inspection reports and maintenance records, and participate in reviews and exercises of the IEAPs of high hazard dams (J. Edward Roush Dam, Mississinewa Lake Dam, and Salamonie Reservoir Dam)	Prior	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☐ Public Information ☒ Structural Control	Dam and Levee Failure	Explore participation from Wabash County EMA in exercises for the J. Edward Roush Lake Dam and Mississinewa Lake Dam	Low	High	EMA

CHAPTER 6: 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.

6.1 EMERGENCY PREPAREDNESS AND WARNING

Explore utilizing CodeRed or IPAWS for geolocated emergency alerts. Explore single-day event sign-ups for community events and tourists.

- Identify nearby counties that have successfully utilized CodeRed or IPAWS for geolocated emergency alerts and discuss replicating those alerts in Wabash County
- Working with the necessary organizations within Wabash County, begin establishing a county-wide system for emergency alerts
- Once the county has established emergency alerts, explore creating single-day sign-ups for large events within the county

Create a Wabash County Community Organizations Active in Disasters (COAD) group to assist in emergency preparedness and response efforts. Conduct outreach to organizations with potential for COAD participation.

- Contact community organizations and businesses and begin identifying potential participation and COAD leaders
- When participation and leadership numbers are met, meet regularly to establish the COAD, discussing when activation would occur, how community members will be contacted, and what organizations will be in charge of what areas of emergency response and recovery
- Regularly meet and identify new organizations to participate in the Wabash County COAD

Identify and meet fire and police department needs throughout Wabash County. Fire departments noted needing additional staff, training, and equipment such as devices capable of viewing the county GIS address verification system.

- Working with Central Dispatch, contact local chiefs, directors, or superintendents to identify equipment, personnel, and training needs per department
- Explore funding sources for equipment, personnel, and training
- As funding becomes available, conduct trainings, hire personnel, or purchase equipment

6.2 EMERGENCY RESPONSE AND RECOVERY

Review and update procedures to alert and evacuate populations (especially special needs populations) in known hazard areas, SFHAs, and dam failure areas. Explore creating a special needs database to send first responders to in the event of a disaster

- Utilizing information available in local county plans, state resources, and federal resources identify known hazard areas and rank based on the MHMPs CPRI or similar tool

- Beginning with the highest priority hazard areas, work with local planning authorities, emergency responders, and central dispatch to develop an alert and evacuation plan for the entire county
- Once alert and evacuation plans have been created for all known hazard areas establish a timeline for reviewing and updating the plans

Increase water rescue and diving capabilities of fire departments in Wabash County. Identify current fire department capabilities.

- Conduct a cost benefit analysis between training from within the county or outside the county
- Hold training inviting as many fire departments as possible
- Explore additional trainings for the fire departments of Wabash County

Purchase sandbags for use in blocking or redirecting floodwaters. Investigate sources of sandbags for use during a flood.

- Contact other EMAs and IDHS for potential sources of sandbags
- Identify storage location(s) for sandbags based on frequency flooded areas
- After a flood occurs within Wabash County, review the county's supply of sandbags and purchase additional as needed

Construct a new brick and mortar EOC. Upgrade communications in mobile EOC to 800 MHz. Purchase two additional communication towers for Wabash County.

- Explore funding sources for the relocation and upgrade of the EOC
- Identify a new location for the EOC
- Identify funding sources and locations for the communication towers

6.3 POWER BACK-UP GENERATORS

Secure a fuel reserve for critical and essential facilities so they may run on power back-up for extended periods of time. Review contract language to prioritize fuel deliveries to county and municipalities in the event of a disaster.

- Identify local sources of fuel to operate critical and essential facilities during emergencies
- Working with the county auditor, draft a contract with a supplier to prioritize fuel deliveries to the county and municipalities
- Investigate if the supplier has a power back-up generator to prevent issues with fuel deliveries during an emergency

6.4 SAFE ROOMS AND COMMUNITY SHELTERS

Inventory and prioritize listing of public facilities which may serve as effective shelters if hardened. Review the list of Red Cross Shelters within Wabash County.

- Investigate current shelters within the county and identify gaps in shelters
- Explore and contact facilities located within the identified gaps
- Explore shelter for domestic animals within Wabash County

Clearly advertise location of safe rooms and/or community shelters for large gatherings of people (football games, 4H fair, etc.). Explore utilizing geolocated emergency alerts or QR Code programs to inform residents and tourists of safe room and community shelter locations.

- Identify common gathering spots and large events within Wabash County
- Consider creating a template for safe rooms and community shelter information for use by businesses, large events, or schools
- Consider requiring large events to establish preparedness information or geolocated alerts

6.5 BUILDING PROTECTION

Install additional dry hydrants throughout the county. Develop a GIS layer with locations of dry hydrants for use by emergency responders.

