MULTI-HAZARD MITIGATION PLAN

Prepared for:

City of Hammond, Indiana

June 2007

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Introduction to the Planning Process

The development of a Multi-Hazard Mitigation Plan (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 and local governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources. The Indiana Department of Homeland Security (IDHS) and the Federal Emergency Management Agency (FEMA) Region V offices administer the MHMP program in Indiana. In order to be eligible for future mitigation funding, the City of Hammond is required to develop a MHMP.

The City of Hammond's MHMP planning effort was led by the City of Hammond Board of Public Works and Safety, and was prepared in partnership with the MHMP Planning Committee which included the City of Hammond Street Department, Sanitary District, Code Enforcement Services Department, Police Department, Fire Department, Environmental Management Department, Emergency Management Agency, Health Department, Parks and Recreation Department, Planning and Development Department, Water Department, and the Mayor's Office. In June 2007, the plan was presented at a public meeting and was made available for public review at the Hammond Public Library and via the City's webpage. Additional information on the planning process is available in **Section 1** of the MHMP.

Hazard Identification and Risk Assessment

A key component of the planning process involved the identification and mapping of critical facilities, which are those facilities that are vital to the health, safety, and welfare of the City's population. In total, 162 critical facilities, including 2 bus stations, 1 broadcast facility, 3 communications centers, 1 community center, 2 emergency operations centers, 7 fire stations, 6 police stations, 24 government facilities, 49 hazardous materials handlers, 2 marinas, 9 medical facilities, 1 military facility, 3 potable water facilities, 1 power station, 45 schools, 5 railway stations, and 1 wastewater treatment plant were identified within the City of Hammond. Additional information on critical facility identification is available in **Section 2** of the MHMP.

Once critical facilities were identified, the Planning Committee determined that earthquakes, extreme temperatures, flooding, hazardous materials, levee failure, severe winter storms/ ice, thunderstorms/ high winds, and tornados were the natural hazards that posed the greatest threat to the City of Hammond. Additional information on hazard selection is available in **Section 3** of the MHMP.

After hazards were identified, a detailed risk assessment was completed for each hazard. A risk assessment measures the potential loss from a hazard event by assessing the vulnerability of buildings, infrastructure, and people in the City of Hammond. It identifies the characteristics and potential consequences of hazards, how much of the City will potentially be affected by a hazard, and the estimated impact on the City of Hammond's assets. Detailed information associated with the potential impacts of each of these hazards is available in Section 3 of the MHMP.

In order to determine which hazard posed the greatest risk to the City, the Planning Committee utilized the Calculated Priority Risk Index (CPRI), which is a tool that allows hazards to be prioritized based on the probability, magnitude, warning time, and duration of each event.

Based on the CPRI, the following hazard ranking was determined by the Planning Committee for the City of Hammond.

1. Flooding
2. Hazardous Materials
3. Thunderstorms/ High Winds
4. Extreme Temperatures
5. Severe Winter Storms/ Ice
6. Tornados
7. Levee Failure
8. Earthquakes

Mitigation Goal

The overall goal of the MHMP is to protect the citizens, visitors, and properties within the City of Hammond from the impacts of hazards through actions associated with emergency services, natural resource protection, prevention, property protection, public information, and structural controls.

Mitigation Practices

In order to fulfill the goal of the planning process, the Planning Committee developed and prioritized a comprehensive list of 38 mitigation practices designed to reduce the social, physical, and economic impacts of each hazard. The following is a list of key high priority mitigation practices identified in the City of Hammond MHMP. Mitigation practices included in the plan are eligible for funding through a wide variety of mitigation grant programs. A comprehensive list of all mitigation practices is available in **Section 4** of the MHMP.

Detailed Flood Studies

- Conduct detailed flood studies (in such a way that would exclude wave run up) to determine Base Flood Elevations for waterways connected to Lake Michigan

Community Rating System

- Reduce flood insurance premiums through participation in the Community Ratings System (CRS).

Building Protection

- Protect existing critical facilities in floodplains.
- Restrict development of new critical facilities in 100-year and 500-year floodplains.

Outdoor Warning Sirens

- Ensure that all outdoor warning sirens are fully operational and remain adequately maintained.
- Add an additional warning siren near the intersection of I-94 and Indianapolis Boulevard.
- Develop Standard Operating Procedures (SOP) clarifying how and when sirens are utilized.

Emergency Warning System

- Require Weather Alert Radios in all municipally owned critical facilities.
- Encourage Weather Alert Radios in all non-municipally owned critical facilities and all other city residences and businesses.

Levee Protection Education
- Develop an education program informing property owners within the "Levee Protection Zone" that their properties are still at risk from flooding.

Public Education & Outreach
- Enhance hazard preparedness literature at public facilities and community events.
- Participate in Severe Weather Awareness Week.
- Become certified as a StormReady Community.
- Promote the existing Lake County Community Emergency Response Team (CERT) Program.

Tree Maintenance and Utility Corridors
- Enhance the existing tree maintenance program to reduce the risk of downed utility lines and falling limbs.

Coordination Among Organizations
- Enhance coordination and collaboration between the City of Hammond and the Red Cross and Salvation Army.
- Continue to re-establish shelter agreements within the City.

Levee Inspection Program
- Conduct regular inspections and perform regular operation and maintenance on flood protection levees.

Power Back-up Generators
- Require power back-up generators at all municipally owned critical facilities.

Implementation Plan
Implementation steps associated with each of the high priority mitigation practices are identified in **Section 5** of the MHMP.

Plan Maintenance
The City of Hammond EMA and Sanitary District will reconvene the MHMP Planning Committee on an annual basis in order to monitor, evaluate, and update the plan as needed. FEMA requires the City to resubmit the MHMP every five years. Additional information related to plan maintenance is available in **Section 6** of the MHMP.

1.0 INTRODUCTION

1.1 PROJECT SCOPE AND PURPOSE

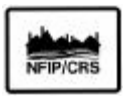
The development of a Multi-Hazard Mitigation Plan (MHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). According to DMA 2000, the purpose of mitigation planning is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify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

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 Federal Emergency Management Agency (FEMA) Region V offices administer the MHMP program in Indiana.

The City of Hammond MHMP planning effort was led by the City of Hammond Board of Public Works and Safety. This Plan was prepared in partnership with the City of Hammond Street Department, Sanitary District, Code Enforcement Services Department, Police Department, Fire Department, Environmental Management Department, Emergency Management Agency, Health Department, Parks and Recreation Department, Planning and Development Department, Water Department, and the Mayor's Office. Representatives from each department attended Planning Committee meetings, provided valuable information about their community, reviewed and commented on the draft MHMP, and assisted with local adoption of the approved Plan.

The development of this MHMP is the necessary first step of a multi-step process to implement programs, policies, and projects to mitigate the effect of hazards in the City of Hammond. The intent of this planning effort was to identify the hazards and the extent that they affect the City, and to formulate mitigation strategies or projects that could be undertaken to mitigate for these hazards. Although this MHMP meets the requirements of DMA 2000 and eligibility requirements of the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), Pre-Disaster Mitigation (PDM) Grant, as well as other FEMA programs including the NFIP Community Ratings System (CRS), additional detailed studies will need to be completed prior to applying for these grants or programs.

Funding to prepare this MHMP was made available through a Pre-Disaster Mitigation Planning (PDM) grant that the IDHS awarded to the City of Hammond. Christopher B. Burke Engineering, Ltd. (CBBEL) was hired to prepare the PDM grant application, facilitate the planning process and prepare the City of Hammond MHMP. This planning process was under the direction of an American Institute of Certified Planners (AICP) Certified Planner.



Throughout this Plan, activities that could count toward 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 rates are discounted to reflect the reduced flood risk resulting from community actions that meet the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote education and awareness of flood insurance. Savings in flood insurance premiums are proportional to the points assigned to various activities. A minimum of 500 points are necessary to enter the CRS program and

receive a 5% flood insurance premium discount. This Plan could contribute as many as 294 points toward participation in the CRS. At this time, the City of Hammond is not a CRS eligible community.

