MULTI-HAZARD MITIGATION PLAN UPDATE

LaPorte County, Indiana

Prepared for:

LaPorte County, Indiana
Town of Kingsford Heights, Indiana
City of LaPorte, Indiana
Town of Long Beach, Indiana
Town of Michiana Shores, Indiana
City of Michigan City, Indiana

April 2016

Prepared by

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CBBEL Project No. 14-440

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CHAPTER 1 INTRODUCTION

1.1 DISASTER LIFE CYCLE

The Federal Emergency Management Agency (FEMA) defines the disaster life cycle as the process through which emergency managers respond to disasters when they occur; help people and institutions recover from them; reduce the risk of future losses; and prepare for emergencies and disasters. The disaster life cycle, **Figure 1-1** includes 4 phases:

Figure 1-1 Disaster Life Cycle

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

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

1.2 PROJECT SCOPE AND PURPOSE

REQUIREMENT §201.6(d)(3):
A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding.

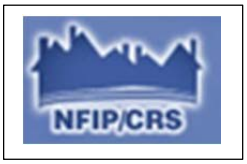
A MHMP is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). According to DMA 2000, the purpose of mitigation planning is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from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

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

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

The LaPorte County MHMP Update is a multi-jurisdictional planning effort led by the LaPorte County the Emergency Management Agency (EMA). This plan was prepared in partnership with LaPorte County, the Town of Kingsford Heights, the City of LaPorte, the Town of Long Beach, the Town of Michiana

Shores, and the City of Michigan City. Representatives from these communities attended the Committee meetings, provided valuable information about their community, reviewed and commented on the draft MHMP, and assisted with local adoption of the approved Plan. As each of the communities had an equal opportunity for participation and representation in the planning process, the process used to update the LaPorte County MHMP satisfies the requirements of DMA 2000 in which multi-jurisdictional plans may be accepted.



Throughout this Plan, activities that could count toward Community Rating System (CRS) points are identified with the NFIP/CRS logo. The CRS is a voluntary incentive program that recognizes and encourages community floodplain activities that exceed the minimum NFIP requirements. As a result, flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions that meet the 3 goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote education and awareness of flood insurance. Savings in flood insurance premiums are proportional to the points assigned to various activities. A minimum of 500 points are necessary to enter the CRS program and receive a 5% flood insurance premium discount. This MHMP could contribute as many as 294 points toward participation in the CRS. At the time of this planning effort, none of the NFIP Communities within LaPorte County participate in the CRS.

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

1.3 PLANNING PROCESS

REQUIREMENT §201.6(c)(1):
The plan shall document the planning process used to prepare the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Preparation for the LaPorte County MHMP Update began in 2014 when a PDM Grant application was submitted to IDHS. The grant request was approved by FEMA and grant funds were awarded in 2014.

Once the grant was awarded, the planning process to update the 2005 MHMP took 14 months. This included a 4 month planning process, followed by a

review period by IDHS and FEMA for the draft MHMP Update, and another month for the NFIP Communities to adopt the final MHMP Update.

1.3.1 Planning Committee and Project Team

In November of 2014, the EMA compiled a list of Planning Committee members to guide the MHMP Update planning process. These individuals were specifically invited to serve on the Committee because they were knowledgeable of local hazards; have been involved in hazard mitigation; have the tools necessary to reduce the impact of future hazard events; and/or served as a representative on the original Planning Committee in 2005. **Table 1-1** lists the individuals that participated on the Committee and the entity they represented.

Table 1-1 MHMP Update Committee

NAME	REPRESENTING	NFIP COMMUNITY / AGENCY
Keith Adkins	LaPorte Water Works	City of LaPorte
Larry Butcher	Lake County EM	Lake County
Angie Cloutier	District 1	IDHS
Angie Deutch	Public Affairs	*NIPSCO*
John Dudek	911 Director	LaPorte County
Shannon Eason	Michigan City Parks Department	Michigan City
Chris Fine	Police Department	Kingsford Heights
Tim Frame	Port Authority	Michigan City
Bart Frank	Utilities	Town of Westville
Jeff Hamilton	HazMat Director	LaPorte County
Jerry Jackson	Wastewater	City of LaPorte
Ken Johnston	Health Department	LaPorte County
Jeremy Kienitz	Parks Department	Michigan City
Will Klein	Wastewater	City of LaPorte
Tony Mancuso	Health Department	LaPorte County
Mike Milatovic	Sanitary District	Michigan City
Nick Minich	Engineering Department	City of LaPorte
Michael Ordziejewski	GIS Department	LaPorte County
Spike Peller	Engineering Department	Michigan City
Ken Purze	Interested Public	Michiana Shores
Mark Robinson	Community Affairs	*Indiana Michigan Power*
Julie Smith	Police Department	City of LaPorte
Andy Snyder	Fire Department	City of LaPorte
Michelle Stelmack	EMA	LaPorte County
Tim Warner	Water Works	City of LaPorte
Royce Williams	Police Department	Michigan City

Members of the Committee participated during the MHMP Update, either as a Project Team, a Planning Committee, or through various other group meetings. During these meetings, the Committee revisited existing (in the 2005 MHMP) and identified new critical infrastructure and local hazards; reviewed the State's mitigation goals and updated the local mitigation goals; reviewed the most recent local hazard data, vulnerability assessment, and maps; evaluated the effectiveness of existing mitigation measures and identified new mitigation projects; and reviewed materials for public participation. A sign-in sheet recorded those present at each meeting to document participation. Meeting agendas and summaries are included in **Appendix 2**. *Members of the Committee attended the public meeting in May 2016 and assisted with adoption of the LaPorte County MHMP Update.*

1.3.2 Public Involvement

A draft of the LaPorte County MHMP Update was posted online on the EMA website for public review and comment. Committee members were provided with an informational flyer to display in their respective offices.

A public meeting was held on May 11, 2016 in the Michigan City Fire Department. Members of the Committee were present to describe details of the plan as well as to answer questions presented by attendees. The media release and power point presentation are located in ***Appendix 3****.*

1.3.3 Involvement of Other Interested Parties

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

Interested agencies, businesses, academia, and nonprofits were invited to review and comment on the draft LaPorte County MHMP Update (Appendix 3). Information related to the planning process, the public meeting, and the availability of the draft LaPorte County MHMP was directly provided to such potentially interested parties via personal conversations, informational flyer, and press releases. Successful implementation and future updates of the LaPorte County MHMP Update will rely on the partnership and coordination of efforts between such groups.

1.4 PLANS, STUDIES, REPORTS, AND TECHNICAL INFORMATION

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

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

- LaPorte Countywide Land Development Plan *(2008)*
- Town of Long Beach Comprehensive Plan Update *(2009)*
- IN-IL-WI CSA Regional Catastrophic Incident Coordination Plan *(2010)*
- The LaPorte County Joint Zoning Ordinance *(2011)*
- The City of LaPorte Trails and Greenway Plan *(2013)*
- RiskMAP Resilience Report *(2013)*
- Great Lakes Planning and Mitigation Needs Assessment of Coastal Storm Hazards *(2014)*

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

CHAPTER 2 COMMUNITY INFORMATION

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

LaPorte County, organized in May 1832, originally belonged to the Pottawatomie Nation and for a time was one of five districts of the larger St. Joseph County. The present boundaries of LaPorte County were realized in January 1850 and the total area is approximately 598 square miles. The location of LaPorte County within the State of Indiana is identified in **Figure 2-1**.

2.1 POPULATION AND DEMOGRAPHICS

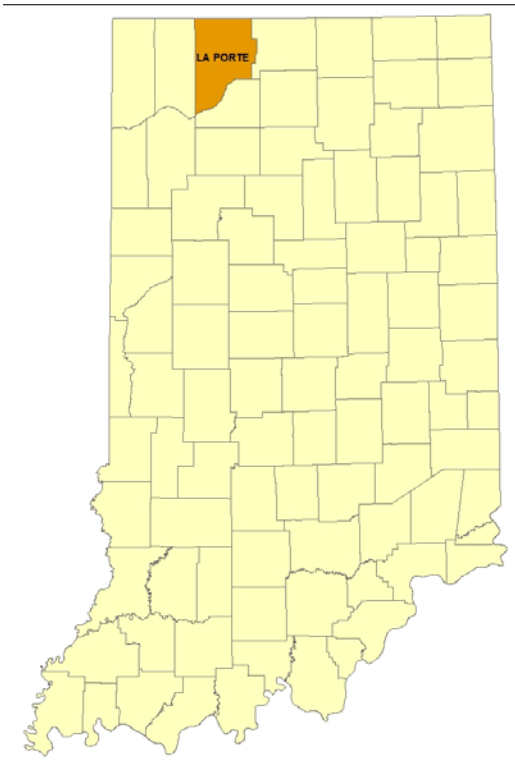


Figure 2-1 LaPorte County Location

The most recent census data for LaPorte County estimates that the 2013 population was 111,281, which ranks 16th in the State. Of that total, the City of Michigan City accounts for 31,494 or 28% of the county's population while City of LaPorte is the second largest community with 20,010 or18% of the population.

In 2011, the median age of the population in the County was 40 years of age. Similar to the rest of Indiana, the largest demographic age groups in the County are older adults (45-64 years) with a population of 31,420, and younger adults (24-44 years) with a population of 28,596. School age children (5-17) are the third largest age group with a population of 17,988 individuals living in LaPorte County. The approximate median household income in 2013 was reported to be $46,610 while the poverty rate in the same year was reported at 17.0% county-wide and 26.9% among children under 18. In total, 16.7% of households are married with children, and 31.9% of households are married without children.

Nearly 87% of the adults, older than 25, within LaPorte County have reportedly completed a High School education. Further, 17% of those same adults have also completed a Bachelor Degree or higher.

2.2 EMPLOYMENT

US Census data indicates that of the LaPorte County work force, 83.7% are employed in unspecified private employment positions. Manufacturing and Retail Trade account for 18.5% and 13.4% respectively. The total resident labor force according to estimates in 2013 is 48,905 with 4,614 unemployed and an unemployment rate of 9.4% or 7th in the State out of 92 counties. **Table 2-1** identifies the top employers within LaPorte County.

Table 2-1 List of Major Employers

Blue Chip	AeroMetals
Franciscan-St Anthony	Horizon Bank
IU Health LaPorte Hospital	TP Orthodontics
Sullair	American Licorice
Hearthside	American Renolit
Alcoa Howmet	Fas Pak
Sullivan Palatek	ATI Castings
Vanair	Nash Finch
CVG-Sprague Devices	Monosol
Weil-McLain	

(GLEDC, 2015)

2.3 TRANSPORTATION AND COMMUTING PATTERNS

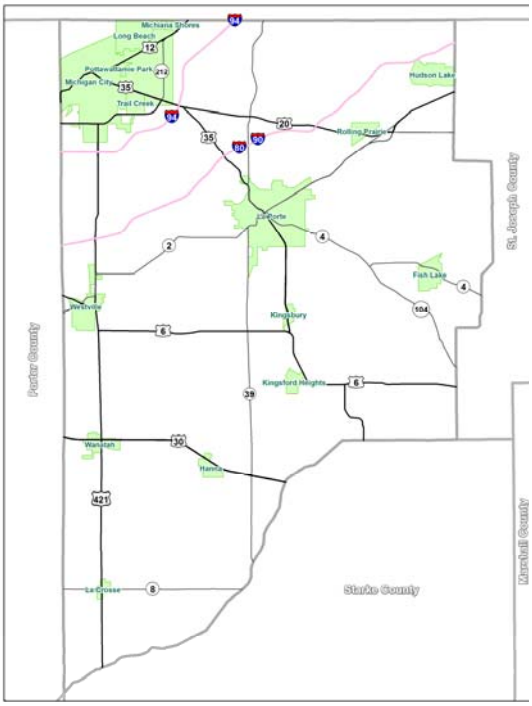


Figure 2-2 LaPorte County Transportation Routes

There are several major transportation routes passing through LaPorte County and the municipalities within. The Indiana Toll Road; Interstates 80, 90, and 94; US Highway 6; and State Roads 12, 20, 30, 35, and 421 serve as main routes between the various municipalities. These transportation routes are identified in **Figure 2-2**.

According to the Indiana Business Research Center, more than 6,000 people commute into LaPorte County on a daily basis. Approximately 50% of these commuters travel from Porter County. Further, approximately 8,800 LaPorte County residents commute to other counties with the majority traveling to Porter County (40%).

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

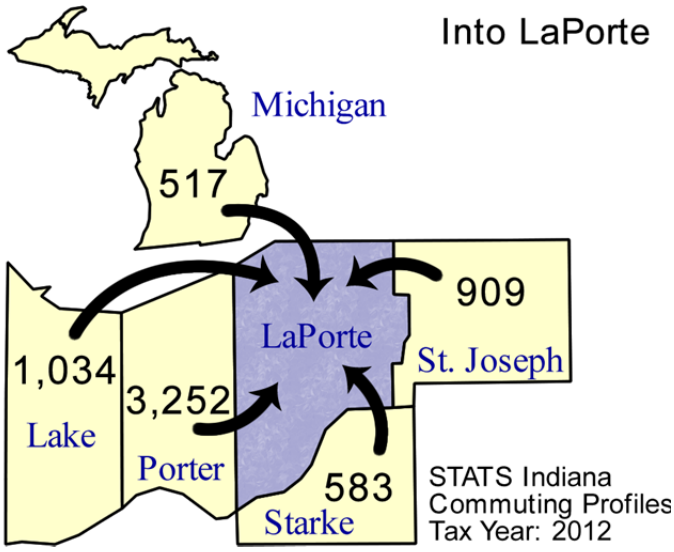


Figure 2-3 Workers Commuting into LaPorte County

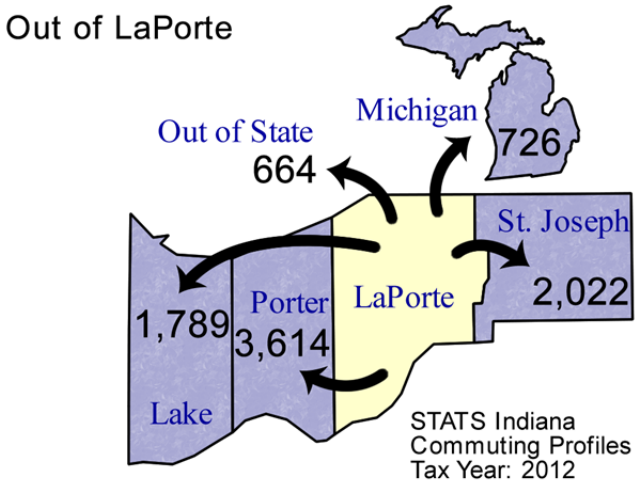


Figure 2-4 Workers Commuting out of LaPorte County

2.4 CRITICAL AND NON-CRITICAL INFRASTRUCTURE

REQUIREMENT §201.6(c)(2)(ii)(A):
The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas….