- Identify and map locations of dry hydrants throughout the county
- Regularly inspect dry hydrants to prevent issues from occurring during emergencies
- Identify gaps within dry hydrants and explore constructing additional dry hydrants

CHAPTER 7: PLAN MAINTENANCE PROCESS

7.1 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 Wabash 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 5.2 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 Wabash County MHMP.

The EMA Director will reconvene with the MHMP committee on an annual basis and following a significant hazard incident. The committee will examine each mitigation action within the plan to evaluate its effectiveness by answering the following questions:

- Has the nature, magnitude, and/or type of risk changed? If so, what new mitigation actions are needed to address this change?
- Are the current resources appropriate for implementation? If not, what additional resources are needed to address the shortfall?
- Are there implementation problems, such as technical, political, legal, or coordination issues with other agencies? How can these issues be addressed?
- Have the outcomes occurred as expected? If not, is something else needed to achieve the desired outcome?
- Have the agencies and other partners participated as originally proposed? If not, determine why and how the action outcomes can be met.

During the annual meetings, the Implementation Checklist provided in **Appendix 13** will be helpful to track any progress, successes, and problems experienced. This will also be a tool to follow up on the progress made and effectiveness of the planned actions.

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 and essential facilities, 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 Wabash County, 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 Wabash County. These hazards, and associated mitigation goals and practices will be prioritized and detailed as in **Chapter 4** this MHMP. **Chapter 5** and **Chapter 6** 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. The plan

update process will incorporate new planning guidance and best practices as planning requirements are updated.

Prior to submission of the updated MHMP, a public meeting, such as the county commissioners meeting, a representative of the planning committee will present information about the plan to residents of Wabash County and will provide them with 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 invitation to review and comment on the plan update.

7.2 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.

Wabash County's Economic Development Plan, Simply Wabash: A Plan for Quality, includes 10 goals for capacity building and development. Some of the goals include workforce development, targeting industry sectors, and real estate development. While not directly related to the MHMP economic development can allow Wabash County to spend more on mitigation measures protecting them from potential disasters. Additionally, by focusing on real estate development there is a potential for more emergency responders throughout the county through more potential volunteers.

The goals of this plan included addressing and assisting with childcare access, addressing the aging population by investing in an assisted-living community, and strategic economic growth. This plan aims to mitigate all potential hazards and in turn create a resilient community which can help protect the county in regard to their goals.

Many of the mitigation practices identified as part of this planning process are ongoing with some enhancement needed. Where needed, modifications will be proposed for each NFIP communities' planning documents and ordinances during the regularly scheduled update including comprehensive plans, floodplain management plans, zoning ordinances, site development regulations, and permits. Modifications include discussions related to hazardous material facility buffers, floodplain areas, and discouraging development of new critical and essential facilities and critical infrastructure in known hazard areas.

The MHMP will be used to update stormwater, subdivision and zoning ordinances based upon recommendations from the plan. For example, information in this plan provides documentation to encourage local officials to reduce release rates, protect floodplains, provide no net loss in SFHA areas, and manage erosion and sediment control. These measures would help mitigate flooding. Recommendations within this plan could initiate new ordinances or studies, such as flood studies, flood response studies, and watershed management studies to protect against floods. The information included in this plan can be helpful in preparing comprehensive plans, transportation plans, and emergency plans to mitigate hazard material impacts and response to hazards such as tornados. These plans also illustrate the importance of planning on the unserved populations and how to develop mitigation efforts that include them in future plans.

In Wabash County this is a similarly timed process. As the county embarks upon their ordinance updates, information is shared with the cities and towns, and the incorporated communities. Each community then evaluates the materials provided by the county and will seek adoption or incorporation on a similar schedule. This process has worked well in the past and is the anticipated

method of future incorporation of materials into plan and ordinance updates. In a similar fashion the updating of comprehensive community plan, park plans, etc. will be able to incorporate at risk population information as well as mitigation action opportunities. **Table 28** is an example of the process the communities use to incorporate planning elements into other community plans and ordinances.

Table 28: MHMP Incorporation Process

Step	Description of Process Action
1	Adopt MHMP at Commissioner meeting, City Council meeting, or Town Council meeting
2	Identify document update cycles for each of the following: a) Comprehensive Plan b) Capital Improvement Plan c) Zoning Ordinances d) Floodplain Ordinance e) Stormwater Plans f) Other plans not listed above
3	Present applicable data to the planning committee and committee leads for inclusion
4	Highlight applicable mitigation actions to be included in the plan
5	Assist with incorporation and adoption of the plans, as needed.