1.2 PLANNING PROCESS

Preparation for the City of Hammond MHMP began in February 2005, when the City of Hammond Board of Public Works and Safety hired CBBEL to assist in the collection of data and development of a Pre-Disaster Mitigation – Competitive (PDM-C) subgrant application package, facilitate the planning process, and prepare the City of Hammond MHMP.

In July 2006, the Mayor's Office compiled a list of Planning Committee members that would meet in August, October, and December 2006, and February 2007. From August through December 2006, CBBEL researched and compiled historic hazard data necessary to prepare the MHMP. In January 2007 a media release describing the development of the MHMP was distributed to local media outlets. In April 2007, CBBEL provided the draft City of Hammond MHMP to the Planning Committee for their review and comment. A public meeting was scheduled for May 2007 to present the draft Plan to the public and other interested parties. Public comments were accepted through the end of May 2007 and then the Plan was forwarded to IDHS and FEMA for their review and comment. Comments from IDHS and FEMA were incorporated into the draft Plan and reviewed by the Planning Committee. Local adoption of the MHMP by the City of Hammond City Council was complete in January 2007.

1.3 PLANNING COMMITTEE

The City of Hammond MHMP Planning Committee was a new committee specifically formed to develop this Plan. Members included representatives from the Board of Public Works and Safety, Street Department, Sanitary District, Code Enforcement Services Department, Police Department, Fire Department, Environmental Management Department, Emergency Management Agency, Health Department, Parks and Recreation Department, Planning and Development Department, Parks Department, Water Department, and the Mayor's Office. These individuals are knowledgeable of local hazards, involved in hazard mitigation, and/or have the tools necessary to reduce the impact of future hazard events. **Table 1-1** lists the individuals that participated on the Planning Committee and the entity they represented.

The Planning Committee convened at the Hammond City Hall and met on August 17, October 12, and December 14, 2006, and February 8, 2007. During these meetings, the Planning Committee successfully identified critical facilities and local hazards; reviewed the State's mitigation goals and set local mitigation goals; reviewed local hazard data and maps; identified and assessed the effectiveness of existing mitigation measures; established 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 1**. Members of the Planning Committee attended the public meeting in May 2007 and assisted with local adoption of the MHMP.

Table 1-1: MHMP Planning Committee

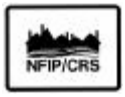
Name	Title	Representing
Rich Diombala	Commissioner	Code Enforcement Services Department
Stan Dostatni	Vice President	Board of Public Works
Gary Gleason	Commissioner	Street Department
Dave Hamm	Fire Chief	Fire Department
Becky McKinley	GIS Manager	Sanitary District
David Milen	Bioterrorism/Disaster Preparedness Coordinator	St. Margaret Mercy Hospital
Brian Miller	Chief	Police Department
Scott Mitchell	Superintendent of Sewer Maintenance	Sanitary District
Pat Moore	Administrator	Parks and Recreation Department
Don Novak	Zoning Administrator	Planning and Development Department
Ron Novak	Director	Environmental Management Department
Rodrigo Panares	Health Officer	Health Department
Brian Poland	City Planner	Planning and Development Department
Sharon Szany	Office Manager	Mayor McDermott's Office
Tony Vicari	Director	Emergency Management Agency
Marty Wielgos	Chief of Staff	Mayor McDermott's Office
Stan Zatorski	Distribution Supervisor	Water Department

1.4 PUBLIC INVOLVEMENT IN THE PLANNING PROCESS

In January 2007, a media release was distributed to the newspapers, radio stations, and television stations in the City of Hammond and surrounding areas and was titled, "How do tornados, floods, and severe winter storms affect you?" The article was faxed to more than 40 local media representatives, discussed the requirements of DMA 2000, and included 4 questions about hazard awareness to which interested residents could respond. Unfortunately, no survey responses were returned to the City, however one resident of the City of Whiting did submit a binder of historic natural and man-made hazard events as covered by local and regional media outlets. **Appendix 2** includes a copy of the media release submitted to local outlets. In June 2007, a media release was submitted to the same group of local media outlets announcing the public meeting. The Northwest Indiana Times and the Post Tribune both ran stories announcing the meeting and Lakeshore Public Television did a television story announcing the event. On June 13, 2007 a public meeting was held at the Lost Marsh Golf Course Youth Clubhouse in the City of Hammond. Seven individuals, one of which was a reporter from the Northwest Indiana Times, attended the meeting. The Times ran an article discussing the draft MHMP on June 15, 2007. The draft MHMP was made available for public review on the City's Web Page and at the City of Hammond Public Library. Media Releases and subsequent articles are included in Appendix 2.

1.5 INVOLVEMENT OF OTHER INTERESTED PARTIES

The Lake County, Indiana EMA's Office, surrounding Lake County municipalities, as well as interested agencies, businesses, academia, and nonprofits were invited to the public meeting and review and comment on the draft City of Hammond MHMP.



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.

2.0 COMMUNITY INFORMATION

The City of Hammond is located in the northwest corner of Lake County in northwestern Indiana along the Illinois-Indiana state line. The City is bordered by Lake Michigan on the north and the City of Chicago on the west. In 2005, the US Census ranked the City of Hammond as the 6th largest city in Indiana with a population of 79,217 citizens.

2.1 NFIP PARTICIPATION

Since March 16, 1968, the City of Hammond has participated in the National Flood Insurance Program (NFIP) (#180134). At the time of preparing this MHMP, the City of Hammond is not participating in the Community Ratings System (CRS) program.

2.2 POPULATION & DEMOGRAPHICS

Between 2000 and 2005, the City of Hammond experienced a decline in population. The 2000 census estimates the City of Hammond's population at 83,048, approximately 4.7% higher than current population estimates of 79,217. Approximately 16% of the population in Lake County lives in the City of Hammond.

Similarly, the area has noticed a decline in population since the 1960's with the largest decreases evident between 1970 and 1980 (13.2% decrease) and between 1980 and 1990 (10.1% decrease). However, as stated in the City's Comprehensive Plan, with affordable housing and good neighborhoods and schools, it is clear that the City of Hammond will experience growth and development in the coming years.

In 2004, the median age of the population in the City of Hammond was 33.9 years. Similar to the rest of Indiana, the largest demographic age group is young adults (25 - 44 years), school aged (5 -17 years), and older adults (45 - 64 years), with a distribution within the City of 30.1%, 22.1%, and 19.8%, respectively. The ethnic majority in the City of Hammond is white which comprises 75% of the City population followed by a growing Hispanic or Latino ethnicity. Similar to the rest of Indiana, 31.8% of the population in the City of Hammond is married with children. The average household size is 2.58 persons compared to the average family size of 3.23. Homeownership is slightly less in the City of Hammond than elsewhere in the state. Approximately 63% of the population owns their home compared to 65.9% statewide.

2.3 LAND USE & DEVELOPMENT TRENDS

Urban land uses dominate the City of Hammond. The City's predominant land use is high intensity residential, which makes up approximately 5,430 acres or 36% of the City's land. Similarly, commercial/industrial/transportation land uses make up approximately 4,070 acres or 27% of the City's land. Include an additional 720 acres associated with low intensity residential land use, and more than two thirds (68%) of the City's land uses consist of urban uses. Deciduous forests are the most common non-urban land use, making up approximately 1,750 acres or 11.5% of land within the City of Hammond. The City of Hammond is divided into the following six neighborhoods, Robertsdale, North Hammond, Central Hammond, South Hammond, Woodmar, and Hessville.

2.4 EMPLOYMENT

Census data from 2000 shows that, of the total working force in the City of Hammond, 86.5% worked in the private sector that includes retail trade, construction, professional technical services, and health care and social services. The annual per capita personal income in 2000

was $16,254 and the median household income in 1999 was $35,528. In 2000, the unemployment rate for the City of Hammond was 5.4%.

Commercial establishments in the City of Hammond employ roughly 34,598 individuals. Manufacturing employs 20% of the workforce, education, health, and social services employs 17.1%, while wholesale and retail trade are the next largest employers with 15.8%. Almost 87% of all workers are employed in the private sector, with another 10% in local government and public administration positions.