Critical facilities, or critical infrastructure, are the assets, systems, and networks, whether physical or virtual, so vital to the local governments and the United States that their incapacitation or destruction would have a debilitating

effect on security, economic security, public health or safety, or any combination thereof.

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

The LaPorte County EMA provided the listing and locations of the following 304 critical infrastructure points for the MHMP Update:

- 3 Airports
- 2 Bus Stations
- 5 Broadcast Facilities
- 60 Daycare Facilities
- 21 Electric Facilities
- 3 Emergency Medical Services
- 2 Emergency Operation Centers
- 22 Fire Departments
- 6 Government Facilities
- 103 Hazardous Materials Facilities
- 3 Jails
- 11 Healthcare Facilities
- 3 Military Installations
- 7 Law Enforcement Facilities
- 7 Water Treatment Structures
- 7 Waste Water Treatment Structures
- 39 Educational Facilities

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

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

2.5 MAJOR WATERWAYS AND WATERSHEDS

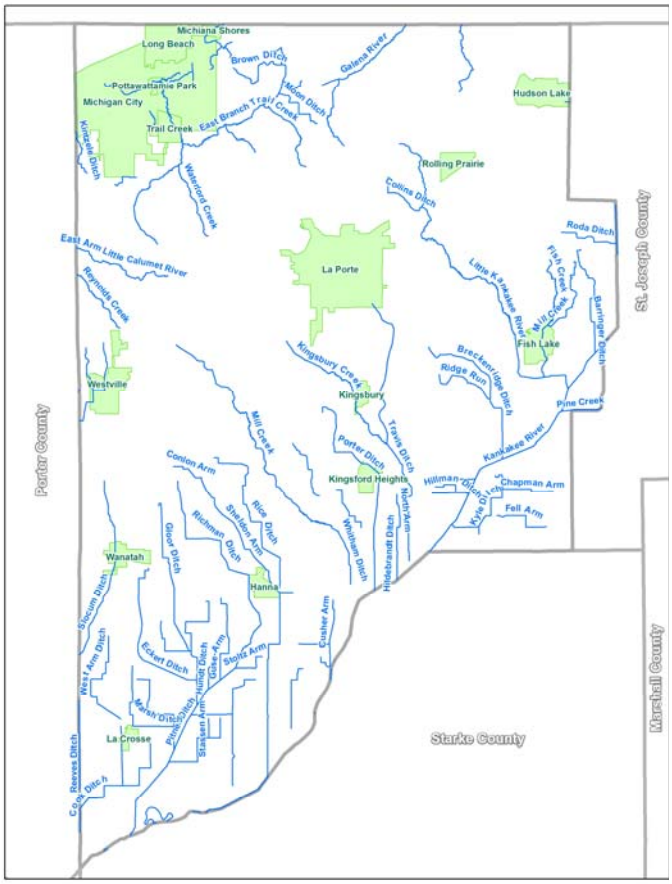


Figure 2-5 LaPorte County Waterways

According to the United States Geological Survey (USGS) there are 113 waterways in LaPorte County; they are listed in Appendix 5. The County's main waterways are the Kankakee River and the Little Calumet River and the county lies within 3 8-digit Hydrologic Unit Codes (HUC): the Little Calumet - Galien (04040001), the Lake Michigan (04060200), and the Kankakee (07120001). These major waterways are identified on **Figure 2-5**.

2.6 NFIP PARTICIPATION

The NFIP is a FEMA program that enables property owners in participating communities to purchase insurance protection against losses from flooding. LaPorte County, the Town of Kingsford Heights, the City of LaPorte, the Town of Long Beach, the Town of Michiana Shores, and the City of Michigan City are participants in the NFIP. Any smaller communities within LaPorte County may also be provided coverage by the MHMP through the County's program.

Since the development of the 2005 LaPorte County MHMP, these communities continue to participate in the NFIP program. These NFIP communities have also adopted Flood Hazard Ordinances containing language regarding compensatory floodplain storage.

At the time of preparing this MHMP, none of the NFIP entities in LaPorte County participate in the CRS program. The CRS program is a voluntary incentive program that recognizes and encourages community floodplain activities that exceed the minimum NFIP requirements. As a result, flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions that meet the 3 goals of the CRS: 1) reduce flood losses; 2) facilitate accurate insurance rating; and 3) promote education and awareness of flood insurance. For CRS participating communities, flood insurance premium rates are discounted in increments of 5% for each class level achieved. **Table 2-2** lists the NFIP number, effective map date, and the date each community joined the NFIP program.

Table 2-2 NFIP Participation

NFIP COMMUNITY	NFIP NUMBER	EFFECTIVE MAP DATE	JOIN DATE
LaPorte County	180144	11/06/2013	01/01/1987
Town of Kingsford Heights	180617	11/06/2013(M)	12/12/2014
City of LaPorte	180490	11/06/2013	04/01/1993
Town of Long Beach	185177	11/06/2013	03/23/1973
Town of Michiana Shores	180505	11/06/2013	11/12/1991
City of Michigan City	180147	11/06/2013	08/17/1981

(FEMA, 2015)

2.7 TOPOGRAPHY

The average topography in LaPorte County, according to the Soil Survey completed by the USDA-Natural Resource Conservation Service (NRCS), is of low relief and only a few abrupt changes in elevation. The lowest elevation, 680 feet above sea level is located in the floodplain of the Kankakee River at the southern border of the county, while the highest elevation (902 feet above

sea level) is located in the northern reaches near the headwaters of Waterford Creek near Michigan City.

2.8 CLIMATE

The Midwestern Regional Climate Center (MRCC) provided climate data that includes information retrieved from a weather station, identified as station 124837 LaPorte, IN. The average annual precipitation is 40.83 inches per year, with the wettest month being August averaging 4.18 inches of precipitation and the driest month being February with an average of 1.91 inches of precipitation. The highest 1-day maximum precipitation was recorded in August of 1978 with 6.00 inches of rain. On average, there are 137.3 days of precipitation greater than or equal to 0.1 inches; 25.3 days with greater than or equal to 0.5 inches; and 8.7 days with greater than or equal to 1.0 inch of precipitation. Mean snowfall is 63.4 inches per year. The highest monthly amount of snowfall recorded at this station is 59.5 inches in February of 1958.

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CHAPTER 3 RISK ASSESSMENT

REQUIREMENT §201.6(c)(2):
[The risk assessment shall provide the] factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessment must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

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

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

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

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

3.1 HAZARD IDENTIFICATION

3.1.1 Hazard Selection

The MHMP Planning Committee reviewed the list of natural, technological, and political hazards from the 2005 LaPorte County MHMP and discussed recent and the potential for future hazard events. The Committee identified those hazards that affected LaPorte County and the NFIP communities and selected the hazards to study in detail as part of this planning effort. As shown in **Table**

3-1 these include: coastal storm and seiche, earthquake, extreme temperatures, flooding, hailstorms, hazardous materials incident, tornado and waterspouts, and snow storms and ice storms.

All hazards studied with the 2005 LaPorte County MHMP are included in the update. Other hazards like those identified on the draft Hazard Identification and Risk Assessment (HIRA) tool being developed by IDHS were discussed but the Committee agreed that either these hazards were addressed in other documents or have little local impact and were therefore not studied in detail as a part of this planning effort.

Table 3-1 Hazard Identification

TYPE OF HAZARD	LIST OF HAZARDS	DETAILED STUDY	
		2005 MHMP	MHMP UPDATE
Natural	Coastal Storm / Seiche	Yes	Yes
	Earthquake	Yes	Yes
	Extreme Temperature	Yes	Yes
	Flood	Yes	Yes
	Hailstorm	Yes	Yes
	Snow / Ice Storm	Yes	Yes
	Tornado / Waterspouts	Yes	Yes
Technological	Dam Failure	Yes	Yes
	Hazardous Material Incident	Yes	Yes

3.2 HAZARD RANKING

The Planning Committee ranked the selected hazards in terms of importance and potential for disruption to the community using a modified version of the Calculated Priority Risk Index (CPRI). The CPRI, adapted from MitigationPlan.com, is a tool by which individual hazards are evaluated and ranked according to an indexing system. The CPRI value (as modified by CBBEL) can be obtained by assigning varying degrees of risk probability, magnitude/severity, warning time, and the duration of the incident for each event, and then calculating as index value based on a weighted scheme. For ease of communications, simple graphical scales are used.

3.2.1 Probability

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

- Unlikely – incident is possible, but not probable, within the next 10 years (1)

- Possible – incident is probable within the next 5 years (2)
- Likely - incident is probable within the next 3 years (3)
- Highly Likely – incident is probable within the next calendar year (4)

3.2.2 Magnitude / Severity

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

- Negligible – few injuries OR critical infrastructure shutdown for 24 hours or less OR less than 10% property damaged OR average response duration of less than 6 hours (1)
- Limited – few injuries OR critical infrastructure shut down for more than 1 week OR more than 10% property damaged OR average response duration of less than 1 day (2)
- Critical – multiple injuries OR critical infrastructure shut down of at least 2 weeks OR more than 25% property damaged OR average response duration of less than 1 week (3)
- Significant – multiple deaths OR critical infrastructure shut down of r1 month or more OR more than 50% property damaged OR average response duration of less than 1 month (4)

3.2.3 Warning Time

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

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

3.2.4 Duration

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

- Less than 6 hours (1)
- Less than 1 day (2)

- Less than 1 week (3)
- Greater than 1 week (4)

3.2.5 Calculating the CPRI

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

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

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

Table 3-2 Determination of Weighted Value for NFIP Communities

NFIP COMMUNITY	POPULATION (2014)	% OF TOTAL POPULATION	WEIGHTED VALUE
LaPorte County	55,057	49.4	0.49
Town of Kingsford Heights	1,428	1.3	0.01
City of LaPorte	22,007	19.7	0.20
Town of Long Beach	1,160	1.0	0.01
Town of Michiana Shores	305	0.3	0.00
City of Michigan City	31,487	28.3	0.28
TOTAL	**111,444**	**100.0**	**1.0**

(Stats Indiana, 2014)

3.3 HAZARD PROFILES

The hazards studied for this report are not equally threatening to all communities throughout LaPorte County. While it would be difficult to predict the probability of an earthquake or tornado affected a specific community, it is much easier to predict where the most damage would occur in a known hazard

area such as a floodplain or near a facility utilizing an Extremely Hazardous Substance (EHS). The magnitude and severity of the same hazard may cause varying levels of damages in different communities.

This section describes each of the hazards that were identified by the Planning Committee for detailed study as a part of this MHMP Update. The discussion is divided into the following subsections:

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

Natural Hazards

3.3.1 Coastal Storms / Seiche

Coastal Storm / Seiche: Overview

Coastal storm systems can affect low-lying coastal areas, buffeting the shoreline with strong winds, heavy rain, and sometimes ice and snow. Associated with coastal storms is shoreline erosion as these storms may generate high waves that can expend great energy on an erodible shoreline, potentially transforming it drastically. Destructive waves are generated by a coastal storm through high wind and friction with the water. The stronger and more sustained the wind in the storm, the higher and more forceful the resulting wave. Other factors are the length of the lake water surface the wind is in contact with, or the fetch.

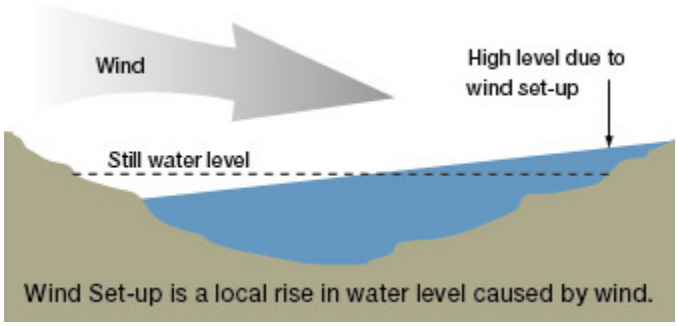


Figure 3-1 Seiche Diagram

A seiche (pronounced *saysh*) is an oscillation of water set in motion by an atmospheric disturbance over a large body of water, such as Lake Michigan. **Figure 3-1** illustrates a seiche. Disturbances such as a fast moving front, pressure system that introduces significant changes between low or high pressure, and changes in wind direction may result in a seiche.

According to the National Oceanic and Atmospheric Administration (NOAA), "If you have observed water sloshing back and forth in a swimming pool, bathtub, or cup of water, you may have witnessed a small-scale seiche. On a much grander scale, the same phenomenon occurs in large bodies of water such as bays and lakes".