7.3 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 Wabash 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 Wabash County website. Periodic reminder notices will be placed on social media to continue to solicit feedback and input on changes for the future plans.

Updates or modifications to the Wabash County MHMP require public notice, reconvening the planning committee in accordance with FEMA local mitigation planning guidance and meeting with the incorporated community leaders prior to submitting revisions to the individual jurisdictions for approval and re-adoption.

The CRS program credits NFIP communities a maximum of 28 points for adopting the plan (2 points); establishing a procedure for implementation, review, and updating the plan; and submitting an annual evaluation report (up to 26 points).

REFERENCES

ASFPM Certified Floodplain Manager Program Information. (n.d.). Retrieved 2019, from Association of State Floodplain Managers: http://www.floods.org

Associated Press. (2021, April 5). *Wildfire burns more than 300 acres at Indiana dunes*. WFYI Indianapolis. https://www.wfyi.org/news/articles/wildfire-burns-more-than-300-acres-at-indiana-dunes

Department of Homeland Security. (2022). *National Risk Index for Natural Hazards*. Retrieved from Federal Emergency Management Agency: https://www.fema.gov/flood-maps/products-tools/national-risk-index

Department of Homeland Security. (n.d.). *Hazard Mitigation Assistance*. Retrieved 2023, from Federal Emergency Management Agency: www.fema.gov/hazard-mitigation-assistance

Department of Homeland Security. (n.d.). *Hazard Mitigation Planning*. Retrieved 2023, from Federal Emergency Management Agency: www.fema.gov/hazard-mitigation-planning

Department of Homeland Security. (n.d.). HAZUS-MH (v1.3). Federal Emergency Management Agency.

Department of Homeland Security. (n.d.). *National Flood Insurance Program Community Rating System*. Retrieved 2024, from Federal Emergency Management Agency: www.fema.gov/national-flood-insurance-program-community-rating-system

Department Of Homeland Security. (n.d.). *National risk index*. National Risk Index. https://hazards.fema.gov/nri/

DNR, Fluvial Erosion Hazards Map, https://indnr.maps.arcgis.com/apps/webappviewer/index.html?id=43e7b307a0184c7c851b5068941e2e23 , accessed 12/21/23.

Early Morning fire claims life of West Central Teen. Wabash Post. (2023, November 22). https://www.Wabashpost.com/index.php/4-news/news/9594-early-morning-fire-claims-life-of-west-central-teen

Ecosystems Mission Area. (2025, March 21). Annual cost of wildfires in the U.S. USGS. https://www.usgs.gov/media/images/annual-cost-wildfires-us

Federal Emergency Management Agency (FEMA), Local Mitigation Planning Policy Guide, FP 206-21-0002, Released April 19, 2022, Effective April 19, 2023, OMB Collection #1660-0062, Retrieved from https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-policy-guide_042022.pdf

Federal Emergency Management Agency (FEMA), Natural Mitigation Saves Interim Report Fact Sheet, June 2018.

Federal Emergency Management Agency (FEMA), NFIP Community Status Book, https://www.fema.gov/cis/IN.csv, accessed 12/12/23.

Fendt, L. (2025, October 6). Is there a danger that pumping liquid carbon dioxide underground could have the same negative impacts as fracking?. MIT Climate Portal.

https://climate.mit.edu/ask-mit/there-danger-pumping-liquid-carbon-dioxide-underground-could-have-same-negative-impacts

Ferrerei, N., & Schuman, B. (2026, March 8). Storm survey report: Two tornadoes confirmed in Huntington, grant, and Wabash counties | wane 15. Wane 15. https://www.wane.com/weather/investigation-into-wabash-and-huntington-county-storm-damage/

Fires Roar Across Central Indiana. (2010, September 23). www.upi.com.

Geological Survey. (n.d.). *Earthquakes in Indiana*. Retrieved 2014, from Indiana Geological Survey: https://igws.indiana.edu/earthquakes/

Gidley, N. (2024, May 27). Five years since the Memorial Day tornado outbreak | wane 15. Wane 15. https://www.wane.com/weather/five-years-since-the-memorial-day-tornado-outbreak/

Hansen, M. C. (2005). Educational Leaflet No. 9. *Earthquakes in Ohio*. Ohio Department of Natural Resources, Division of Geological Survey.