2.5 CRITICAL & NON-CRITICAL FACILITIES

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

- **Governmental Facilities** – essential for the delivery of critical services and crisis management including data and communication centers and key government complexes
- **Essential Facilities** – vital to health and welfare of entire population including hospitals and other medical facilities, police and fire, emergency operations centers, evacuation shelters, and schools.
- **Transportation Systems** – necessary for transport of people and resources including airports, highways, railways, and waterways.
- **Lifeline Utility Systems** – vital to public health and safety including potable water, wastewater, oil, natural gas, electric power, and communication systems.
- **High Potential Loss Facilities** – failure or misoperation may have significant physical, social, and/or economic impact to neighboring community including nuclear power plants, high hazard dams, and military installations.
- **Hazardous Material Facilities** – involved in the production, storage, and/or transport of corrosives, explosives, flammable materials, radioactive materials, and toxins.

The HAZUS-MH program and the City of Hammond's GIS information generated a preliminary map and list of critical facilities within the City of Hammond. HAZUS-MH databases include information on critical facilities such as hospitals, police and fire stations, emergency operations centers, shelters, and schools; transportation systems; utility lifelines; high potential loss facilities such as potable water, wastewater, oil, natural gas, electric power, and communication systems; and hazardous material facilities. The Planning Committee reviewed both the database and map for police stations, fire stations, schools, and medical facilities within the City of Hammond. After further discussion, the Planning Committee modified the existing list and added or modified the locations of critical facilities.

There are 162 critical facilities in the City of Hammond identified using the HAZUS-MH database, local GIS data, and input from the MHMP Planning Committee. These facilities include 2 bus stations, 1 broadcast facility, 3 communications centers, 1 community center, 2 emergency operations centers, 7 fire stations, 6 police stations, 24 government facilities, 49 hazardous materials handlers, 2 marinas, 9 medical facilities, 1 military facility, 3 potable water facilities, 1 power station, 45 schools, 5 railway stations, and 1 wastewater treatment plant. **Exhibit 1** illustrates the location of critical facilities and **Appendix 3** lists the critical facilities.

Non-critical facilities include residential, industrial, commercial, and other structures not meeting the definition of a critical facility and are not required for a community to function. Non-critical facilities were identified using the City's building layer and subtracting from that all critical facilities listed above. In total, there are approximately 47,570 non-critical facilities in the City of Hammond, of which approximately 43,800 are residential, 1,450 are commercial, 530 are industrial, 180 are non-critical governmental facilities, and 1,610 are considered miscellaneous. The development of this MHMP focused on critical facilities; thus, non-critical facilities are not mapped or listed.

2.6 MAJOR WATERWAYS & WATERSHEDS

According to the United States Geological Survey (USGS), there are two named rivers in the City of Hammond, the Little Calumet and the Grand Calumet River. The Little Calumet River flows east to west and forms the City of Hammond's municipal boundary to the south. The Grand Calumet River also flows east to west, bisecting the City of Hammond between Michigan Street and 150th Street. In addition to these two waterways, there are Wolf Lake and Lake George, which are located in the Robertsdale Neighborhood. The City of Hammond is bordered on the north by Lake Michigan.

According to USGS, there are 5 14-digit Hydrologic Unit Code (HUC) watersheds draining the City of Hammond. The largest watershed is the Lake Michigan Shoreline-Indiana Harbor Canal Watershed (19,787 acres) and the smallest is the Little Calumet River-Indiana/Illinois Stateline Watershed (3,046 acres). **Table 2-1** lists the 14-digit HUC watersheds in the City of Hammond.

Table 2-1: List of 14-Digit HUC Watersheds

14-Digit HUC #	14-Digit HUC NAME	Acres
04040001020010	Lake Michigan Shoreline-Indiana Harbor Canal	19,787
07120003050010	Grand Calumet River – West	4,618
04040001020020	Grand Calumet River – Gary	16,200
07120003030060	Little Calumet River – Indiana/Illinois Line	3,046
07120003030050	Little Calumet River (E-W Split)	9,676

(USGS, 2006)

2.7 TOPOGRAPHY

The City of Hammond lies in an area where soils are derived from glacial till and outwash, lacustrine deposits, windblown sand and organic materials, and is located in the plain of former glacial Lake Chicago, referred to as the Lake Michigan Border region. This region can be characterized by long and narrow ridges extending in the same general direction as the lakeshore. Forming in the depression areas of these ridges are the poorly drained Tawas soils while the Oakville soils were formed atop the narrow ridges. The topography of Hammond is generally flat, with a maximum relief of 25 feet.

2.8 CLIMATE

The Midwestern Regional Climate Center provided climate data that includes information retrieved from a weather station located in Hobart, approximately 16.5 miles east of the City of Hammond, and is identified as National Climatic Data Center (NCDC) station 124008. The average annual mean temperature for the area is 49.2 ºF. Mean precipitation is 38.02" a year, with the wettest month being June with 4.47" mean total, and the driest month is February, with

1.52” mean total. The highest 1-day maximum precipitation was 5.64” on June 3, 1941. Although, various other reports indicate that a September 13, 2006 rain event resulted in more than 6 inches of rainfall in Lake County, Indiana. Mean snowfall is 25.9” per year. The highest monthly amount of snowfall recorded at this station is 32.5” for January 1979. On average, there are 117.8 days of rain greater than or equal to 0.01”, 23.4 days of rain greater than or equal to 0.5”, and 9 days of rain greater than or equal to 1.0” of depth. There are approximately 160 days in the growing season for the area, based on a base temperature of 32 ºF and falls between May 5 and October 16.

3.0 RISK ASSESSMENT

The goal of mitigation is to reduce the future impacts of a hazard including property damage, disruption to local and regional economies, and the amount of public and private funds spent to assist with recovery. To realize this goal, a comprehensive examination of natural hazard risk in the City of Hammond is required. A risk assessment measures the potential loss from a hazard event by assessing the vulnerability of buildings, infrastructure, and people in the City of Hammond. It identifies the characteristics and potential consequences of hazards, how much of the City will be affected by a hazard, and the impact on City of Hammond's assets.

3.1 HAZARD IDENTIFICATION

The MHMP Planning Committee reviewed the list of natural hazards prepared by FEMA Region V, identified those hazards that affected the City of Hammond, and agreed upon which hazards they would like to study in detail as part of this planning effort. As illustrated in **Table 3-1**, the Planning Committee decided to study, earthquake, extreme temperature, flooding, hazardous materials, levee failure, severe winter storm (ice), thunderstorm/ high wind, and tornado in detail as part of this planning effort.

Table 3-1: Hazards Identification

List of Hazards	Hazards with Local Impact	Hazards for Detailed Study
Dam Failure	No	No
Earthquake	**Yes**	**Yes**
Extreme Temperature	**Yes**	**Yes**
Flooding	**Yes**	**Yes**
Hazardous Materials (Storage and Transport)	**Yes**	**Yes**
Levee Failure	**Yes**	**Yes**
Landslide	No	No
Severe Winter Storm/ Ice	**Yes**	**Yes**
Thunderstorm/ High Wind	**Yes**	**Yes**
Tornado	**Yes**	**Yes**

Once the hazards were identified, the Planning Committee prioritized these hazards in terms of importance and potential for disruption to the City of Hammond using the Calculated Priority Risk Index (CPRI). The CPRI was adopted from MitigationPlan.com and is a tool by which individual hazards can be evaluated and ranked according to an indexing system. The CPRI value was obtained by assigning varying degrees of risk to four categories (probability, magnitude/severity, warning time, and duration) for each hazard, and then calculating an index value based on a weighting scheme. To determine the CPRI, a value of 1 through 4 is assigned to the categories for probability (unlikely – highly likely), magnitude/severity (negligible – catastrophic), warning time (more than 24 hours – less than 6 hours), and duration of event (less than 6 hours – greater than 1 week). The following is 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 of Event X 0.10.

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

- **Unlikely** – Event is possible within the next ten years.
- **Possible** – Event is probable within the next five years.
- **Likely** – Event is probable within the next three years.
- **Highly Likely** – Event is probable within the calendar year.