Coastal Storm / Seiche: Recent Occurrences

The second highest recorded Lake Michigan wave height (20.3 ft) was recorded on October 30, 2012 and is associated with the Superstorm Sandy, according to the National Weather Service. Wind speeds of 68 mph were recorded in Michigan City and a 15 inch water level rise in the southern basin was noted during the same event.

As reported by WGN Channel 9 (Chicago, IL), a 2014 Halloween event delivered water to the northbound lane of Lakeshore Drive in Chicago and set new wave height records, ousting the record mentioned above and setting 21.7 ft as the second highest recorded wave height. This event impacted nearly all areas of the southern shoreline ranging from increased drive times due to high water,

Figure 3-2 Washington Park Beach LIfeguard Tower, October 2014, Brian Brophy

to damages such as observed in **Figure 3-2** where a lifeguard tower was toppled. **Figure 3-3** provided to WGN Channel 9 by a Michigan City resident shows waves hitting the lighthouse during the same storm event.

The historical coastal storm event of note is the March 1998 event where the entire southern shoreline was impacted resulting in 10-12 feet high waves, an increase in water level of 3.5 feet, and roads and structures washed out. Approximately $1.4M in funding from FEMA was received through a request from the Governor's office.

In 1954 a notable seiche affected Chicago's shoreline as water rushed over the North Avenue Pier dragging several bystanders into the water. While many were rescued, 8 lost their lives. According to the Illinois State Geological Survey, a "storm generated wind speeds of up to 60 miles per hour and sent a seiche toward Michigan City, Indiana. A 5.5- to 6-foot wave reached shore there at 8:10 a.m. and was reflected back across southern Lake Michigan, heading northwest toward Chicago. Unlike a tsunami, which can travel across the open ocean at hundreds of miles per hour, a seiche moves much more slowly. It took 80 minutes for the seiche to travel 40 miles from Michigan City to the Chicago lakeshore at North Avenue. That translates into a speed of roughly 30 mph".

While considering the historical events and noting that small scale seiches and coastal storms frequently occur within the reaches of LaPorte County, the Planning Committee determined the probability of a coastal storm or a seiche occurring throughout the County. Results range from "Unlikely" in LaPorte, Michiana Shores, and Kingsford Heights; "Possible" in Long Beach and Michigan City; to "Highly Likely" within the unincorporated areas of the County along the shoreline. Impacts from such an event are anticipated to range from "Critical" in Long Beach and Michigan City and "Negligible" in all other areas. The Committee also determined that the warning time would be 12-24 hours for those that would be impacted, and that the duration of such an event is anticipated to last less than 6 hours. A summary is shown **Table 3-3**.

Figure 3-3 Michigan City Lighthouse, October 2014, Laura Niemic

Table 3-3 CPRI for Coastal Storm / Seiche

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
LaPorte County	**Highly Likely**	**Negligible**	**12-24 Hours**	**< 6 Hours**	**Elevated**
Town of Kingsford Heights	**Unlikely**	**Negligible**	**> 24 Hours**	**< 6 Hours**	**Low**
City of LaPorte	**Unlikely**	**Negligible**	**> 24 Hours**	**< 6 Hours**	**Low**
Town of Long Beach	**Possible**	**Critical**	**12-24 Hours**	**< 6 Hours**	**Elevated**
Town of Michiana Shores	**Unlikely**	**Negligible**	**> 24 Hours**	**< 6 Hours**	**Low**
City of Michigan City	**Possible**	**Critical**	**12-24 Hours**	**< 6 Hours**	**Elevated**

Many of the noted differences in considerations for the metrics above stem from the location of each community and their proximity to Lake Michigan and the amount of shoreline within each entity. As the Town of Kingsford Heights is far away from the shoreline, they are unlikely to be impacted and are afforded great warning time for such an event. Conversely, the City of Michigan City is located directly on the shore and is anticipated to be critically impacted by such a storm event.

Coastal Storm / Seiche: Assessing Vulnerability

While a seiche is not as catastrophic in terms of damages potentially caused by true tsunamis, the suddenness of a seiche may overtake individuals or property near the water and may cause severe damages, injuries, or even death. Direct and indirect effects from either a coastal storm or a seiche may include:

Direct Effects:

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

Indirect Effects:

- Increased response times for emergency personnel if roads are impassable
- Increased costs associated with personnel to carry out evacuations in needed areas
- Losses associated with missed work or school due to closures or recovery activities

Estimating Potential Losses

Critical and non-critical structures located along the coastal areas of Lake Michigan are most at risk for damages associated with flooding. For this planning effort, a GIS Desktop Analysis methodology was utilized to estimate flood damages. **Figure 3-4** identifies the Zone AE, or the 1% Annual Chance Flood Zone, along the coastline of LaPorte County (the darker shade of blue).

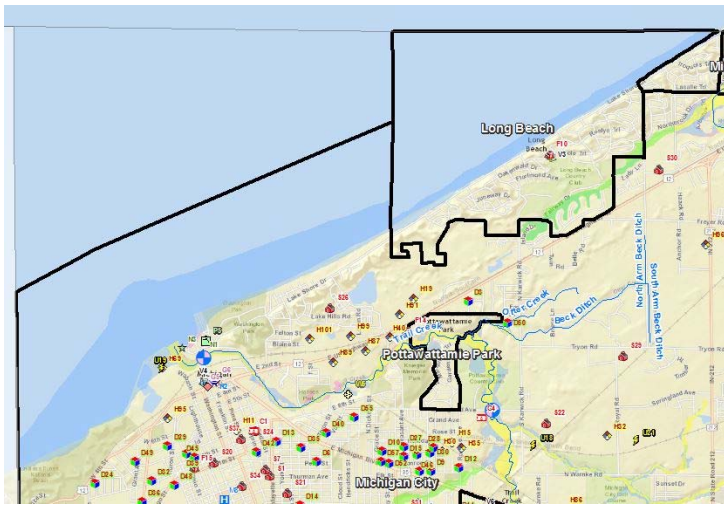


Figure 3-4 Coastal Flood Zone

For the GIS Desktop Analysis method, an analysis was completed utilizing the effective Digital FIRMs (DFIRMs) overlaid upon the Modified Building Inventory provided by LaPorte County and structures located within each flood zone (**Figure 3-5**) were tallied using GIS analysis techniques.

The Modified Building Inventory was created in ESRI ArcGIS by converting parcels to centroids, and joining Assessor Data to these centroids. Assessor data included square footage for the structure, and any structure that was listed as less than 400 ft^2 in area or was classified in the Assessor's database as a non-habitable structure was assumed to be an outbuilding. Also, buildings with an assessed value of $0.00 or buildings that did not match the Assessor Data (parcel numbers did not match) were excluded from the analysis. Replacement values were calculated using:

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

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

In order to estimate anticipated damages associated with a seiche along the coastline of Lake Michigan within LaPorte County and the affected NFIP communities, it was estimated that 25% of structures in the flood zones would be destroyed, 35% of structures would be 50% damaged, and 40% of structures would be 25% damaged. **Table 3-4** identifies the estimated losses associated

with structures in the coastal 100-year floodplain by NFIP community within LaPorte County.

Table 3-4 Structures within the Coastal Flood Zone

	COASTAL FLOOD ZONE AE	
	#	$
LaPorte County	0	0
Kingsford Heights		
LaPorte	0	0
Long Beach	130	0
Michiana Shores	0	0
Michigan City	0	0
Total	**130**	**$1.73M**

Figure 3-5 Properties within the AE Flood Zone

It is difficult to estimate the potential damages associated with a coastal storm as this may have a more wide-spread impact area similar to impacts discussed later for the tornado and windstorm hazard events.

Future Considerations

While the occurrence of a coastal storm or a seiche in or near to LaPorte 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 one occur. For that reason, LaPorte County, and more specifically the Town of Long Beach, should continue to provide education and outreach regarding coastal storms and seiche events along with education and outreach for other hazards. As the coastal communities within the County continue to grow and develop, the proper considerations for the potential of a coastal storm or seiche to occur may help to mitigate against social, physical, or economic losses in the future.

<u>Coastal Storm / Seiche: Relationship to Other Hazards</u>

A seiche may occur following an earthquake or associated aftershocks due to the shifting of the lake beds and water levels in Lake Michigan.

3.3.2 Earthquake

Earthquake Overview

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

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

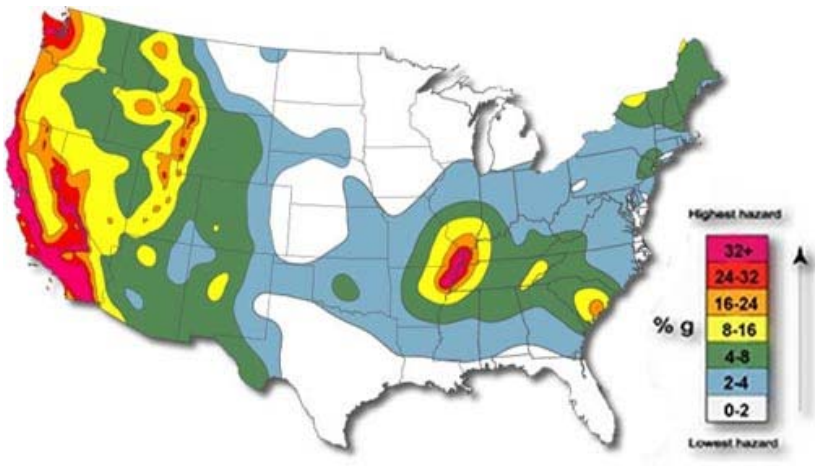


Figure 3-6 Earthquake Hazard Areas in the US

Earthquakes strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night. On a yearly basis, 70-75 damaging earthquakes occur throughout the world. Estimates of losses from a future earthquake in the United States approach $200B. Scientists are currently studying the New Madrid fault area and have predicted that the chances of an earthquake in the M8.0 range occurring within the next 50 years are approximately 7%-10%. However, the chances of an earthquake at a M6.0 or greater, are at 90% within the next 50 years.

There are 45 states and territories in the United States at moderate to very high risk from earthquake, and they are located in every region of the country (**Figure 3-6**). California experiences the most frequent damaging earthquakes;

however, Alaska experiences the greatest number of large earthquakes-most located in uninhabited areas. The largest earthquakes felt in the United States were along the New Madrid Fault in Missouri, where a three-month long series of quakes from 1811 to 1812 occurred over the entire Eastern United States, with Missouri, Tennessee, Kentucky, Indiana, Illinois, Ohio, Alabama, Arkansas, and Mississippi experiencing the strongest ground shaking.

Earthquake: Recent Occurrences

Indiana, as well as several other Midwestern states, lies in the most seismically active region east of the Rocky Mountains. The nearest area of concern is the Fort Wayne Rift Zone in eastern Indiana.

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

On December 30, 2010, central Indiana experienced an earthquake with a magnitude of 3.8; rare for this area in Indiana as it is only the 3rd earthquake of notable size to occur north of Indianapolis. Even rarer is the fact that scientists believe that the quake was centered in Greentown, Indiana approximately 13 miles southeast of Kokomo, Indiana. According to *The Kokomo Tribune,* "113 people called 911 in a 15-minute period after the quake, which was the first tremblor centered in Indiana since 2004". Further, a geophysicist from the USGS in Colorado stated, "It was considered a minor earthquake", and "Maybe some things would be knocked off shelves, but as far as some significant damage, you probably wouldn't expect it from a 3.8".

Figure 3-7 Earthquake Damaged Porch

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

Based on historical earthquake data, local knowledge of previous earthquakes, and the results of the HAZUS-MH scenario conducted as a part of this planning effort, the Committee determined that the probability of an earthquake occurring in LaPorte County or any of the communities is "Unlikely". Should an earthquake occur, the impacts associated with this hazard are anticipated to be "Negligible" within all areas of the County.

As with all earthquakes, it was determined that the residents of LaPorte County would have little to no warning time (less than 6 hours) and that the duration of the event would be expected to be less than 1 day. A summary is shown in **Table 3-5**.

Table 3-5 CPRI for Earthquake

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
LaPorte County	**Unlikely**	**Limited**	**< 6 Hours**	**< 1 Day**	**Low**
Town of Kingsford Heights	**Unlikely**	**Limited**	**< 6 Hours**	**< 1 Day**	**Low**
City of LaPorte	**Unlikely**	**Limited**	**< 6 Hours**	**< 1 Day**	**Low**
Town of Long Beach	**Unlikely**	**Limited**	**< 6 Hours**	**< 1 Day**	**Low**
Town of Michiana Shores	**Unlikely**	**Limited**	**< 6 Hours**	**< 1 Day**	**Low**
City of Michigan City	**Unlikely**	**Limited**	**< 6 Hours**	**< 1 Day**	**Low**

According to the Ohio Department of Natural Resources Division of Geological Survey, "…it is difficult to predict the maximum-size earthquake that could occur in the state and certainly impossible to predict when such an event would occur. In part, the size of an earthquake is a function of the area of a fault available for rupture. However, because all known earthquake-generating faults in Ohio are concealed beneath several thousand feet of Paleozoic sedimentary rock, it is difficult to directly determine the size of these faults." Further according to the Indiana Geological Survey, "…no one can say with any certainty when or if an earthquake strong enough to cause significant property damage, injury, or loss of life in Indiana will occur…we do indeed face the possibility of experiencing the potentially devastating effects of a major earthquake at some point in the future". The Committee felt that an earthquake occurring within or near to LaPorte County is "Unlikely" to occur within the next 10 years.

<u>Earthquake: Assessing Vulnerability</u>

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

Direct Effects:

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

Indirect Effects:

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

Figure 3-8 Minor Earthquake Damages

Types of loss caused by an earthquake could be physical, economic, or social in nature. Due to the unpredictability and broad impact regions associated with an earthquake, all critical and non-critical infrastructure are at risk of experiencing earthquake related damages. Damages to structures, infrastructure, and even business interruptions can be expected following an earthquake. Examples of varying degrees of damages are shown in **Figure 3-7** and **Figure 3-8**.