Hogan, J. (2021, June 19). *Gallery: Bloomington floods*. The Bloomingtonian. https://bloomingtonian.com/2021/06/19/gallery-bloomington-floods/

Home. Lagro. (2024, August 14). https://www.in.gov/towns/lagro/

Home. Roann. (2024, December 2). https://www.in.gov/towns/roann/

Home. The City of Wabash, Indiana. (n.d.). https://www.cityofwabash.com/

Home. Town of LaFontaine. (2024, November 26). https://www.in.gov/towns/lafontaine/

Home. Wabash County. (2024, November 20). https://www.in.gov/counties/wabash/

Hoosiers By the Numbers, Major Employers for Wabash County, https://www.hoosierdata.in.gov/nav.asp?id=197, accessed 5/31/25.

IN.Gov. (2025, August 8). Watershed Management Plans. Indiana Department of Environmental Management. https://www.in.gov/idem/nps/resources/watershed-management-plans/#ne

Indiana Department of Environmental Management. (2022). Integrated Water Monitoring and Assessment Report. 303(d) *List of Impaired Waters*. Retrieved from Nonpoint Source Water Pollution. https://www.in.gov/idem/nps/watershed-assessment/water-quality-assessments-and-reporting/section-303d-list-of-impaired-waters/

Indiana Department of Homeland Security. (n.d.). *Mitigation & Recovery*. Retrieved 2023, from Indiana Department of Homeland Security: https://www.in.gov/dhs/emergency-management-and-preparedness/mitigation-and-recovery/

Indiana Department of Natural Resources (2024), Indiana Floodplain Information Portal, Retrieved from https://secure.in.gov/dnr/water/surface-water/indiana-floodplain-mapping/indiana-floodplain-information-portal/

Indiana Department of Natural Resources. (2023). Dam Inspections and records. *Wabash County, Indiana*, Retrieved from https://dowunity.dnr.in.gov/#/Community

Indiana Department of Natural Resources. (2024). Flood Insurance Information. *Wabash County*, Retrieved from https://dowunity.dnr.in.gov/#/Community

Indiana Department of Transportation (2022) Road and Railroad Maps – INDOT, retrieved 2025, from https://www.in.gov/indot/files/RailSystemMap_Med_StWide_11x17_RH_Final.pdfIndiana

Indiana DNR. (n.d.). Non-Levee Embankments in Indiana. ArcGIS web application. https://indnr.maps.arcgis.com/apps/webappviewer/index.html?id=9282d05debb14bb6a4fbf5f6967e7f6c

Indiana Geological and Water Survey, Map of Indiana Showing Earthquake Epicenters and Structural Features, from the Indiana Journal of Earth Sciences Vol.7 (2025) retrieved from: https://scholarworks.iu.edu/journals/index.php/IJES/article/view/40880

Indiana Geological and Water Survey, Map of Indiana showing Known Faults and Historic Earthquake Epicenters having Magnitude 3.0 and Larger, Retrieved 2022, from https://igws.indiana.edu/bookstore/details.cfm?Pub_Num=MM84

Indiana University. (2022). *IndianaMap*. Retrieved from Indiana Geological & Water Survey: https://www.indianamap.org/

Indiana University. (n.d.). *Indiana Earthquakes*. Retrieved from Indiana Geological & Water Survey: https://igws.indiana.edu/earthquakes/recent

Insurance Institute for Business & Home Safety. (n.d.). Retrieved from Insurance Institute for Business & Home Safety: www.disastersafety.org

Mack, J. (2015, May 5). *Michigan Earthquake: "Big Deal" for a Couple of Reasons, US Geological Survey Scientist says*. Retrieved 2016, from www.mlive.com: http://www.mlive.com/news/kalamazoo/index.ssf/2015/05/feds_on_michigan_earthquake_un.html#incart_river_index_topics

Maddox, O. (2021, June 14). *More crops affected as drought spreads throughout Indiana*. Purdue University. https://www.purdue.edu/newsroom/archive/releases/2012/Q2/more-crops-affected-as-drought-spreads-throughout-indiana.html

Midwest Regional Climate Center. (2024). *Midwest Climate: Climate Summaries*. Retrieved 2024, from Midwest Regional Climate Center: https://mrcc.purdue.edu/mw_climate/climateSummaries/climSumm.jsp

Miller, M. (2015, July 1). Evacuations underway after dams in Wabash, Huntington counties open. WISH-TV. https://www.wishtv.com/news/evacuations-underway-after-dams-in-wabash-huntington-counties-open/

Myall, J. (2022, December 15). *Heating and housing relief package can't wait until January* . Maine Center for Economic Policy. https://www.mecep.org/blog/heating-and-housing-relief-package-cant-wait-until-january/

National Drought Mitigation Center. (n.d.). *US Drought Monitor*. Retrieved 2024, from https://droughtmonitor.unl.edu/

National Land Cover Database (2019). Retrieved 2024, from Multi-Resolution Land Characteristics Consortium: https://www.mrlc.gov/viewer/

National Oceanic and Atmospheric Administration. (n.d.). Safety. Retrieved from National Weather Service: https://www.weather.gov/safety/

National Oceanic and Atmospheric Administration. (n.d.). *Storm Events Database*. Retrieved 11/1/24, from National Centers for Environmental Information: https://www.NCEI.noaa.gov/stormevents/

National Weather Service Indianapolis, Heat Information Page, https://www.weather.gov/ind/heatinfo, accessed 12/14/23.