Magnitude/Severity is defined by the extent of injuries, shutdown of critical facilities, and the extent of property damage sustained.

- **Negligible** – Injuries and/or illnesses are treatable with first aid, minor quality of life is lost, shutdown of critical facilities and services for 24 hours or less, less than 10% property is severely damaged.
- **Limited** – Injuries and/or illnesses do not result in permanent disability, complete shutdown of critical facilities for more than one week, more than 10% property is severely damaged.
- **Critical** – Injuries and/or illnesses result in permanent disability, complete shutdown of critical facilities for at least 2 weeks, more than 25% property is severely damaged.
- **Catastrophic** – Multiple deaths, complete shutdown of facilities for 30 or more days, and more than 50% property is severely damaged.

The CPRI value provides a means to assess the impact of one hazard relative to other hazards within the City of Hammond. **Table 3-2** illustrates the combined CPRI values for the City of Hammond.

Table 3-2: Determination of CPRI Value for Natural Hazards

	Probability • Unlikely • Possible • Likely • Highly likely	**Magnitude/ Severity** • Negligible • Limited • Critical • Catastrophic	**Warning Time** • > 24 hrs • 12-24 hrs • 6-12 hrs • < 6 hrs	**Duration of Event** • < 6 hrs • < 1 day • < 1 wk • > 1 wk	**CPRI**
Flooding	Highly Likely	Critical	< 6 hrs	< 1 wk	3.60
Hazardous Materials	Highly Likely	Limited/ Critical	< 6 hrs	< 1 day	3.35
Thunderstorm/ High Wind	Highly Likely	Negligible/ Limited	< 6 hrs	< 6 hrs	2.95
Extreme Temperature	Highly Likely	Limited	> 24 hrs	> 1 wk	2.95
Winter/ Ice Storm	Likely	Limited	12-24 hrs	> 1day/ < 1 wk	2.50
Tornado	Possible	Critical	< 6 hrs	< 6 hrs	2.50
Levee Failure	Unlikely/ Possible	Limited	< 6 hrs	< 1 wk	2.18
Earthquake	Unlikely	Negligible/ Limited	< 6 hrs	< 6 hrs	1.60

According to the Planning Committee, flooding (3.6) ranked as the number one hazard followed by hazardous materials (3.35), thunderstorm/ high wind (2.95), extreme temperatures (2.95), severe winter storm/ ice storm (2.5), tornado (2.5), levee failure (2.18), and earthquake (1.6). In those cases where hazards received the same CPRI value, the Planning Committee discussed

and selected that hazard which is a higher priority. **Section 3.2** includes a profile the individual hazards as well as a CPRI value for the City of Hammond.

Similar to this type of ranking procedure, the Lake County EMA, along with other response and support agencies within the County developed the Lake County Comprehensive Hazard Analysis in 2003. Within this analysis, the committee completed a Hazard Identification Worksheet by which each hazard was assigned a score of 1-5 based on the information below to establish an overall probability for each hazard. The scoring results are listed in **Table 3-3** and are compared with the CPRI values, historical losses and estimated damages for each hazard in **Table 3-13** at the end of this chapter.

Table 3-3: Comprehensive Hazard Analysis Scores

Hazard	Score
Earthquake	Unlikely to occur (1)
Extreme Temperature	Hazard has occurred and is likely to occur again (4)
Flooding	Hazard has occurred and is likely to occur again (4)
Hazardous Materials	High impact and high probability (5)
Levee Failure	Not evaluated
Severe Winter Storm/ Ice Storm	High impact and high probability (5)
Thunderstorm/ High Wind	High impact and high probability (5)
Tornado	High impact and high probability (5)

(Lake County Comprehensive Hazard Analysis, 2003)

According to the 2003 Comprehensive Hazard Analysis scoring, hazardous materials events, severe winter storms, thunderstorm/ high wind events, and tornados have the highest probability occurring within the County, and are likely to have a high impact to the area. Extreme temperatures and flooding were individually scored as a hazard that has occurred and is likely to occur in the area again. Earthquakes were considered unlikely to occur.

3.2 HAZARD PROFILES

The following sections profile each of the hazards selected for additional investigation by the Planning Committee. Each hazard is discussed in terms of the causes, effects and characteristics that the hazard presents to the City. Information on hazard extent, historic occurrence, and probable future event occurrence is discussed. A community vulnerability assessment follows the hazard profile and describes, in general terms, the current exposure, or risk, to the City of Hammond regarding potential losses to critical facilities and infrastructure. Finally, future risk related to new development and land use is discussed for each hazard.

3.2.1 FLOODING

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 thaws. A flood, as defined by the National Flood Insurance Program, is a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from overflow of inland or tidal waters and unusual and rapid accumulation or runoff of surface waters from any source, or a mudflow. Floods can be slow or fast rising but generally develop over a period of days. Mitigation includes any activities that prevent an emergency, reduce the chance of an emergency

happening, or lessen the damaging effects of unavoidable emergencies. Investing in mitigation steps now, such as, engaging in floodplain management activities, constructing barriers, such as levees, and purchasing flood insurance will help reduce the amount of structural damage to the homes and financial loss from building and crop damage should a flood or flash flood occur.

River flooding, flash flooding, and urban flooding are the predominant types of flooding that occur in the City of Hammond. Flooding and associated flood damage is most likely to occur during the spring because of heavy rain combined with melting snow. However, provided the right saturated conditions, intense rainfall of short duration during summer and fall rain storms are capable of producing damaging flash flood conditions throughout the City.

The standard for evaluation of urban flooding is a 1% chance of flooding or a 100-year flood. This is a benchmark used by the FEMA to establish a standard of flood protection in communities throughout the country. The 100-year flood is referred to as the "regulatory" or "base" flood. The term 100-year flood is often incorrectly used and can be misleading. It does not mean that only one 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 period.

Flooding: Historic Data

According to the National Oceanic Atmospheric Administration's (NOAA) NCDC, there have been 16 floods in Lake County since 1993. Eleven of those have been flash floods and five have been traditional floods. According to NCDC records, these events have resulted in an estimated $14 Million in property damages. Three of these events have resulted in more than $1 Million dollars in property and crop damages. The first event recorded by the NCDC was a January 1993 event that resulted in approximately $5 Million in losses. The impacts of this flood were felt over a regional area that extended well beyond the City of Hammond and Lake County boundaries, affecting communities in Elkhart, LaPorte, Lagrange, Noble, Porter, St. Joseph, and Steuben Counties. The second event occurred in October 2003, and it too impacted multiple northwest Indiana communities.

The third event occurred in September of 2006, as the City was going through the MHMP planning process. According to the City of Hammond Sanitary District, this storm resulted in approximately 3.8 to 8 inches of rain falling on the City, in approximately 5 hours. The City received complaints of basement backups from over one thousand residents across the City. Particular hard hit areas included portions of the Robertsdale, North Hammond, Central Hammond, and Hessville Neighborhoods, while backups also occurred in both the South Hammond and Woodmar Neighborhoods. In addition, the NCDC reports that manhole covers were blown off storm sewers in the City of Munster, which is located directly to the south of the City of Hammond across the Little Calumet River. The September event also resulted in many residents becoming stranded at Dowling Park, which is located in the Hessville Neighborhood and is bordered on the south by JF Mahoney Drive and Interstate 80/94 and on the east by

Parish Avenue. Flooding from State-owned drainage ditches along Interstate 80/94 are believed to be the primary cause of Dowling Park access roads becoming impassible. Directly south of Dowling Park, across Interstate 80/94, exit ramps between the Interstate and Kennedy Avenue were also impassable due to high water.

In addition to these events, the City of Hammond Flood Insurance Study (FIS) indicates that major flooding events have occurred in the City of Hammond in March 1908, March 1944, April 1947, March 1948, May 1948, October 1954, and July 1957. Widespread damage has resulted from many of these events. For example, the FIS indicates that the October 1954 event resulted in more than 400 residents in the Schleicher Subdivision being evacuated, and damages associated with the event were estimated to exceed $2.3 Million. The Schleicher Subdivision is located in the South Hammond/Woodmar Neighborhoods and is bordered on the north by Interstate 80/94, on the east by Northcote Avenue, on the South by the Little Calumet River, and on the west by Columbia Avenue. Flooding from the Little Calumet River continues to be a problem for residents of the Schleicher Subdivision today.