Estimating Potential Losses

In order to determine the losses associated with an earthquake, the HAZUS-MH software was utilized. This model develops probabilistic scenarios, computes the potential losses associated with each scenario, and weighs those losses against the probability of an event occurring.

According to the HAZUS-MH scenario, no building damage, injuries, or loss of life are expected to occur

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. In addition to importing local building data, these models were further enhanced by adding localized

parameters (i.e., shake maps, liquefaction, soils). While the results of the hypothetical scenario appear to be plausible, care should be taken when interpreting these results.

Future Considerations

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

Earthquake: Relationship to Other Hazards

Hazardous materials incidents may occur as a result of damage to material storage containers or transportation vehicles involved in road crashes or train derailments. Further, a seiche may occur following an earthquake or associated aftershocks due to the shifting of the lake beds and water levels in these hazard areas. These types of related hazards may have greater impacts on LaPorte County communities than the earthquake itself. It is not expected that earthquakes will be caused by other hazards studied within this plan.

3.3.3 Extreme Temperatures

Extreme Temperatures: Overview

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

According to the NWS, "The Heat Index or the "Apparent Temperature" is an accurate measure of how hot it really feels when the Relative Humidity is added to the actual air temperature". To find the Heat Index Temperature, refer to the Heat Index Chart in **Figure 3-9**. As an example, if the air temperature is 96°F and the relative humidity is 65%, the heat index – how hot it feels – is 121°F. The Weather Service will initiate alert procedures when the Heat Index is expected to exceed 105°-110°F for at least 2 consecutive days.

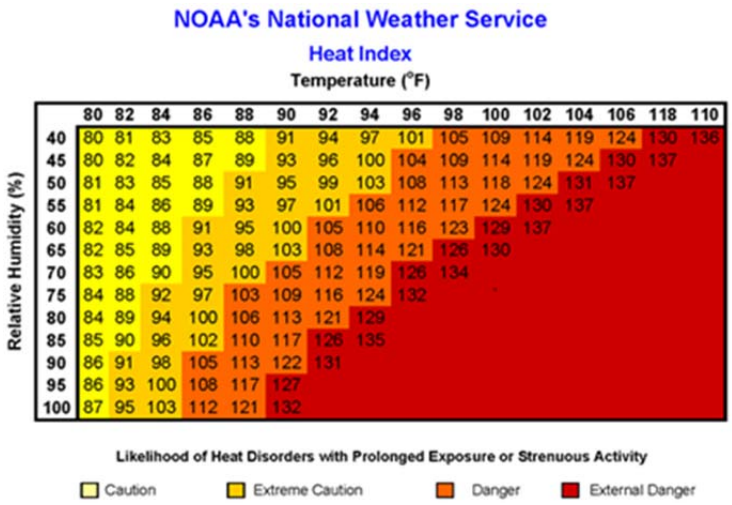


Figure 3-9 Heat Index Chart

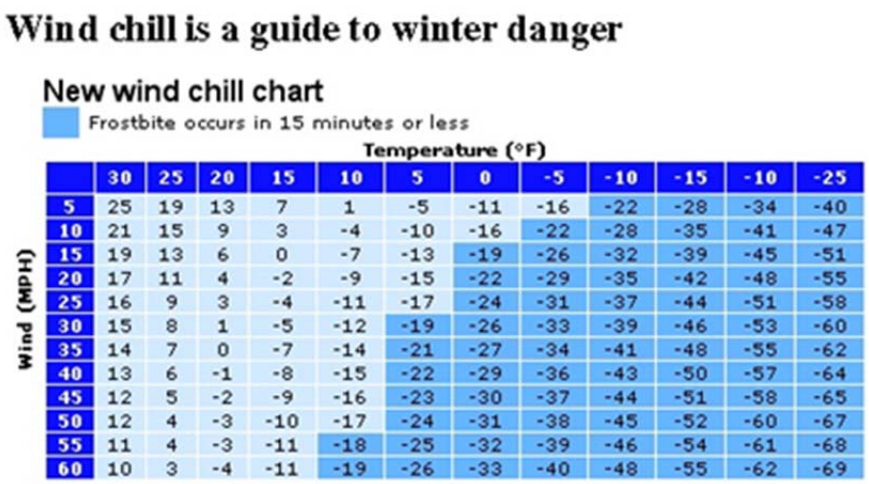
It is important to also note that these heat index values were devised for shady, light wind conditions. Exposure to full sunshine may increase heat index values by up to 15°F. Further, strong winds, particularly with very hot, dry air, can also be extremely hazardous.

As Figure 3-9 indicates, there are 4 cautionary categories associated with varying heat index temperatures.

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

Extreme cold is defined as a temporary, yet sustained, period of extremely low temperatures. Extremely low temperatures can occur in winter months when continental surface temperatures are at their lowest point and the North

American Jet Stream pulls arctic air down into the continental United States. The jet stream is a current of fast moving air found in the upper levels of the atmosphere. This rapid current is typically thousands of kilometers long, a few hundred kilometers wide, and only a few kilometers thick. Jet streams are usually found somewhere between 10-15 km (6-9 miles) above the Earth's surface. The position of this upper-level jet stream denotes the location of the strongest surface temperature contrast over the continent. The jet stream winds are strongest during the winter months when continental temperature extremes are greatest. When the jet stream pulls arctic cold air masses over portions of the United States, temperatures can drop below 0° F for 1 week or more. Sustained extreme cold poses a physical danger to all individuals in a community and can affect infrastructure function as well.



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

Figure 3-10 Wind Chill Chart

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

Extreme Temperature: Recent Occurrences

The effects of extreme temperatures extend across large regions, typically affecting several counties, or states, during a single event. According to the National Climate Data Center (NCDC), there have been 0 reported occurrences of extreme heat and 4 extreme cold events between August 2005 and April 2015.

In January 2008, two deaths were attributed to extreme cold temperatures. A Michigan City resident died from hypothermia inside her home, while in LaCrosse, it was believed that a resident was locked out of home and died through the night as temperatures fell lower.

January 2014 brought a string of cold weather that caused school delays, emergency response delays, and several cold weather advisories. As arctic air came into the region, strong winds with gusts between 30 and 40 mph resulted in wind chills between 30 and 45 degrees below zero along with blowing and drifting snow.

More recently, in February 2015 several reports of slide-offs and accidents were received due to reduced visibility from blowing and drifting snow. Temperatures dropped and wind chills were recorded between 10 and 20 degrees below zero. A LaPorte resident died from exposure during this event.

It is difficult to predict the probability that an extreme temperature event will affect LaPorte County residents within any given year. However, based on historic knowledge and information provided by the NFIP representatives, an extreme temperature event is "Possible" (within the next 5 years) to occur and an event did occur, it would result in "Negligible" magnitude. Error! Reference source not found. **Table 3-6** identifies the CPRI for extreme temperature events for all NFIP communities in LaPorte County.

Table 3-6 CPRI for Extreme Temperatures

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
LaPorte County	**Possible**	**Negligible**	**> 24 Hours**	**> 1 Week**	**Low**
Town of Kingsford Heights	**Possible**	**Negligible**	**> 24 Hours**	**> 1 Week**	**Low**
City of LaPorte	**Possible**	**Negligible**	**> 24 Hours**	**> 1 Week**	**Low**
Town of Long Beach	**Possible**	**Negligible**	**> 24 Hours**	**> 1 Week**	**Low**
Town of Michiana Shores	**Possible**	**Negligible**	**> 24 Hours**	**> 1 Week**	**Low**
City of Michigan City	**Possible**	**Negligible**	**> 24 Hours**	**> 1 Week**	**Low**

As shown in the table, index values remain identical throughout each NFIP community due to the regional extent and diffuse severity of this hazard event.

Extreme Temperatures: Assessing Vulnerability

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

By assessing the demographics of LaPorte County, a better understanding of the relative risk that extreme temperatures may pose to certain populations

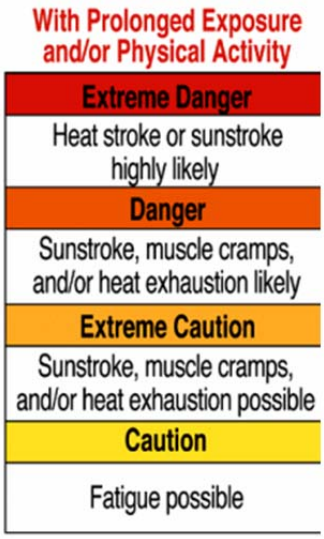


Figure 3-11 Danger Levels with Prolonged Heat Exposure

can be gained. In total, nearly 15% of the County's population is over 65 years of age, more than 5% of the population is below the age of 5, and approximately 17% of the population is considered to be living below the poverty line. People within these demographic categories are more susceptible to social or health related impacts associated with extreme heat.

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

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

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

Direct Effects:

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

Indirect Effects:

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

Estimating Potential Losses

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

This hazard is not typically as damaging to structures or critical infrastructure as it is to populations so monetary damages associated with the direct effects of the extreme temperature are not possible to estimate. Indirect effects would cause increased expenses to facilities such as healthcare or emergency services, manufacturing facilities where temperatures are normally elevated

may need to alter work hours or experience loss of revenue if forced to limit production during the heat of the day, and energy suppliers may experience demand peaks during the hottest and/or coldest portions of the day.

Future Considerations

As more and more citizens are experiencing economic difficulties, local power suppliers along with charitable organizations have implemented programs to provide cooling and heating mechanisms to residents in need. Often, these programs are donation driven and the need for such assistance must be demonstrated. As susceptible populations increase or as local economies are stressed, such programs may become more necessary to protect LaPorte County's at risk populations.

Extreme Temperatures: Relationship to Other Hazards

While extreme temperatures may be extremely burdensome on the power supplies in LaPorte County, the Committee concluded that this type of hazard is not expected to cause any hazards studied.

3.3.4 **Flood**

Flood: Overview

Floods are the most common and widespread of all natural disasters. Most communities in the United States have experienced some kind of flooding, after spring rains, heavy thunderstorms, or winter snow melts. A flood, as defined by the NFIP, is a general and temporary condition of partial or complete inundation or 2 or more acres of normally dry land area or of 2 or more properties from overflow of inland or tidal waters and unusual and rapid accumulation or runoff of surface waters from any sources, or a mudflow. Floods can be slow or fast rising but generally develop over a period of days.

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

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

Flood: Recent Occurrences

The NCDC reports that between August 2005 and April 30, 2015, there were 5 flood events (1 flood and 4 flash floods) that resulted in approximately $950.0K in property damages and $0K in crop damages. An NCDC event narrative from the September 2008 event reported several road closures throughout the northern part of the County including US 25 and US 35. Rainfall amounts of 8-11 inches were recorded with LaPorte receiving 11.2 inches.

An event on July 29, 2009 resulted in a closure of all lanes of US 20 between Johnson Road and US 421 due to flowing water. Vehicles were stalled along roads and several damages were noted associated with washouts and flooded basements. Michigan City was impacted by an event in June of 2013 when

heavy rain fell resulting in basement collapses and a roof collapse at the K&M Plaza. Widespread flooding of roads was also observed.

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

Stream gages are utilized to monitor surface water elevations and/or discharges at key locations and time periods. Some such gages are further equipped with NWS' Advanced Hydrologic Prediction Service (AHPS) capabilities. These gages have the potential to provide valuable information regarding historical high and low water stages, hydrographs representing current and forecasted stages, and a map of the surrounding areas likely to be flooded. Within LaPorte County, there are 2 active USGS stream gages equipped with AHPS capabilities; these are identified on **Exhibit 2**.

Any property having received 2 insurance claim payments for flood damages totaling at least $1,000, paid by the NFIP within any 10-year period since 1978 is defined as a repetitive loss property. These properties are important to the NFIP because they account for approximately 1/3 of the country's flood insurance payments. According to FEMA Region V, there are 2 properties within the unincorporated areas of LaPorte County that are considered to be repetitive loss properties.

There have been numerous claims made for damages associated with flooding in LaPorte County. Within the City of Michigan City, there have been 45 paid losses resulting in approximately $104K in payments. Further, within the unincorporated areas of the County, there were 39 payments totaling approximately $236K. **Table 3-7** identifies the number of claims per NFIP community as well as payments made.

Table 3-7 Repetitive Loss Properties, Claims, and Payments

NFIP COMMUNITY	# OF REPETITIVE LOSS PROPERTIES	CLAIMS SINCE 1978	$$ PAID
LaPorte County	2	39	$236.0K
Kingsford Heights			
LaPorte	0	17	$132.7K
Long Beach	0	17	$47.2K
Michiana Shores	0	1	$31.4K
Michigan City	0	45	$104.7K
TOTAL	**2**	**119**	**$552.0K**

(IDNR, 2015)
(FEMA Region V, 2015)
(Data for the Town of Kingsford Heights is included within that reported for LaPorte County)

Mandatory flood insurance purchase requirements apply to structures in 1% annual chance of flooding delineated areas. Total flood insurance premiums for LaPorte County and the NFIP communities is approximately $247.5K. Total flood insurance coverage for LaPorte County is nearly $57M. **Table 3-8** further indicates the premiums and coverage totals for individual NFIP communities.

Table 3-8 Insurance Premiums and Coverage

NFIP COMMUNITY	FLOOD INSURANCE PREMIUMS	FLOOD INSURANCE COVERAGE
LaPorte County	$135.2K	$29.8M
Kingsford Heights		
LaPorte	$43.0K	$8.0M
Long Beach	$19.6K	$6.6M
Michiana Shores	$10.9K	$4.4M
Michigan City	$38.8K	$8.1M
TOTAL	**$247.5K**	**$56.9M**

(IDNR, 2015)

As determined by the Committee, the probability of a flood occurring throughout LaPorte County ranges from "Unlikely" in Long Beach to "Possible" in the remaining areas. Impacts from such an event are anticipated to range from "Limited" in the unincorporated areas of the County and Kingsford Heights to "Negligible" in all other areas. The Committee also determined that the warning time would be 12-24 hours, and that the duration of such an event is anticipated to last less than 1 week. A summary is shown in **Table 3-9**.