National Weather Service, Flood gages and crests, https://water.noaa.gov/, accessed 11/1/24.

Natural Hazard Mitigation Saves: 2019 Report. National Institute of Building Sciences. (2019, December 1). https://nibs.org/projects/natural-hazard-mitigation-saves-2019-report

NFIP Flood Insurance Data and Analytics. Retrieved August 2024 from: https://nfipservices.floodsmart.gov/reports-flood-insurance-data

No Adverse Impact. (n.d.). Retrieved 2022, from Association of State Floodplain Managers: https://www.floods.org/resource-center/nai-no-adverse-impact-floodplain-management/

Peng, Jin; 2018, Morphological Filters In Floodplain For Demextracted Data – Using Minimum Bounding Circle & Youden Index – Non-levee embankment description.

Phases of disaster management - Community Emergency Response Guide | Emergency Management (fairfaxcounty.gov) https://www.fairfaxcounty.gov/emergencymanagement/cerg accessed 2/9/24.

Phillips, A., Barboza, T., Vives, R., & Greene, S. (2021, October 7). *Heat waves are far deadlier than we think. how California neglects this climate threat*. Los Angeles Times. https://www.latimes.com/projects/california-extreme-heat-deaths-show-climate-change-risks/

Pinchok, M. (2021, January 3). *Downed power lines and fallen tree causes roadway closure and power outages in Pomeroy*. https://www.wsaz.com. https://www.wsaz.com/2021/01/03/downed-power-lines-and-fallen-tree-closes-roadway-in-pomeroy/

Public Law 106-390. (2000, October 30). *Disaster Mitigation Act of 2000*.

Purdue Climate Change Research Center, Purdue University. (2021). Retrieved from Indiana Climate Change Impacts Assessment: https://ag.purdue.edu/indianaclimate/

Purdue University. (2013, March 12). Indiana Crop Insurance Payouts Top $1 Billion. *Purdue Agricultural News*.

Report: 1.5 million chickens died in fire at Indiana egg-producing facility. WSBT 22. (2017, October 3). https://wsbt.com/news/regional/fire-breaks-out-at-egg-producing-facility-in-north-manchester

STATS Indiana. (2024). Indiana IN Depth. *Wabash County*. Retrieved from http://www.stats.indiana.edu/profiles/

The Guardian, Canadian Wildfires 2023, https://www.theguardian.com/world/2023/nov/09/canada-wildfire-record-climate-crisis, last accessed 12/14/23.

Topographic -map.com, Topographic map of Wabash County, https://en-us.topographic-map.com/map-mz4pz4/Ohio-County/ accessed 10/13/24.

Town of North Manchester, Indiana. Home / North Manchester, IN. (n.d.). https://northmanchester.in.gov/

United States Department of Agriculture, Crop Loss Data, https://www.rma.usda.gov/-/media/RMA/State-Profiles/2022/Indiana-2022-State-Profile-Form_updated-1-10-23_PDF.ashx?la=en, accessed 12/14/23.

United States Department of Agriculture, Soil Conservation Service. (n.d.). *Soil Survey of Wabash County, Indiana*.

United States Department of Agriculture. (n.d.). *Indiana Field Office County Estimates*. Retrieved 2024, from National Agriculture Statistical Service: https://www.nass.usda.gov/Statistics_by_State/Indiana/Publications/County_Estimates/index.php

US Army Corps of Engineers. (2024). *Dams of Wabash County, Indiana*. Retrieved from National Inventory of Dams: https://nid.sec.usace.army.mil/#/

US Drought Monitor – Retrieved 2024, from: https://www.drought.gov/states/indiana/county/Wabash

US Geological Survey Water Watch (nd) Retrieved from https://waterwatch.usgs.gov/m=real&r=in.

US Geological Survey, Seismic hazards map, https://www.usgs.gov/media/images/2014-seismic-hazard-map-indiana, accessed 12/14/23.

Wabash County. American Courthouses. (2026, March 31). https://courthouses.co/us-states/h-l/indiana/wabash-county/