According to the Indiana Department of Natural Resources (IDNR), there are 5 repetitive loss properties in the City of Hammond. As of July 31, 2006, there were 2,195 flood insurance policies in the City of Hammond, totaling more than $197 Million in total coverage, and more than 180 claims had been paid totaling approximately $285,000. **Exhibit 2** identifies the general location of repetitive loss structures in the City of Hammond.

As shown in Exhibit 2, the primary source of flooding in the City of Hammond is the Little Calumet River. In addition, there is also flooding along the Grand Calumet River, Wolf Lake, and Lake George. The Little Calumet River has been a major source of flooding to communities in Northwest Indiana for many years. In recognition of the magnitude of the flooding problem, the Army Corps of Engineers (USACE) in cooperation with the Little Calumet River Basin Commission are currently constructing the Little Calumet River Flood Control and Recreation Project. When complete, the levee control project will span approximately 22 miles from the City of Gary through the City of Hammond all the way to the Indiana-Illinois State Line and will cost approximately $200 Million. Of that $200 Million, $150 Million are federally funded with the remaining $50 Million coming from non-federal cost share. As it stands, the project is estimated at 49% complete. Levee construction is currently complete from Martin Luther King Drive in the City of Gary all the way to the far eastern edge of the City of Hammond at Cline Avenue. Within the City of Hammond, there are four proposed construction stages. The first stage runs from the western border with Gary at Cline Avenue to Kennedy Avenue. Construction of this stage is currently complete. The next stage to be completed runs from Kennedy Avenue to Northcote Avenue and is scheduled to be completed in late 2007. The third stage of the project will run from Northcote Avenue to Columbia Avenue and is anticipated to be completed in July 2009. The fourth and final stretch of the project runs from Columbia Avenue to the Indiana-Illinois State Line and is anticipated to be completed in December 2009. Exhibit 2 also identifies the stretch of the Little Calumet River impacted by the Little Calumet River Flood Control and Recreation Project. The vulnerability

assessment below details the long-term benefits that the project will have to City residents and business currently located within the Little Calumet River's known flood hazard area.

In addition to flooding along the Little Calumet, concerns have also been raised with regard to approximately 1,800 homes shown within the City of Hammond's regulatory floodplain associated with Wolf Lake in the Robertsdale Neighborhood. Wolf Lake consists of nine pools divided by earthen or slag dikes and causeways and is hydraulically connected to Lake Michigan. Incidents of actual flooding of this area have been historically rare and have not occurred since a portion of the Wolf Lake shore was raised by slag material a few decades ago in response to flooding originating from high lake levels.

However, a recent study by the USACE on the aquatic ecosystem restoration of Wolf Lake, dated June 2003, showed that after the proposed restoration work is completed, the "likely" 100-year flood elevation of Wolf Lake would be reduced. Based on that conclusion, the report raised the hope that as much as 1,800 homes in the Robertsdale Neighborhood can be removed from the Wolf Lake flood hazard area as a result of this restoration project. However, based on an in-depth review of that study, despite a reduction in "likely" 100-year flood elevations and due to FEMA special requirements, which include wave-run up in the Base Flood Elevation (BFE) determination, the restoration project will not result in the desired intent of structure removal from the Wolf Lake regulatory flood hazard designation.

In recognition of this, practical alternatives to reduce the regulatory BFE of Wolf Lake or to remove as many Robertsdale Neighborhood structures as possible from the regulatory floodplain were evaluated. Based on a detailed evaluation of various alternatives, it was recommended that a field survey be completed and that the results be used in support of a multi-structure FEMA Letter of Map Amendment (LOMA) application in order to identify and remove from the Wolf Lake regulatory floodplain, those homes that are located on local high ground above the BFE. This study is currently being completed.

This investigation into the regulatory BFE of Wolf Lake has also led the City of Hammond to request FEMA to conduct flood studies to determine BFEs, which would exclude wave run-up, for waterways connected to Lake Michigan.

The probability of a flood in the City of Hammond is highly likely. The magnitude or severity of flooding determines the extent to which there is substantial damage and/or disruption to homes, businesses, and transportation corridors during flood events. In the City of Hammond, the magnitude of flooding is considered critical. The warning time associated with flood events is usually less than six hours, and the duration of flood events is typically greater than a day but less than a week.

Flooding: Vulnerability Assessment

In order to determine the number of structures within the City of Hammond's floodplain boundaries, the City's most recent building layer was overlaid on FEMA floodplain boundaries, which were provided by the Hammond Sanitary District and the IDNR. The Hammond Sanitary District provided the bulk of the floodplain data. However, floodplain boundaries relevant to the Grand Calumet River were provided by the IDNR. Floodplain boundary information relevant to this stretch of the Grand Calumet River is still considered preliminary, as it is currently being studied by the IDNR. However, this data is considered the best available data relevant to flooding in the City of Hammond. At the time of this report, preliminary floodplain boundary information was only available for the Grand Calumet River and was not available for other waterways within the City of Hammond.

According to this analysis, there are approximately 11,020 structures within the City of Hammond's known flood hazard area. Known flood hazard areas include delineated 500-year flood boundaries, 100-year flood boundaries (including floodway), and Unnumbered Zone A (approximate studies) floodplain boundaries as defined on the most recent FIRMs. Of this total, 5,074 structures are located within the 100-year floodplain (zero structures within floodway), 8,663 structures are located in the 500-year floodplain (of these, 3,589 are located outside the 100-year boundary), and 2,357 structures are located in the Unnumbered Zone A floodplain boundaries. Of the structures located in known flood hazard areas, 95% are residential. **Table 3-4** below identifies the approximate number and relative size of each of the structures currently located within the City of Hammond's known flood hazard areas.

Table 3-4: Structures Located in Known Flood Hazard Areas

Structure Size	100-Year	500-Year*	Unnumbered Zone A
Small (<400 Sq Ft)	556	987	292
Medium (>=400 and <=5000 Sq. Ft.)	4,446	7,567	2,042
Large (> 5000 Sq. Ft)	72	109	23
Total	**5,074**	**8,663**	**2,357**

*These numbers include structures also located within the 100-year floodplain boundary.

In order to estimate the potential total damage that could be associated with a large-scale flood event, it was estimated that 25% of structures in the known flood hazard area would be destroyed, 35% of structures would be 50% damaged, and 40% of structures would be 25% damaged. Building values were based on national median values provided by the HAZUS-MH software, which estimate median residential property values at $137,107, commercial property values at $190,400, industrial property values at $219,940, and public or governmental property values at $215,540. Based on these assumptions, it is estimated that a large scale flood event in the City of Hammond could result in $372 Million in damages to structures in the 100-year floodplain, $636 Million in damages to structures in the 500-year floodplain (includes structures in 100-year floodplain), and $174 Million in damages to structures in Unnumbered Zone A floodplains.

Of the structures included above, 13 of them are considered critical facilities. Again assuming that 25% of structures would be destroyed, 35% of structures would be 50% damaged, and 40% of structures would be 25% damaged it is estimated that a large scale flood event would result in approximately $3.2 Million in damages to 6 critical facilities in the 100-year floodplain, $7.2

Million in damages to 10 critical facilities in the 500-year floodplain (includes structures in 100-year floodplain), and $395,000 in damages to 3 critical facilities in the Unnumbered Zone A floodplain.

The above analysis is based on current floodplain delineations. However, as discussed above the Little Calumet River Basin Commission and the USACE are currently constructing the Little Calumet River Flood Control and Recreation Project. When complete, the Levee project will run from the City of Gary to the Indiana-Illinois State Line. Currently, within the City of Hammond, levee construction is complete from Cline Avenue to Kennedy Avenue, and it is anticipated that by the end of 2007 the levee will be complete from Kennedy to Northcote Avenue. When this stretch of levee is completed, it will result in the removal of all properties between Northcote Avenue and Cline Avenue from the Little Calumet River's floodplain boundaries. In total, 2,041 structures will be removed from the 100-year floodplain and 4,402 structures will be removed from the 500-year floodplain (includes structures in 100-year floodplain). In addition, completion of this stage of the levee project removes all 6 critical facilities from the City's 100-year floodplain.