Table 3-9 CPRI for Flood

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
LaPorte County	**Possible**	**Limited**	**12 - 24 Hours**	**< 1 Week**	**Elevated**
Town of Kingsford Heights	**Possible**	**Limited**	**12 - 24 Hours**	**< 1 Week**	**Elevated**
City of LaPorte	**Possible**	**Negligible**	**12 - 24 Hours**	**< 1 Week**	**Low**
Town of Long Beach	**Unlikely**	**Negligible**	**12 - 24 Hours**	**< 1 Week**	**Low**
Town of Michiana Shores	**Possible**	**Negligible**	**12 - 24 Hours**	**< 1 Week**	**Low**
City of Michigan City	**Possible**	**Negligible**	**12 - 24 Hours**	**< 1 Week**	**Low**

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

Flood: Assessing Vulnerability

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

Direct Effects:

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

Indirect Effects:

- Increased response times for emergency personnel if roads are impassable
- Increased costs associated with personnel to carry out evacuations in needed areas
- Increased risk of explosions and other hazards associated with floating propane tanks or other debris
- Losses associated with missed work or school due to closures or recovery activities
- Cancellations of special events in impacted areas or water related activities that become too dangerous due to high water

Estimating Potential Losses

Figure 3-12 Car Submerged on Flooded Street

Critical and non-critical structures located in regulated floodplains, poorly drained areas, or low lying areas (**Figure 3-12**) are most at risk for damages associated with flooding. For this planning effort, a GIS Desktop Analysis methodology was utilized to estimate flood damages.

For the GIS Desktop Analysis method, an analysis was completed utilizing the effective Digital FIRMs (DFIRMs) overlaid upon the Modified Building Inventory provided by LaPorte County and structures located within each flood zone were tallied using GIS analysis techniques.

The Modified Building Inventory was created in ESRI ArcGIS by converting parcels to centroids, and joining Assessor Data to these centroids. Assessor data included square footage for the structure, and any structure that was listed as less than 400 ft^2 in area or was classified in the Assessor's database as

a non-habitable structure was assumed to be an outbuilding. Also, buildings with an assessed value of $0.00 or buildings that did not match the Assessor Data (parcel numbers did not match) were excluded from the analysis. Replacement values were calculated using:

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

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

In order to estimate anticipated damages associated with each flood in LaPorte County and NFIP communities, it was estimated that 25% of structures in the flood zones would be destroyed, 35% of structures would be 50% damaged, and 40% of structures would be 25% damaged. **Table 3-10** identifies the estimated losses associated with structures in the floodway, the 100-year floodplain, and the 500-year floodplain areas by NFIP community within LaPorte County.

Table 3-10 Manual GIS Analysis Utilizing Most Recent Preliminary DFIRM Data and LaPorte County Building Inventory

	FLOODWAY		1%		0.2%		UNNUMBERED	
	#	$	#	$	#	$	#	$
LaPorte County	0	0	1	$0.06M	0	0	453	$26.15M
Kingsford Heights								
LaPorte	0	0	1	$0.06M	0	0	121	$8.00M
Long Beach	0	0	101	$5.64M	0	0	18	$1.01M
Michiana Shores	25	$1.40M	17	$0.95M	0	0	0	0
Michigan City	4	$0.33M	28	$2.07M	4	$0.22M	101	$6.90M
Total	**29**	**$1.73M**	**148**	**$8.78M**	**4**	**$0.22M**	**693**	**$42.06M**

Structures and damages within each zone are not inclusive

Utilizing the same GIS information and process, the number of critical infrastructure within each of the Special Flood Hazard Areas (SFHA) in LaPorte County was determined. Within the unincorporated areas of the County, 1 electric facility, 1 hazmat facility, and a WWTP are located within the 100 year flood zone. Additionally, there is 1 electric facility within Michigan City that is also located within the 100 year flood zone.

Utilizing the information in Table 3-7 regarding the number of structures within each Flood Hazard Area, it is also important to note the number of flood

insurance policies within each NFIP area in LaPorte County. **Table 3-11** provides the comparison between the number of structures in the SFHA and the number of flood insurance policies. It is also important to note that flood insurance is voluntary unless the property owner carries a federally subsidized mortgage; insurance coverage may be discontinued when the mortgage is completed.

Table 3-11 Number of Structures in the SFHA and Number of Flood Insurance Policies

NFIP COMMUNITY	# STRUCTURES IN SFHA	# POLICIES
LaPorte County	454	175
Kingsford Heights		
LaPorte	122	40
Long Beach	119	23
Michiana Shores	52	17
Michigan City	137	54
Total	**884**	**309**

(IDNR, 2015)

Future Considerations

As the municipalities within LaPorte County continue to grow in population, it can be anticipated that the number of critical and non-critical infrastructure will also increase accordingly. Location of these new facilities should be carefully considered and precautions should be encouraged to ensure that school, medical facilities, community centers, municipal buildings, and other critical infrastructure are located outside the 0.2% annual chance (500-year) floodplain and/or are protected to that level along with a flood-free access to reduce the risk of damages caused by flooding and to ensure that these critical infrastructure will be able to continue functioning during major flood events.

It is also important to ensure that owners and occupants of residences and businesses within the known hazard areas, such as delineated or approximated flood zones, are well informed about the potential impacts from flooding incidents as well as proper methods to protect themselves and their property. As new FIRMS have been recently adopted throughout LaPorte County, residents within these areas will be notified that they may be subject to an increased risk of damages associated with flooding.

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

Figure 3-13 Fire Engine in Flood Waters

Indirect effects of flooding may include increased emergency response times due to flooded or redirected streets (**Figure 3-13**), the danger of dislodged and floating propane tanks causing explosions, and the need for additional personnel to carry out the necessary evacuations. Additional effects may include sheltering needs for those evacuated, and the loss of income or revenue related to business interruptions. As many communities within LaPorte County are closely tied to the river systems, special events occurring near to or on these rivers and waterways may be cancelled or postponed during periods of flooding or high water levels.

Flood: Relationship to Other Hazards

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

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

3.3.5 Tornado / Waterspout / Windstorm

Tornado / Waterspout / Windstorm: Overview

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

Figure 3-14 Funnel Cloud During a Lightning Storm at Night

A tornado is generated when conditions in a strong cell are produced that exhibit a wall of cool air that overrides a layer of warm air. The underlying layer of warm air rapidly rises, while the layer of cool air drops – sparking the swirling action. The damage from a tornado is a result of the high wind velocity and wind-clown debris. Tornado season is generally April through June in Indiana, although tornadoes can occur at any time of year. Tornadoes tend to occur in the afternoons and evenings; over 80 percent of all tornados strike between 3:00 pm and 9:00 pm, but can occur at any time of day or night as shown in **Figure 3-14**. Tornadoes occur most frequently in the United States east of the Rocky Mountains. Tornadoes in Indiana generally come from the south through the east.

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

The belief that a waterspout is simply a tornado over water is partially correct as there are two main types of waterspouts; tornadic and fair weather. Tornadic waterspouts generally begin as a true tornado over land and then move out over the water. Fair weather waterspouts form only over open water and are usually smaller, briefer in duration, and more common.

Waterspouts occur more frequently in the months of August, September, and October, when the waters of the Great Lakes are near their warmest levels. Formation of a waterspout involves cold air moving across the Great Lakes resulting in large temperature differences between the warm water and the

overriding cold air. Waterspouts tend to last up to 20 minutes and move at slower speeds of 10-15 mph.

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.

Tornado / Waterspout / Windstorm: Recent Occurrences

The classification of tornadoes utilizes the Fujita Scale of tornado intensity, described in **Table 3-12**. Tornado intensity ranges from low intensity (F0) tornadoes with effective wind speeds of 40-70 mph to high intensity (F5+) tornadoes with effective wind speeds of 261-318+ mph. According to the NCDC, LaPorte County has experienced 6 tornadoes (1-F0; 5-F1) between April 2007 and April 2015.

Table 3-12 Fujita Scale of Tornado Intensity

F-SCALE	WINDS	CHARACTER OF DAMAGE	RELATIVE FREQUENCY
F0 (weak)	40-72 mph	Light damage	29%
F1 (weak)	73-112 mph	Moderate damage	40%
F2 (strong)	113-157 mph	Considerable damage	24%
F3 (strong)	158-206 mph	Severe damage	6%
F4 (violent)	207-260 mph	Devastating damage	2%
F5 (violent)	261-318 mph	Incredible damage	<1%

One tornado reported by the NCDC occurred on October 26, 2010 and resulted in approximately $500K in property damages as it touched down north of West Bailey Road and east of 421 in an open field. Several structures at Hoosier Machinery Solutions were destroyed and debris was carried for more than a mile northeast. Continuing across US 30, damages to a residential garage, roof, and a barn were realized as the maximum wind speed approached 90 mph. The June 30, 2014 event resulted in several snapped or uprooted trees east of Kingsford Heights. Structural damages were caused to numerous homes along South County Road 300 East when broken or fallen trees landed on these homes. **Exhibit 3** identifies the historical paths and touchdown locations of tornadoes occurring within LaPorte County.

Figure 3-15 Twin Waterspouts

Neither NCDC nor local media reported any waterspouts relevant to LaPorte County since the development of the

previous MHMP. However, several reports of waterspouts in the upper reaches of Lake Michigan, along with Lake Erie and Lake Ontario were reported through their local media outlets. **Figure 3-15** identifies twin waterspouts sighted near Kenosha Wisconsin.

The Committee estimated the probability of a tornado, waterspout, or a windstorm occurring in LaPorte County would be "Highly Likely" and the magnitude and severity of such an event to be "Limited" throughout all areas of the County. As with many hazardous events, the Committee anticipated a short warning time, less than 6 hours, and a short duration, also less than 6 hours. The summary is shown in **Table 3-13**.

Table 3-13 CPRI for Tornado /Waterspout / Windstorm

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
LaPorte County	Highly Likely	Limited	< 6 Hours	< 6 Hours	Severe
Town of Kingsford Heights					
City of LaPorte					
Town of Long Beach					
Town of Michiana Shores					
City of Michigan City					

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

Tornado / Waterspout /Windstorm: Assessing Vulnerability

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

Direct Effects:

- Damages to older construction structures, mobile homes, and accessory structures (pole barns, sheds, etc.)
- Damages to above ground utility lines and structures
- Damages to vessels on the water
- Damages to structures along the shore

Indirect Effects:

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

Estimating Potential Losses

Due to the unpredictability of this hazard, all critical and non-critical structures within the County are at risk of future damage or loss of function. Estimates of potential physical losses (**Table 3-14**) were determined through an exercise where a hypothetical tornado traveled through portions of the County. This is intended to present a "what-if" scenario of a tornado incident and associated damages. Damage estimates were derived by assuming that 25% of all structures in the path of the tornado would be completely destroyed, 35% would be 50% damaged, and 40% would have only 25% damage. These estimations were also determined using three wind speed zones based on distance from the tornado path. Zone A is nearest the center of the tornado path, while Zone C is the farthest from the path and with a theoretical lower wind speed. The hypothetical tornado pathway and zones are included on Exhibit 3.

Table 3-14 Summary of Hypothetical Tornado Damages

ZONE	NUMBER OF STRUCTURES DAMAGED	ESTIMATED DAMAGE ($)
Zone A	365	$30.6M
Zone B	376	$18.7
Zone C	596	$28.9

Future Considerations

Within LaPorte County, there are numerous events each year that draw thousands of guests. Due to this, it is imperative that the EMA place continued importance on the need to maintain, and as necessary, upgrade their outdoor warning siren coverage. Currently, much of the more populous areas of the County are covered by the audible ranges of the existing outdoor warning sirens. The existing siren locations and their coverage areas are provided in **Figure 3-16**.

There may also be indirect effects of a tornado event. For example, post-event clean-up may result in high expenses or inability to work for property owners that have experienced damages from either the tornado directly or by debris from high winds. Affected business owners may experience loss of revenue if unable to continue operations following the event. Similarly, if a business is

affected and unable to operate, employees may experience a loss of wages during the period of recovery.

Tornado / Waterspout / Windstorm: Relationship to Other Hazards

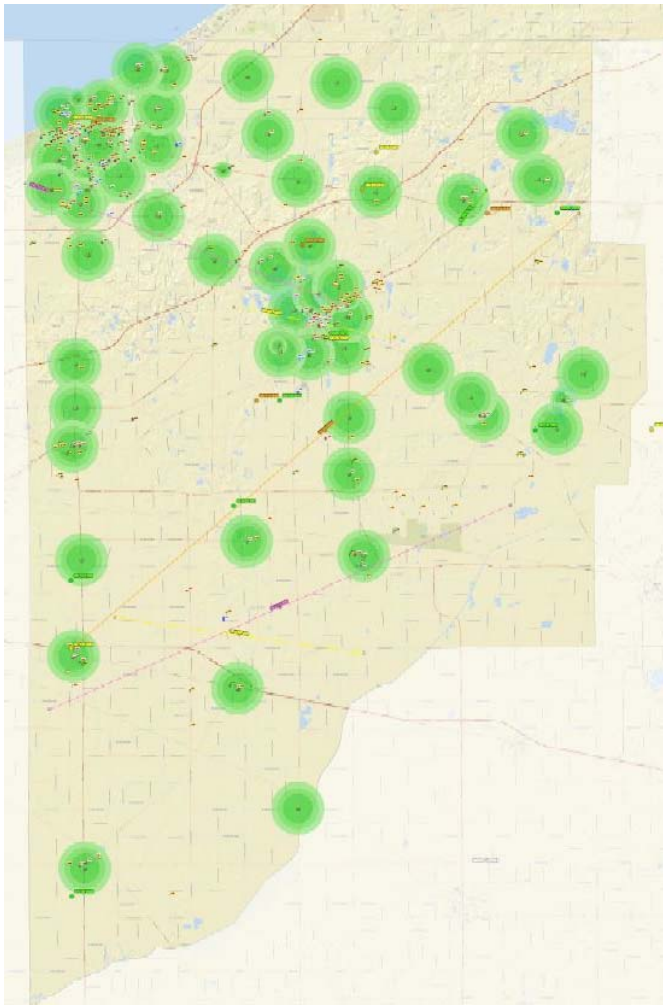


Figure 3-16 Outdoor Warning Siren Coverage

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

While the force associated with a waterspout that has made it ashore is greatly less than the force of a tornado, the potential does exist for a waterspout to cause a hazardous materials incident.