Once the levee project is completed to Northcote Avenue, work on 2 additional stages will begin. One stage runs from Northcote Avenue to Columbia Avenue, and the other stage runs from Columbia Avenue to the Indiana-Illinois State Line. Once these final stages are complete, an additional 3,009 properties will be removed from the 100-year floodplain and an additional 4,231 properties will be removed from the 500-year floodplain.

In total, it is estimated that completion of the Little Calumet Flood Control and Recreation Project will remove 8,633 structures from the 100-year and 500-year floodplain. **Table 3-5** identifies the number of structures in the known flood hazard area in the City of Hammond as of the writing of this plan, once Stage 1 and 2 (Cline Avenue to Northcote Avenue) of the levee project are complete, and once Stages 3 and 4 (Northcote Ave. to State Line) are complete.

Table 3-5: Current and Future Estimates of Structures in the City of Hammond's Floodplains

Floodplain Boundary	Currently		Stage 1 and 2 Complete (Cline to Northcote)		Stage 3 and 4 Complete (Northcote to State Line)	
	Non-Critical	Critical	Non-Critical	Critical	Non-Critical	Critical
100-Year	5,074	6	3,033	0	24	0
500-Year*	8,663	10	4,261	3	30	0
Zone A	2,357	3	2,357	3	2,357	3
Total	**11,020**	**13**	**6,618**	**6**	**2,387**	**3**

*These numbers include structures also located within the 100-year floodplain boundary.

Utilizing the same assumption as utilized in Table 3-5, **Table 3-6** estimates total damages that could be associated with a large scale flood event as of the writing of this plan, after the completion of levee Stages 1 and 2, and following the completion of levee Stages 3 and 4.

Table 3-6: Current and Future Estimates of Flood Damages in the City of Hammond's Floodplains

Floodplain Boundary	Current		Stage 1 and 2 Complete (Cline to Northcote)		Stage 3 and 4 Complete (Northcote to State Line)	
	Non-Critical	Critical	Non-Critical	Critical	Non-Critical	Critical
100-Year	$ 372 M	$3.15 M	$222 M	$0	$1.83 M	$0
500-Year*	$ 636 M	$7.18 M	$312 M	$3.93 M	$ 2.47 M	$0
Zone A	$174 M	$395 K	$174 M	$395 K	$174 M	$395 K
Total	**$810 M**	**$7.58 M**	**$486 M**	**$4.32 M**	**$178.30 M**	**$395 K**

*These numbers include structure values also located within the 100-year floodplain boundary.

As shown, the Little Calumet River Flood Control and Recreation Project will reduce the number of structures in the City's 100-year floodplains by 99% and will reduce the number of structures in the City's 500-year floodplains by 96%. In addition, potential damages associated with flood events are estimated to drop by approximately 99% for residents in the City's 100 and 500-year floodplains.

While it is difficult to overstate the value that the Little Calumet River Flood Control and Recreation Project will bring to the City of Hammond, it is important to note that flooding risks will still exist throughout the City even after the Project is completed. In addition to riverine flooding, the City also experiences overland flooding associated with inadequate drainage in certain parts of the City. These events typically occur after heavy rain events. While the completion of the Little Calumet River Flood Control and Recreation Project will be very beneficial to the City, much can be done to continue to mitigate the impacts that future flood events have on the City of Hammond.

Flooding: Existing Mitigation Practices

Mitigation practices are projects, policies, or programs that reduce the social, physical, and economic impact of hazards. As part of this planning process, the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements as well as suggested new practices. The following is a summary of the mitigation practices discussed. A chart detailing all of the existing and proposed mitigation practices, hazards addressed, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in **Section 4.0** of this Plan.

In 1993, the City of Hammond adopted a Floodplain Ordinance. The purpose of the ordinance is to reduce the potential loss of life and property, reduce the potential for health and safety hazards, and to reduce the potential for extraordinary public

expenditures for flood protection and relief. The ordinance prohibits development in the floodplain that creates a damaging or potentially damaging increase in flood heights or velocity or threats to public health and safety. The ordinance also states that the cumulative effect of developments in the 100-year floodplain when combined with all other existing and anticipated development will not increase the regulatory flood elevation more than one tenth of one foot and will not increase damages or potential flood damages. In the future, the City of Hammond should also restrict development of critical facilities in the 100 and 500-year floodplain.

Flood monitoring systems such as USGS stream gages, field observation, and vigilant attention to local weather systems are used in the City of Hammond to monitor continuous changes in water levels on local waterways. These monitoring systems, in partnership with local media weather warnings and advisories, reduce potential losses by providing needed time to prepare and take action to remove persons and protect property as well as mobilize emergency response personnel. Currently there are 2 USGS stream gages located in the City of Hammond. The gages are located on the Grand Calumet River, at Kennedy Avenue and Hohman Avenue. In order to ensure continued warning the City should ensure that these gages remain well maintained, and as funding allows should coordinate with USGS to add additional gages. The City also coordinates closely with Army Corp of Engineers to monitor water levels along the Little Calumet River. During the September 2006 event, the City notified hundreds of residents along the Little Calumet River of the pending flood risks, and loaded sand bags on municipal trucks in preparation for the flood. Fortunately, water levels did not crest as high as predicted, and sandbags and evacuations were not necessary.

As discussed above, the City of Hammond should also conduct detailed floodplain studies for all waterways connected to Lake Michigan. Floodplains for these areas are currently delineated utilizing approximate measures and have not been studied in detail. These studies should be conducted in a way that would exclude wave run-up in determination of BFEs. Detailed studies would help reduce flood insurance premiums for landowners who are determined to be outside of the known flood hazard area, and would assist the City in developing the most efficient and effective solutions to mitigate against the impacts of future flooding in these areas.

The City of Hammond Sanitary District should continue to inspect and maintain storm sewers within the City, and where possible should divert and retain stormwater through regional detention to minimize and prevent localized flooding. The vast majority of stormwater within the City of Hammond drains through closed pipes. However, there a few State regulated drainage ditches located along State highways that are maintained by the Indiana Department of Transportation (INDOT). The City should coordinate with INDOT to ensure that these ditches are adequately maintained to prevent future flood events such as the event that occurred in September 2006 at Dowling Park.

The City of Hammond should also continue to pursue separation of their storm and sanitary sewer systems, and should continue moving forward with their Combined Sewer Overflow (CSO) Long Term Control Plan and Stormwater Quality Management Plans. Compliance with both CSO and Stormwater requirements will result in tangible long-term reductions in localized flooding problems and improvements in receiving water quality. In the middle to late 1980's the City of Hammond completed a City-wide Sewer Modeling Project that resulted in a wide variety of sewer system separation and enhancement projects, which the City has been steadily implementing over the last 15 to 20 years. One such project resulting from the Modeling Project, is the East Hammond Sewer Separation Project, which involves the installation of more than 1,400 feet of storm sewer pipe to the Columbia Avenue area and will result in local

drainage improvements as well as a reduction of basement backups. Additionally, the City should continue to explore additional structural flood control solutions such as stormwater diversion and detention projects.

In addition, the Hammond Sanitary District is currently constructing a CSO Pond on the west side of a Columbia Avenue, adjacent to the Wastewater Treatment Plant. The pond is designed to divert CSO flows from the sewer system, and should help prevent basement backups and CSOs throughout the City.

Basement backups as a result of inadequate sewer system capacity have been a concern and problem for the City for many years. In recognition of this problem, in the past, the City of Hammond Sanitary District has offered a 50/50 cost-share with local property owners to install back-flow prevention devices in basements. The Sanitary District is currently considering reestablishing this program.