3.3.6 Winter Storm / Ice

Winter Storm / Ice: Overview

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

Figure 3-17 Ice Covered Power Lines

Storm effects such as extreme cold, flooding, and snow and ice accumulation (**Figure 3-17**) can cause hazardous conditions and hidden problems for people in the affected area. People can become stranded on the road or trapped at home, without utilities or other services, including food, water, and fuel supplies. The conditions may overwhelm the capabilities of a local jurisdiction. Winter storms are considered deceptive killers as they may indirectly cause transportation accidents, and injury and death resulting from exhaustion/overexertion, hypothermia and frostbite from wind chill, and asphyxiation; and house fires occur more frequently in the winter due to lack of proper safety precautions.

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

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

Winter Storm / Ice: Recent Occurrence

Since December 2005, the NCDC has recorded 4 ice storms, 14 winter storms, 2 blizzards, 13 winter weather, 6 heavy snow, and 17 lake effect snow events. No Injuries or deaths were not reported with any of these events, and narrative descriptions indicated poor travel conditions, power outages and debris associated with similar events. Monetary damages of an estimated $25,000 were provided for one of the ice storm events which occurred on February 24, 2007. During this event, an estimated three-tenths of an inch of ice covered roads and power lines, especially in the county near Wanatah and LaCrosse.

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

The probability, magnitude, warning times, and duration of a snow storm or ice storm causing disruption to residents and businesses in LaPorte County, as determined by the Planning Committee, is expected to be consistent throughout the County and NFIP communities. It is "Highly Likely" that this type of hazard will occur in this area and will typically affect the entire county, and possibly several surrounding counties, at one time, resulting in primarily "Limited" severity. The warning time for severe temperatures or several inches of snow associated with a winter storm is usually greater than 24 hours while the duration of the incident is anticipated to last less than 1 week. A summary is shown in **Table 3-15**.

Table 3-15 CPRI for Winter Storm / Ice

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
LaPorte County	**Highly Likely**	**Limited**	**> 24 Hours**	**< 1 Week**	**Elevated**
Town of Kingsford Heights					
City of LaPorte					
Town of Long Beach					
Town of Michiana Shores					
City of Michigan City					

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

Winter Storm / Ice: Assessing Vulnerability

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

Direct Effects:

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

Indirect Effects:

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

Estimating Potential Losses

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

For planning purposes, information collected in snow storms impacting other communities around the nation is also useful in assessing the potential social, physical, and economic impact that a winter storm could have on LaPorte County communities. For example, a March 2003 snow storm in Denver, Colorado dropped approximately 31 inches of snow and caused an estimated $34M in total damages. In addition, a February 2003 winter storm dropped an estimated 15-20 inches of snow

Figure 3-18 Travel Impacted During Snow Storm

in parts of Ohio. The Federal and Ohio Emergency Management Agencies and U.S. Small Business Administration surveyed damaged areas and issued a preliminary assessment of $17M in disaster related costs. These costs included snow and debris removal, emergency loss prevention measures, and public utilities repair. The agencies found over 300 homes and businesses either damaged or destroyed in 6 counties. Snow storms and blizzards also make road travel difficult and dangerous, as in **Figure 3-18**.

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

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

Future Considerations

As populations increase and communities continue to grow in size, the need to respond to snow storms or ice storms will remain an important municipal effort. As new construction or re-development occurs, especially new or existing critical infrastructure, it is important to ensure that these new structures are equipped to deal with the potential risks associated with this hazard. Those may include lengthy power outages and potentially impassable transportation routes, making it difficult to obtain supplies or for passage of response vehicles.

Winter storms can also result in substantial indirect costs. Increased emergency response times, loss of work or the inability to get to work, as well as business interruption, are possible indirect effects of a winter storm. According to a report by the National Center for Environmental Predictions, the

cold and snowy winter in late 1977 and early 1978, which impacted several heavily populated regions of the country, was partially responsible for reducing the nation's Gross Domestic Product (GDP) from an estimated growth rate of between 6% and 7% during the first 3 quarters of 1977 to approximately -1% in the last quarter of 1977 and 3% during the first quarter of 1978.

Winter Storm / Ice: Relationship to Other Hazards

Figure 3-19 Flooding Caused by Snow Melt

Winter storms and ice storms can lead to flooding as the precipitation melts and enters local receiving water bodies. This increased volume of water on already saturated, or still frozen ground can quickly result in flooding related damages to structures and properties (**Figure 3-19**) as well as within the stream or river channel. The increased flooding may then lead to a dam failure within the same area, further exacerbating the damages.

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

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

TECHNOLOGICAL HAZARDS

3.3.7 Hazardous Materials Incident

Hazardous Materials Incident: Overview

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

Figure 3-20 Drums of Potentially Hazardous Waste

As materials are mobilized for treatment, disposal, or transport to another facility, all infrastructure, facilities, and residences in close proximity to the transportation routes are at an elevated risk of being affected by a hazardous materials release. Often these releases can cause serious harm to LaPorte County and its residents if proper and immediate actions are not taken. Most releases are the result of human error or improper storage (**Figure 3-20**), and corrective actions to stabilize these incidents may not always be feasible or practical in nature.

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

Hazardous Materials Incident: Recent Occurrences

During conversations with Committee members and through information provided by local news outlets, it was noted that no significant incidents involving manufacturing facilities and transportation routes have occurred since the development of the original MHMP. However, the number of facilities utilizing, storing, and/or manufacturing chemicals and the number of high volume transportation routes increase the likelihood of an incident. These facilities are identified on Exhibit 1.

According to the Committee, the probability of a hazardous materials release or incident is “Likely” within all areas and “Limited” damages are anticipated to

result from an incident throughout LaPorte County. As with hazards of this nature, a short warning time and a short duration, both less than 6 hours, are anticipated in the event of a hazardous materials incident. A summary is shown in **Table 3-16**.

Table 3-16 CPRI for Hazardous Materials Incident

	PROBABILITY	MAGNITUDE/ SEVERITY	WARNING TIME	DURATION	CPRI
LaPorte County	**Likely**	**Limited**	**< 6 Hours**	**< 6 Hours**	**Elevated**
LaPorte					
Long Beach					
Michiana Shores					
Michigan City					
Kingsford Heights					

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

Hazardous Materials Incident: Assessing Vulnerability

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

Direct Effects:

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

Indirect Effects:

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

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

quantity of hazardous materials being utilized, stored, transported or released within their communities.

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

In LaPorte County, 102 facilities are subject to SARA Title III provisions due to the presence of listed hazardous materials in quantities at or above the minimum threshold established by the Act. These facilities are also required to create and distribute emergency plans and facility maps to local emergency responders such as the LEPC, fire departments, and police departments. With this knowledge on hand, emergency responders and other local government officials can be better prepared to plan for an emergency, the response it would require, and prevent serious affects to the community involved.

Estimating Potential Losses

Figure 3-21 Fuel Tanker Fire

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

Future Considerations

Additional facilities, both critical and non-critical in nature may be affected if a hazardous materials release were to occur along a transportation route (**Figure 3-21**). Several routes including railways, US Highways 6, 12, 20, 30, 35, 39, and

421 along with State Routes 2, 4, 8, 39, 104, and 212 are traveled by carriers of hazardous materials.

By restricting development within the known hazardous materials facility buffer zones, future losses associated with a hazardous materials release can be reduced. Critical infrastructure especially should be discouraged from being located within these areas. Further, by restricting construction in these zones, the number of potentially impacted residents may also be greatly reduced, lowering the risk for social losses, injuries, and potential deaths. Future construction of hazardous materials facilities should be located away from critical infrastructure such as schools, medical facilities, municipal buildings, and daycares, reducing the risk to highly populated buildings and potentially populations with specials needs or considerations such as children, elderly, and medically unfit.

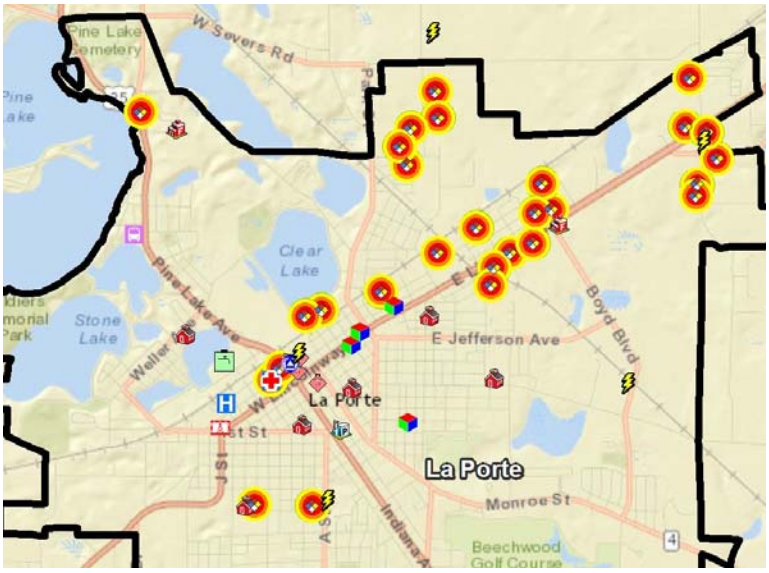


Figure 3-22 Hazardous Materials Facilities and Buffer Zones

Figure 3-22 identifies some of the hazardous materials facilities and their potential evacuation buffer zones. It is important to note other critical structures within or near those buffers, which may need to be evacuated in the event of a spill or a leak.

Hazardous Materials Incident: Relationship to Other Hazards

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

3.4 HAZARD SUMMARY

For the development of this MHMP, the Committee utilized the CPRI method to prioritize the hazards they felt affected LaPorte County. Hazards were

assigned values based on the probability or likelihood of occurrence, the magnitude or severity of the incident, as well as warning time and duration of the incident itself. A weighted CPRI was calculated based on the percent of the County's population present in the individual NFIP communities.

Table 3-17 summarizes the CPRI values for the various hazards studied within this MHMP. The hazards that ranked as "Elevated" risk were flooding; tornado & windstorm; and winter storm and ice storm. The hazards with a "Low" risk were dam failure; earthquake; and hazardous materials incident.

Table 3-17 Combined CPRI

TYPE OF HAZARD	LIST OF HAZARDS	WEIGHTED AVERAGE CPRI
Natural	Coastal Storm / Seiche	
	Earthquake	
	Extreme Temperature	
	Flood	
	Tornado / Waterspout / Windstorm	
	Winter Storm / Ice	
Technological	Hazardous Materials Incident	

It can be important to understand the cause and effect relationship between the hazards selected by the Committee. **Table 3-18** can be utilized to identify those relationships. For example, a winter storm (along the side of the table) can result in a flood (along the top of the table). In a similar fashion, a hazardous materials incident (along the top of the table) can be caused by an earthquake; flood; tornado; or a winter storm or ice storm (along the side of the table).

Table 3-18 Relationship of Hazards

EFFECT → / CAUSE ↓	Coastal Storm / Seiche	Earthquake	Extreme Temperatures	Flooding	Tornado / Waterspout / Windstorm	Winter Storm / Ice	Hazardous Materials
Coastal Storm / Seiche				X			X
Earthquake	X						X
Extreme Temperatures							
Flooding							X
Tornado / Waterspout / Windstorm							X
Winter Storm / Ice							X
Hazardous Materials							

As a method of better identifying the potential relationships between hazards, Exhibit 2 can be referenced to indicate the proximity of one or more known hazard areas such as the delineated floodplains and the locations of EHS facilities. For this reason, the City of LaPorte or any other community may be impacted by more than one hazard at a time, depending on certain conditions. It can be anticipated that if a flood or coastal storm were to occur within these areas, there would be a potentially increased risk of facilities experiencing a hazardous materials incident.

Future development in areas where multiple known hazard areas (coastal areas, floodplains and surrounding hazardous materials facilities) overlap should undergo careful design, review, and construction protocol to reduce the risk of social, physical, and economic losses due to a hazard incident. While it may certainly be difficult, critical infrastructure should not be constructed within these regions.

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CHAPTER 4 MITIGATION GOALS AND PRACTICES

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

4.1 MITIGATION GOAL

REQUIREMENT §201.6(c)(3)(i):
[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

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

4.2 MITIGATION PRACTICES

REQUIREMENT §201.6(c)(3)(ii):
[The mitigation strategy shall include a] section that identifies and analyzed a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

REQUIREMENT §201.6(c)(3)(iii):
[The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

In 2005, the Multi-Hazard Mitigation Council conducted a study about the benefits of hazard mitigation. This study examined grants over a 10-year period (1993-2003) aimed at reducing future damages from earthquake, wind, and flood. It found that mitigation efforts were cost-effective at reducing future losses; resulted in significant benefits to society; and represented significant potential savings to federal treasury in terms of reduced hazard-related expenditures. This study found that every $1 spent on mitigation

efforts resulted in an average of $4 savings for the community. The study also found that FEMA mitigation grants are cost-effective since they often lead to additional non-federally funded mitigation activities, and have the greatest benefits in communities that have institutionalized hazard mitigation programs. Six primary mitigation practices defined by FEMA are:

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

4.2.1 Existing Mitigation Practices

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

<u>Emergency Services</u>

- The LaPorte County EMA and the County 911 Dispatch Center test and maintain 50 outdoor warning sirens providing coverage for much of the populated areas of LaPorte County. *(2005 Measure)*
- Weather radios are promoted and encouraged throughout the County during presentations, events, and on the EMA website. *(2005 Measure)*
- Stream gages are utilized for flood forecasting and flood warnings for various stream levels. *(2005 Measure)*

<u>Natural Resource Protection</u>

- LaPorte County, the City of LaPorte, the Town of Long Beach, the Town of Michiana Shores, the City of Michigan City, and the town of

Kingsford Heights are in good standing with the NFIP Program and have flood protection ordinances which meet minimum requirements.

- The MS4 communities enforce erosion and sediment control practices during construction activities to prevent the restriction of conveyances from sedimentation. *(2005 Measure)*

Prevention

- Information related to hazard mitigation has been incorporated, where appropriate, into individual Comprehensive Land Use Plans and other long-range plans. *(2005 Measure)*
- Hazard Zones have been incorporated into Zoning Ordinances (where appropriate) to limit development and protect natural resources in some critical areas. *(2005 Measure)*
- Several representatives participate in the Indiana Association of Floodplain and Stormwater Managers (INAFSM) or are certified as a CFM. *(2005 Measure)*
- LaPorte County and the Cities of LaPorte and Michigan City have developed GIS databases which are used in land use planning decisions and can be utilized in HAZUS-MH "what-if" scenarios. *(2005 Measure)*
- The LaPorte County LEPC provides routine training regarding the proper storage, transport, and disposal of hazardous materials.
- Electric providers routinely complete preventative maintenance on trees within the ROW and utility corridor. *(2005 Measure)*
- Local developers routinely bury new and retrofitted utilities to minimize exposure to hazards.

Property Protection

- All communities follow the International Building Code which includes requirements to minimize damages from natural hazards.

Public Information

- Outreach materials are routinely provided within office and agencies throughout LaPorte County, large public events, speaking opportunities within schools, etc. *(2005 Measure)*

Structural Control

- Stormwater conveyances and regulated drains are maintained on a routine basis to prevent localized flooding, increased erosion, and material deposition as a result of rainfall or snowmelt. *(2005 Measure)*

4.2.2 Proposed Mitigation Practices

After reviewing existing mitigation practices, the Committee reviewed the list of mitigation ideas for each of the hazards studied as a part of this planning effort and identified which of these they felt best met their needs as a community according to selected social, technical, administrative, political, and legal criteria. The following identifies the key considerations for each evaluation criteria:

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

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

The benefit derived from each mitigation practice along with the estimated cost of that practice was utilized to identify the mitigation practices having a

high, moderate, or low benefit cost ratio. Preparing detailed benefit cost ratios was beyond the scope of this planning effort and the intent of the MHMP.

The update of this MHMP is a necessary step of a multi-step process to implement programs, policies, and projects to mitigate the effect of hazards in LaPorte County. The intent of this planning effort was to identify the hazards and the extent to which they affect LaPorte County and to determine what type of mitigation strategies or practices may be undertaken to mitigate for these hazards. A FEMA-approved MHMP is required in order to apply for and/or receive project grants under the HMGP, PDM, FMA, and SRL. FEMA may require a MHMP under the Repetitive Flood Claims (RFC) program. Although this MHMP meets the requirements of DMA 2000 and eligibility requirements of these grant programs additional detailed studies may need to be completed prior to applying for these grants. **Section 5.0** of this plan includes an implementation plan for all high priority mitigation practices identified by the Committee.

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

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Table 4-1 Proposed Mitigation Practices

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Geographic Information Systems 1. Update and coordinate GIS layers with location and attributes of critical infrastructure 2. 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.	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Coastal Storm/Seiche ☒ Earthquake ☒ Extreme Temperature ☒ Flooding ☒ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☒ HazMat Incident	**Ongoing –** 1. GIS is used by several communities **Proposed Enhancement –** 1. Coordinate consistent layers county-wide 2. Additional training for GIS staff	High	High	GIS Department *(County)*	Existing Budget
Public Education & Outreach 1. Provide multi-lingual hazard preparedness literature (warning sirens, radio stations, go-kits, insurance protection, etc.) during Severe Weather Awareness Week, at public facilities and events and to populations within known hazard areas such as floodplains, near hazmat facilities, etc. *(2005 Measure)* 2. Post information/warning signs in local parks and other public gathering places explaining what to do in case of a hazard event.	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Coastal Storm/Seiche ☒ Earthquake ☒ Extreme Temperature ☒ Flooding ☒ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☒ HazMat Incident	**Ongoing –** 1. Literature is provided at several public facilities and office locations as well as large public events throughout the County. Populations within the special flood hazard areas are educated through required flood insurance purchases and various website and literature pieces. **Proposed Enhancement –** 1. Encourage the enhancement of the messages provided to various cultural groups and neighborhoods 2. Post information in public places that describes what should be done and where to go during a hazard event	High	High	EMA Red Cross Salvation Army Municipal Offices *(County Kingsford Heights LaPorte Long Beach Michiana Shores Michigan City)* Parks Departments	Existing budget Grant
Hazardous Materials Response Team 1. Maintain LEPC reporting and training efforts as required through SARA Title III and ensure current facility maps and response plans are on file for Tier II facilities. 2. Establish/maintain a local HMRT 3. Increase number of personnel certified to OSHA III Technician level	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☐ Coastal Storm/Seiche ☐ Earthquake ☐ Extreme Temperature ☐ Flooding ☐ Tornado/Waterspout/ Windstorm ☐ Winter Storm/Ice ☒ HazMat Incident	**Ongoing –** 1. Records are maintained for many Tier II facilities **Proposed Enhancement –** 1. Efforts should be strengthened to ensure requirements are met. 2. The local HMRT should be maintained with adequate staff and supplies 3. Additional personnel should be trained to a higher response qualification as appropriate	High	Moderate	LEPC EMA Fire Departments *(Municipal, Township, and Volunteer)* Tier II Facility Owners	Existing Budget

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Land Use Planning & Zoning 1. Incorporate hazard information, risk assessment, and hazard mitigation practices into the Comprehensive Land Use Plan and Development Review to better guide future growth and development	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Coastal Storm/Seiche ☒ Earthquake ☒ Extreme Temperature ☒ Flooding ☒ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☒ HazMat Incident	**Ongoing –** 1. Hazard information has been incorporated into some areas of the Comprehensive Land Use Plan and Joint Zoning Ordinances **Proposed Enhancement –** 1. Increase the number of hazards considered, more definitively outline higher risk areas and those that should be avoided for future development	High	Moderate	Planning Departments *(County LaPorte Long Beach Michigan City)*	Existing Budget
Safe Rooms and Community Shelters 1. Develop temporary and/or long-term shelter agreements within the County. Potential for tiered levels of shelters, domestic animal shelters, etc. 2. Educate the public regarding the importance of safe areas and/or community shelters in vulnerable locations 3. Advertise or announce locations of safe rooms and community shelters for large gatherings of people. (Football games, 4H Fair, etc.)	☒ Emergency Services ☐ Nat. Res. Protection ☐ Prevention ☐ Property Protection ☒ Public Information ☐ Structural Control	☒ Coastal Storm/Seiche ☒ Earthquake ☒ Extreme Temperature ☒ Flooding ☒ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☒ HazMat Incident	**Ongoing –** 1. Local representatives work with Salvation Army to establish initial temporary shelters and fulfill needs 2. Some areas provide announcements prior to or during large gatherings **Proposed Enhancement –** 1. Increase the number of “pet friendly” shelters and shelters that are capable of housing moderate medically needy clients 2. Increase announcements and postings indicating the location of safe areas during large gatherings and events	High	Low	EMA Large gathering liaisons Salvation Army Red Cross	Existing budget

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Emergency Preparedness & Warning 1. Coordinate with private business owners utilizing large dynamic message boards for business to provide messages during hazardous events and recovery efforts. 2. Require weather radios in all critical infrastructure and encourage use by residents and businesses. 3. Coordinate communications and notifications within County and DHS District utilizing redundant systems. 4. Increase awareness and participation in a mass notification system 5. Improve disaster preparedness and emergency response at the local level through the CERT program 6. Continue to utilize social media outlets for preparedness and recovery efforts; and increase participation. 7. Prepare a detailed flood response and evacuation plan (utilizing gages, maps, and alerts) to improve response and reduce losses from a flood event. 8. Propose and adopt an ordinance to require developers to pay to install additional sirens for new developments or pay into a County-wide fund to install additional sirens as needed 9. Purchase additional mobile message boards, warning signs, or barricades to place in areas affected by hazards. 10. Encourage new or retrofitted critical infrastructure to incorporate structural bracing, shutters, laminated/impact-resistant glass and interlocking roof coverings to minimize damage	☒ Emergency Services ☐ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☐ Structural Control	☒ Coastal Storm/Seiche ☒ Earthquake ☒ Extreme Temperature ☒ Flooding ☒ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☒ HazMat Incident	**Ongoing –** 2. Many weather radios have been provided through outreach efforts. 5. CERT trainings occur as needed 6. Social media is utilized by several County and municipal offices **Proposed Enhancements –** 1. Develop protocol to include local information on private message boards 2. Continue to provide weather radios at public events and as funding allows. 3. Increase coordination and communications 4. Debut mass notification system and increase awareness and participation in the mass notification program 5. Increase CERT (or similar) participation 6. Increase awareness and participation in the available social media outlets 7. Prepare flood plans for areas routinely flooded or those at an increased risk 8. Propose and adopt a siren ordinance 9. Increase availability of flood warning devices 10. Encourage additional building materials to reduce damages	High *(private message boards, radios, communications, mass notification, CERT, social media, flood response plans, ordinance)* Moderate *(message boards, structural bracing)*	High	EMA Red Cross Salvation Army Floodplain Administrator *(County Kingsford Heights LaPorte Long Beach Michiana Shores Michigan City)* Planning Department *(County LaPorte Long Beach Michigan City)*	Existing budget Grant

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Building Protection 1. Encourage property owners and renters in known hazard areas to have proper insurance coverage to protect their property and assets from potential damage. 2. Prohibit the development of new critical infrastructure in 1% & 0.2% annual chance flood hazard area 3. Relocate, buyout, or floodproof (non-residential) existing non-critical structures that are subject to repetitive flooding. 4. Develop an inventory and complete an inspection of public and commercial buildings that may be particularly vulnerable to earthquake damages *(Will assist with NFIP compliance)*	☐ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Coastal Storm/Seiche ☒ Earthquake ☐ Extreme Temperature ☒ Flooding ☐ Tornado/Waterspout/ Windstorm ☐ Winter Storm/Ice ☐ HazMat Incident	**Ongoing –** 2. There are additional requirements and restrictions for construction within floodplains throughout LaPorte County. **Proposed Enhancements –** 1. Include insurance options (above flood insurance) to protect structures from additional hazards. 2. Continue to prohibit development within floodplains. 3. Prioritize structures located in floodplains or other known hazard areas and work with facility owners to relocate, buyout, or floodproof these structures to a minimum of 500-year protection with flood-free access. 4. Complete a structure inventory within each community.	High (*Insurance, prohibit development)* Moderate (*Relocate, inventory)*	Moderate	Building / Infrastructure owners EMA Floodplain Administrator *(County Kingsford Heights LaPorte Long Beach Michiana Shores Michigan City)* Planning Department *(County LaPorte Long Beach Michigan City)* County Surveyor / Drainage Board	Grant Existing budget Municipal Bond

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Floodplain Management 1. Conduct detailed hydraulic analyses of areas with repetitive flooding problems, unstudied, understudied, and unnumbered Zone A streams to determine exact floodplain boundaries. *(2005 Measure)* 2. Allow Floodplain Administrators and other related staff to prepare for and obtain the Certified Floodplain Manager (CFM) certification and/or participate in INAFSM activities 3. Support FEMA approved flood depth mapping (RiskMAP) to better understand the flood risk potential 4. Participate in the update of the Lake Michigan coastal flood hazard zone studies 5. Obtain or dedicate funding to implement recommendations from completed flood protection studies and/or install regional detention or diversion projects. *(Will assist with NFIP compliance)*	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Coastal Storm/Seiche ☐ Earthquake ☐ Extreme Temperature ☒ Flooding ☐ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☐ HazMat Incident	**Ongoing –** 1. Flood studies are completed as funding becomes available. **Proposed Enhancements –** 1. Complete analyses as appropriate to determine exact floodplain boundaries and flood depth grid mapping to include all flood prone areas within the County. Implement flood protection study recommendations as feasible 2. Increase number of County and Municipal CFM registrants. 3. Support flood depth mapping for prioritized areas 4. Adopt Lake Michigan Coastal Flood Zone updates 5. Implement recommendations from completed studies	High *(Analysis, CFM/INAFSM, RiskMAP, Coastal hazards)* Moderate *(Implementation funding)*	Moderate	Floodplain Administrator *(County Kingsford Heights LaPorte Long Beach Michiana Shores Michigan City)* Planning Department *(County LaPorte Long Beach Michigan City)* County Surveyor / Drainage Board	Existing budget Grant
Power Back-Up Generators 1. Require wiring for large generator power back up be installed in all new critical infrastructure 2. Develop and adopt an ordinance requiring the burial of power lines in new development or require designed-failure mode that allows lines to fall or fail in small sections only.	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Coastal Storm/Seiche ☒ Earthquake ☒ Extreme Temperature ☒ Flooding ☒ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☒ HazMat Incident	**Ongoing –** **Proposed Enhancements –** 1. Encourage new critical infrastructure is constructed with generator capabilities as feasible 2. Develop and adopt the ordinance	High *(wiring)* Moderate *(ordinance)*	Low	EMA Building Owners	Existing budget Grant