In October 2004, the City of Hammond completed a Community Rating System (CRS) Activity Evaluation, which summarizes a review of the floodplain management activities in the City of Hammond. In order to reduce the premiums paid on flood insurance, the City of Hammond should begin implementing recommendations from the CRS Activity Evaluation and should consider joining the NFIP CRS program. The CRS is a voluntary incentive program that recognizes and encourages community floodplain activities that exceed the minimum NFIP requirements. Floodplain activities are assigned points and the higher the points, the higher the flood insurance premium discount. A minimum of 500 points are necessary to enter the CRS program, which equates to a 5% discount in flood insurance premiums. Participation and adoption of this MHMP could contribute as many as 294 points toward the 500 points needed to join the CRS program.

Currently, the City of Hammond Sanitary District has an extensive GIS system. City staff members have also received training in the use of HAZUS-MH software. The City should continue to upgrade its GIS data to improve information related to housing, elevation, and point addresses. Concurrently, the City should incorporate local GIS information into HAZUS-MH software to enhance the accuracy of HAZUS-MH software. Once updated with the City's GIS data, HAZUS-MH software can be used as an extremely powerful tool through which to predict impacts and develop mitigation strategies associated with potential future flood events.

In addition, the Lake County EMA participates in the Severe Weather Awareness Week, which was created by the NWS. Severe Weather Awareness Week is a multi-agency education and awareness event focusing on severe weather, including flooding. Along with the County representatives, the Indiana State Police, the NWS, and the Indiana State Emergency Management Agency provide and distribute information to county schools, hospitals, community groups and facilities and the public. The City should facilitate and assist in the dissemination of educational materials during Severe Weather Awareness week.

The Planning Committee also discussed the need to develop a public awareness campaign encouraging local residents to coordinate with and assist neighbors during flooding and other emergency events. The City should also coordinate and meet regularly with representatives from the Red Cross of Northwest Indiana and the Salvation Army to ensure that local emergencies are handled as efficiently as possible.

In addition, the City should also ensure that all building inspectors, fire fighters, police officers, and other emergency responders are appropriately immunized. This will help ensure that emergency responders are well prepared to efficiently respond to all emergency situations. Currently Comprehensive Care of Indiana provides the Hammond Fire Department with the following services: Physical, Sprometry, Respirator Evaluation, Chest X-ray, Electrocardiogram, Audiogram, Vision Exam, CBC, Chemical Profile, Hemoglobin A1C, and Urinalysis. In addition, the Hammond Fire Department is offered the following optional services: Prostate Specific Antigen, Hemoccult, HIV testing, Tuberculosis testing, Tetanus testing, and Hepatitis B and C testing.

Finally, the City should also actively pursue becoming a certified StormReady Community. StormReady is a community based program offered by the NWS that helps arm America's communities with the communication and safety skills needed to save lives and property–before and during severe weather events. The program encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations.

Social, physical, and economic losses from flooding will most likely increase as more people choose to live, work and visit the City of Hammond. Increases in damages, losses and injuries can be expected as the population and number of facilities continues to increase within the City. Ensuring that residents and visitors are well informed about the potential impacts from flooding as well as proper methods to protect themselves and their property will help to reduce future losses and damage.

3.2.2 HAZARDOUS MATERIALS

An explosion is the sudden loud release of energy and a rapidly expanding volume of gas that occurs when a gas explodes. Explosions result from the ignition of volatile products such as petroleum products, natural and other flammable gases, hazardous materials/chemicals, dust, and bombs. While an explosion surely may cause death, injury, and property damage, a fire routinely follows which may cause further damage and inhibit emergency response. Materials classified as hazardous may also leak from storage facilities or be accidentally released into the air or onto the ground, creating a serious hazard for workers, neighbors and emergency responders. Emergency response may require fire, safety/law enforcement, search and rescue, and hazardous materials response units.

Hazardous Materials: Historic Data

Historically, the City of Hammond and Lake County have not experienced a large scale hazardous materials release from a fixed location or during transportation. Likewise, even

small-scale releases or events have not been the cause of serious injuries or death to those involved or responding to the incident. However, the potential for a serious event is still large enough to warrant plans and preparedness at the local level. **Table 3-7** identifies significant hazardous materials releases from fixed sites located in Lake County.

Table 3-7: Significant Hazardous Materials Releases – Fixed Sites (1987-2003)

Date	Location	Characteristics of the Events
1987	Gary, Indiana	Hydrochloric acid spill triggers the evacuation of 2500 residents for more than 9 hours. This resulted in many unique problems related to emergency transportation, medical treatment, shelter locations, and communications.
2000	Hammond/East Chicago, Indiana	A hazardous materials release resulted in fire and heat damage, and the evacuation of more than 2,000 residents in East Chicago.
2003	Whiting	An electrical problem caused an explosion and fire at a BP Amoco facility in Whiting. 135 people needed to be decontaminated as a result of this incident.

(Lake County Comprehensive Hazard Analysis, 2003)

In addition to the events listed in Table 3-7, in November of 2006, a large fire occurred at the Jupiter Aluminum Plant in the City of Hammond. No injuries were reported, but total losses associated with the fire have been estimated in excess of $100 Million. These estimates include structural damages as well as other economic costs associated with lost production.

Table 3-8 identifies significant hazardous materials releases from transportation related activities.

Table 3-8: Significant Hazardous Materials Releases – Transportation (2002-2003)

Date	Location	Characteristics of the Events
2002	Lake Station	A fuel truck rolled over on the Indiana Toll Road at Lake Station, which resulted in a release of 1,000 gallons of diesel fuel.
2002	Cedar Lake	A snowmobile collided with an ammonia tank, resulting in the release of 1,500 gallons .
2003	St. John	Derailment of small train resulted in diesel spill into adjacent, Shilling's Ditch.

(Lake County Comprehensive Hazard Analysis, 2003)

Additionally, there are 49 facilities that that utilize or produce materials listed as hazardous by the US Environmental Protection Agency (EPA) in quantities large enough to require annual reporting to IDEM. Hazardous materials facilities included in this plan were collected from the Indiana Department of Environmental Management. All facilities 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 are listed as critical facilities. 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. In addition to SARA Title III facilities, all facilities listed as Large Quantity Generators were listed as critical facilities. Large Quantity Generators are those facilities that generate more than 1,000 kilograms of hazardous waste or 1 kilogram of acutely hazardous waste. It is possible that other facilities in the City of Hammond also utilize or produce hazardous materials. However, they may fall below the current reporting limits. Hazardous materials handlers, producers, and transporters identified by the Planning Committee as well as the IDEM are identified on **Exhibit 3**, along with the major transportation routes and rail lines located in the City of Hammond.

According to US Department of Transportation (DOT), Office of Hazardous Materials Safety (OHMS), there were 14,745 transportation related hazardous materials incidents nationally during the calendar year 2004. **Table 3-9** identifies hazardous materials incidents in the United States by mode of transportation for the year 2004.

Table 3-9: 2004 United States Hazardous Materials Incidents by Transportation Mode

Transportation Mode	Number of Accidents	Associated Deaths	Associated Injuries
Air	996	0	12
Highway	12,979	10	156
Railway	755	121	3
Water	15	0	0
Other	0	0	0
TOTAL	**14,745**	**131**	**31**

(OHMS, 2005)

According to the Planning Committee, the probability of a hazardous material release or event is highly likely for the City of Hammond. The magnitude or severity of such an event could be critical, while the warning time for such an event is very short typically less than 6 hours. The expected duration of a hazardous materials event is expected to be less than a day.

Hazardous Materials: Vulnerability Assessment

Explosions and/or other fixed site releases are not the only risk involved with hazardous materials storage and/or transport. 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 spill or release.

In order to determine the relative risk associated with hazardous materials events occurring within the City of Hammond, all structures located within 250 yards of fixed site hazardous materials facilities, railways, or highways were identified. **Table 3-10** lists the highway and railway corridors that were evaluated as a part of this process.

Table 3-10: Major Highways and Railways within the City of Hammond.