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Emergency Response & Recovery 1. Utilize realistic training and exercises that stimulate response conditions and scenarios for emergency responders, decision-makers, and general public 2. Coordinate communications, documentation, and record keeping between NFIP communities and agencies including a database of accurate and community specific information following each hazard event s 3. Prepare evacuation plans for neighborhoods and/or mobile home parks in hazard areas 4. Designate and enforce snow routes with no street parking to allow for snow removal activities 5. Develop tiered levels of snow emergencies/advisories, etc. within municipalities, County, and DHS District 6. Develop and implement a voluntary immunization program for all emergency responders, inspection staff, and families	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Coastal Storm/Seiche ☒ Earthquake ☒ Extreme Temperature ☒ Flooding ☒ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☒ HazMat Incident	**Ongoing –** 1. Training exercises are routinely held. **Proposed Enhancement –** 1. Continue exercises and vary scenario to include various municipal departments 2. Coordinate communications and strengthen the relationship between the communities during response efforts. 3. Prepare evacuation plans for localized risk areas 4. Provide signage for snow routes and enforce restrictions 5. Adopt tiered levels of emergencies/advisories 6. Develop a wide-based immunization program	High *(realistic exercises, communications, evacuation plans, snow routes, snow emergencies)* Low *(immunizations)*	Moderate	DHS Sheriff Department Police Department *(LaPorte Long Beach Michigan City)* Fire Departments *(Municipal Townships Volunteer)* Health Department	Existing budget Grant
Community Rating System 1. Reduce flood insurance premiums through increased participation in the NFIP's CRS Program. *(2006 Measure)* *(Will assist with NFIP compliance)*	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☒ Public Information ☒ Structural Control	☒ Coastal Storm/Seiche ☐ Earthquake ☐ Extreme Temperature ☒ Flooding ☐ Tornado/Waterspout/ Windstorm ☐ Winter Storm/Ice ☐ HazMat Incident	**Ongoing –** 1. None of the communities currently participate in CRS program **Proposed Enhancement –** 1. Participation from one or more NFIP Communities	Moderate	Moderate	Floodplain Administrator *(County Kingsford Heights LaPorte Long Beach Michiana Shores Michigan City)*	Existing budget Grant
Stormwater Management 1. Implement the erosion and sediment control BMPs identified in the Storm Water Quality Management Plan	☐ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☐ Public Information ☐ Structural Control	☒ Coastal Storm/Seiche ☐ Earthquake ☐ Extreme Temperature ☒ Flooding ☒ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☐ HazMat Incident	**Ongoing –** 1. LaPorte County, City of LaPorte, and City of Michigan City have developed and routinely review the SWQMPs **Proposed Enhancement –** 1. Continue to implement BMPs outlined in the SWQMP and enforce applicable stormwater ordinances	Moderate	Moderate	Stormwater Departments *(County LaPorte Michigan City)* Planning Department *(County LaPorte Long Beach Michigan City)*	Existing Budget

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT-COST RATIO	RESPONSIBLE ENTITY	FUNDING SOURCE
Tree Maintenance 1. Maintain trees on public property and right-of-ways and encourage maintenance on private property to reduce the risk of downed utility lines and falling limbs	☒ Emergency Services ☒ Nat. Res. Protection ☒ Prevention ☒ Property Protection ☐ Public Information ☐ Structural Control	☒ Coastal Storm/Seiche ☒ Earthquake ☐ Extreme Temperature ☐ Flooding ☒ Tornado/Waterspout/ Windstorm ☒ Winter Storm/Ice ☒ HazMat Incident	**Ongoing –** 1. Utility providers perform routine maintenance along ROW **Proposed Enhancement –** 1. Encourage private landowners to perform maintenance or avoid planting improper trees and shrubs	Moderate	Moderate	County Highway Municipal Street Departments *(LaPorte Long Beach Michigan City)*	Existing Budget Power Suppliers

CHAPTER 5 IMPLEMENTATION PLAN

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

5.1 GEOGRAPHIC INFORMATION SYSTEMS

Update and coordinate GIS layers with location and attributes of critical infrastructure.

- Review current GIS layers and attribute information
- Include additional data as obtained relative to each critical infrastructure
- Coordinate access to layers for each community within the County

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.

- Determine GIS staff familiarity with HAZUS-MH
- Determine appropriate staff and provide opportunities for basic HAZUS-MH training as needed
- Utilize results in planning efforts and hazard training events

5.2 PUBLIC EDUCATION AND OUTREACH

Provide hazard preparedness (warning sirens, radio stations, insurance protection, etc.) literature during Severe Weather Awareness Week, at public facilities and events and to populations within known hazard areas.

- Distribute literature at large public events throughout LaPorte County.
- Provide literature at all municipal offices as appropriate.
- Evaluate additional media outlets and utilize as appropriate (social media, print, billing inserts, etc.)

Post information and/or warning signage in local parks and other public gathering locations explaining outdoor warning sirens and local radio stations that carry emergency information.

- Identify areas where large gatherings may occur
- Prioritize areas identified
- Post information or signage as appropriate for each location

5.3 HAZARDOUS MATERIALS RESPONSE TEAM

Maintain LEPC reporting and training efforts as required through SARA Title III and ensure current facility maps and response plans are on file for Tier II facilities.

- Ensure reports and training exercises are completed as required.
- Prepare listing of all Tier II facilities within LaPorte County.
- Obtain facility maps and response plans

Establish and maintain a local HMRT

- Determine current response capabilities
- Determine needs to establish a local HMRT
- Obtain funding to establish a local HMRT

Increase number of personnel certified to OSHA III Technician level

- Determine current number of each level of OSHA training.
- Identify current personnel suited for increased training
- Obtain training for those staff as available

5.4 LAND USE PLANNING AND ZONING

Incorporate hazard information, risk assessment, and hazard mitigation practices into the Comprehensive Land Use Plan and development review to better guide future growth and development.

- Draft language and prepare exhibits to incorporate into the appropriate sections of the LaPorte County Comprehensive Land Use Plan, individual municipal plans, neighborhood redevelopment plans, etc.
- Adopt amendments as appropriate

5.5 SAFE ROOMS AND COMMUNITY SHELTERS

Develop temporary and/or long term shelter agreements within the County. Potential for tiered levels of shelters, domestic animal shelters, etc.

- Evaluate existing shelter locations.
- Determine if additional locations are needed and in which areas.
- Coordinate with property owners to develop written procedures for opening shelters.

Clearly advertise/announce location of safe rooms and community shelters for large gatherings of people (Football games, 4H Fair, etc.)

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

5.6 EMERGENCY PREPAREDNESS & WARNING

Coordinate with private business owners utilizing large dynamic message boards for business to provide messages during hazardous events and recover efforts.

- Inventory private businesses within each community.
- Determine which dynamic boards are highly visible and in well-traveled areas.
- Coordinate with business owners to determine willingness to post messages and alerts.
- Provide business owners with pre-determined messages as applicable.

Require weather radios in all critical infrastructure and encourage use by residents and businesses.

- Continue to stress the importance of weather radios in all literature, public events, and presentations provided.
- As available, secure funding to purchase weather radios.
- Provide weather radios to facilities in need.

Coordinate communications and notifications within County and DHS District utilizing redundant systems.

- Determine which systems are utilized by which communities and agencies.
- Review capabilities of each system to determine coordination possibilities.
- Determine if systems need to be changed or altered to allow coordination.
- Develop written protocols for roles and responsibilities for communications during and following an event.

Increase awareness and participation in the mass notification system

- Inform residents of the mass notification system and how to register for participation.
- Develop consistent messages to utilize during various hazard events.
- Investigate multiple systems to allow residents to determine the most appropriate system for them to subscribe.

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

- Identify existing CERT trained residents and areas of coverage
- Determine and prioritize areas uncovered by a CERT representative.
- Routinely offer CERT trainings and refreshers.

Continue to utilize and increase participation in various social media outlets for preparedness and recovery efforts

- Investigate social media outlets and determine how they can be employed to provide routine updates and information.
- Determine an appropriate staff member or department to coordinate social media messages
- Increase awareness and participation in the social media outlets to ensure the largest number of residents receive updates and messages

Prepare a detailed response and evacuation plan (utilizing gages, maps and alerts) to improve response and reduce losses from a hazard event.

- Review current forecasting capabilities, including stream gages, maps, and alert systems.
- Prioritize high risk areas.
- Collaborate with agencies and municipalities to prepare evacuation plans for high risk areas
- Present response and evacuation plans to owners/renters within those high risk areas.

Propose and adopt an ordinance to require developers to pay to install additional sirens for new developments or pay into a County-wide fund to install additional sirens as needed.

- Review ordinances from other counties.
- Propose ordinance with appropriate considerations for LaPorte County.
- Adopt the ordinance and set up the appropriate fund.

5.7 BUILDING PROTECTION

Encourage property owners and renters in known hazard areas to have proper insurance coverage to protect their property and assets from potential damage.

- Overlay known hazard area delineations onto parcel information.
- Develop listing of property owners and residents.
- Mail annual postcard, letter, or other announcement indicating the potential need for insurance coverage.

Prohibit the development of new critical infrastructure in 1% and 0.2% annual chance flood hazard areas.

- Review current zoning code and determine if amendments need to be made to strengthen the review process for structures in these flood hazard areas.
- Make any amendments necessary.
- Evaluate proposed development on a case-by-case basis and determine risk for flood damages.
- Suggest flood protection measures for any development allowed in the flood risk areas.

5.8 FLOODPLAIN MANAGEMENT

Conduct detailed hydraulic analyses of areas with repetitive flooding problems, unstudied, understudied, and unnumbered Zone A streams to determine exact floodplain boundaries.

- Review listing of unstudied streams and floodprone areas.
- Secure funding, municipal bond, or funds from existing budgets to complete floodplain studies.
- Update the Floodplain Prioritization Study to direct future analyses.

Allow Floodplain Administrators and other related staff to prepare for and obtain the Certified Floodplain Manager (CFM) certification

- Prepare listing of appropriate staff eligible to prepare for the certification.
- Allow staff time to prepare and study for CFM exam

Support FEMA approved flood depth mapping (RiskMAP) to better understand the flood risk potential.

- Prioritize areas of greatest potential impact from flooding.
- Review effective floodplain boundaries.
- Secure funding and prepare a depth map to indicate the flood risk potential as a depth of water in affected areas.
- Inform land and property owners of the potential risk to their property and structures.

Participate in the update of the Lake Michigan coastal flood hazard zone studies

- Reach out to study developers and determine status of the study.
- Ensure each affected community is represented at future meetings or discussions
- Assist with local adoption and implementation of recommendations within they study.

5.9 POWER BACK-UP GENERATORS

Require wiring for large generator for power back-up be installed in all new critical infrastructure

- Determine needed equipment or retrofits for the proper wiring for large generators.
- Review local and State building requirements for various critical infrastructure.
- Propose and adopt additional requirements if necessary to include proper wiring capabilities in new critical infrastructure.

5.10EMERGENCY RESPONSE AND RECOVERY

Utilize realistic training and exercises that simulate response conditions and scenarios for emergency responders, decision-makers, and general public.

- Determine needs for continued training
- Identify personnel that will benefit from training and exercises
- Coordinate trainings and vary topic to present new scenarios and response actions
- Utilize follow-up debriefing to allow for input on enhancements and/or lessons learned

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

- Review current procedures of each NFIP community and determine any similarities.
- Develop standardized protocols, forms, etc. for each community to utilize following a hazard event and a system through which they provide that information to the EMA.
- Coordinate reported information and utilize during future MHMP update meetings.

Designate and enforce snow routes with no street parking to allow for snow removal activities.

- Review existing routes or prioritized areas in each community.
- Determine high traffic areas or areas where emergency vehicles may need to travel.
- Develop prioritized routes, provide signing to alert public.
- Present routes to Street/Highway Departments and the public to raise awareness of the importance of maintaining clear routes.

Develop tiered levels of snow emergencies/advisories etc. within municipalities, County, and DHS District.

- Review State levels and protocols for issuing emergencies and/or advisories.
- Determine applicability for each community; adjust as needed.
- Develop standardized protocols and roles and responsibilities for those capable of issuing emergencies and/or advisories.
- Locally adopt and enforce the standardized LaPorte/Indiana emergencies and advisories.

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CHAPTER 6 PLAN MAINTENANCE PROCESS

6.1 MONITORING, EVALUATING, AND UPDATING THE PLAN

REQUIREMENT §201.6(c)(4)(i):
[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

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

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

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

During the annual meetings the Implementation Checklist provided in **Appendix 7** will be helpful to track any progress, successes, and problems experienced.

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

DMA 2000 requires local jurisdictions to update and resubmit their MHMP within 5 years (from the date of FEMA approval) to continue to be eligible for mitigation project grant funding. In early 2021, 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 LaPorte County. These hazards, and associated mitigation goals and practices will be prioritized and detailed as in Section 3.0 this MHMP. Sections 4.0 and 5.0 will be updated to reflect any practices implemented within the interim as well as any additional practices discussed by the Committee during the update process.

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

6.2 INCORPORATION INTO EXISTING PLANNING MECHANISMS

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

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

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

6.3 CONTINUED PUBLIC INOLVEMENT

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

Continued public involvement is critical to the successful implementation of the LaPorte 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 LaPorte County website.

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

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

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