Highway	Railway
Interstate 80/94	Norfolk and Southern
Interstate 90	Norfolk and Southern Lakeshore
US 41	CSX
US 20	CSX Lakefront

Highway	Railway
US 12	Chicago Southshore
SR 151	IHB Gibson Railyard
SR 912	Indiana Harbor Belt
SR 312	Chesapeake and Ohio

There are 76 critical and 13,120 non-critical facilities located within 250 yards of railroads. There are 51 critical and 9,186 non-critical facilities within 250 yards of all highways intersecting the City. In addition, there are 60 critical facilities and 2,902 non-critical facilities within 250 yards of the 49 fixed hazardous materials facilities.

In an effort to estimate damages that might result from a hazardous materials event occurring within the City of Hammond, a hypothetical hazardous materials incident was analyzed. All structures (greater than 700 square feet) located within 250 yards of the SBC Facility located just north of 173rd Street on Kennedy Avenue were identified in order to estimate potential economic damages that could result from a hazardous materials event occurring at this facility. It was assumed that 25% of facilities with 250 yards would be 100% damaged, 35% of facilities would be 50% damaged, and 40% of facilities would be 25% damaged. Based on this estimate, there are two hazardous materials facilities, one water tower and 68 non-critical facilities located within 250 yards of this hazardous materials facility. Total damages resulting from a hazardous materials incident at this facility could exceed $ 5.18 Million. Of this total, approximately $72,000 in damages would be associated with critical facilities, and $5.1 Million would be associated with non-critical facilities. This loss estimate includes structural damages only and does not include potential losses associated with infrastructure or business interruption.

Hazardous Materials: Existing Mitigation Measures

Mitigation practices are projects, policies, or programs that reduce the social, physical, and economic impact of hazards. As part of this planning process, the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements as well as suggested new practices. The following is a summary of the mitigation practices discussed. A chart detailing all of the existing and proposed mitigation practices, hazards addressed, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

In an effort to ensure that residents and visitors to the City of Hammond are well protected in the event of a hazardous materials incident, all City firefighters are trained to the Awareness Level in Hazardous Materials Response. In addition, in 1986 the Superfund Amendments and Reauthorization Act (SARA) was signed into Law. A major provision of this act was Title III, which establishes hazardous materials emergency planning, reporting and training requirements. One of the major provisions of SARA Title III is the establishment of the local Emergency Planning Committees for each county in the state. The Lake County Emergency Plan Committee is the primary organization through which planning, training, and exercise activities are implemented for SARA Title III facilities within Lake County. All facilities that have

been identified as being required to report under Title III must be covered by a response plan that addresses the following areas, hazard identification, vulnerability assessment and map, population and protective actions, and response procedures.

The City of Hammond Fire Department has a Hazardous Materials Team, which is responsible for responding to hazardous materials events in and around the City of Hammond. A Hazardous Material Officer is assigned to each shift of the City of Hammond Fire Department. The Hazardous Materials Officer provides training to all Fire Department Companies, works with the Hammond Department of Environmental Management to enforce all hazardous materials related ordinances, and responds to general fire calls, and all hazardous materials calls. The Hazardous Materials Officers report directly to the Assistant Fire Chief.

The Hammond Fire Department has also developed a Disaster Planning Guide, which provides the Fire Department with a basic response when the threat of terrorism or disaster is impending. The plan identifies the responsibilities, intra-relationships of personnel, the working relationships with surrounding departments, and relationships with outside agencies. In general, the plan outlines emergency preparedness activities for emergency response and protection of citizens from the effects of disasters.

Additionally, the Hammond Fire Department has 102 staff members certified to OSHA III Technician Level in Hazardous Materials training. The City would benefit by expanding the number of City Fire Department, Police Department, and EMA officials certified to the OSHA III Technician Level.

The Planning Committee also discussed the need to develop a public awareness campaign encouraging local residents to coordinate with and assist neighbors during hazardous materials and other emergency events. The City should also coordinate and meet regularly with representatives from the Red Cross of Northwest Indiana and the Salvation Army to ensure that local emergencies are handled as efficiently as possible.

In addition, the City should also ensure that all building inspectors, fire fighters, police officers, and other emergency responders are appropriately immunized. This will help ensure that emergency responders are well prepared to efficiently respond to all emergency situations. Currently Comprehensive Care of Indiana provides the Hammond Fire Department with the following health services: Physical, Sprometry, Respirator Evaluation, Chest X-ray, Electrocardiogram, Audiogram, Vision Exam, CBC, Chemical Profile, Hemoglobin A1C, and Urinalysis. In addition, the Hammond Fire Department is offered the following optional services: Prostate Specific Antigen, Hemoccult, HIV testing, Tuberculosis testing, Tetanus testing, and Hepatitis B and C testing.

Social, physical, and economic losses from hazardous materials events will most likely increase as more people choose to live, work and visit the City of Hammond. Increases in damages, losses and injuries can be expected as the population and number of facilities continues to increase within the City. Ensuring that residents and visitors are well informed about the potential impacts from hazardous materials events as well as proper methods to protect themselves and their property will help to reduce future losses and damage.

3.2.3 THUNDERSTORM/ HIGH WINDS

The NWS estimates that over 100,000 thunderstorms occur each year on the U.S. mainland, and approximately 10% of those events are classified as severe. Thunderstorms can produce

many other hazards such as high winds, hailstorms, tornados, and microburst winds that are also known to affect the City of Hammond. However, only thunderstorm and high winds are discussed within this section. High winds generally result from thunderstorm inflow and outflow, or downburst winds when a storm cloud collapses, or from strong frontal systems, or gradient winds (high or low-pressure systems). Sustained or gusting winds exceeding 50 knots (57 mph) are classified as high winds.

Since 1975, severe thunderstorms were involved in at least 327 Federal Disaster Declarations across the United States. In addition, thunderstorms have resulted in more than 15,000 lightening induced fires that have resulted in extensive property damage nation wide since 1987. In any given year, according to FEMA, an estimated 89 people are killed and 300 people are injured by lightening. In 1993, thunderstorm winds caused 23 fatalities and more than $348 Million in property damage in the United States, while lightening resulted in 43 deaths and approximately $32.5 Million in property damages.

Thunderstorm/ High Winds: Historic Data

Thunderstorms and high winds are a common occurrence in Lake County and the City of Hammond. In fact, according to the NCDC 90 high wind events have been reported in Lake County since 1957. Of those events, 77 were associated with thunderstorm events. Total property damages associated with these events are estimated at $240,000. These events have also accounted for 4 injuries and 1 death. Like most hazards that are regional in nature, the property losses and casualties associated with these events are not necessarily limited to the jurisdiction boundaries of Lake County or the City of Hammond.

The most severe thunderstorm/ high wind event to impact Lake County occurred in July of 2003. This event resulted in more than $100,000 in property damages and trees, large limbs, and power lines were blown down. Additionally a tree blew through a house in Hobart, and an old barn was blown over in the Town of Dyer.

Relatively speaking these thunderstorm/ high wind events occur frequently, and common damages associated with these events range from downed trees and power lines to structural damages to residential, commercial, and industrial structures in the City of Hammond. The probability of a thunderstorm/ high wind event affecting the City of Hammond in the future is highly likely, and impacts from these events will likely be felt over large regional areas and the impacts associated with these events range from negligible to limited. As advancements in technologies such as radar weather systems, broadcast alerts, and outdoor warning sirens are continually made, the warning time for such events may increase. Currently, the typical warning time provided for thunderstorm/ high wind events in the City of Hammond is less than 6 hours. Similarly, thunderstorm/ high wind events typically last for less than 6 hours.

Thunderstorm/ High Winds: Vulnerability Assessment

Due to the unpredictability of these events, all critical and non-critical facilities in the City of Hammond are at risk of future damage or loss of function. Critical facilities include those associated with emergency services, transportation systems, lifeline utility systems, high potential loss facilities, and hazardous material handlers. Non-critical facilities include residential, industrial, commercial, and other structures not meeting the definition of critical facilities that are not required in order for a community to function. For thunderstorm/

high wind events, it is not possible to isolate specific critical or non-critical facilities that would be more or less vulnerable to damages. However, based on the information obtained through the NCDC regarding previous events of this nature, future storms could potentially cause damages to structures in excess of $100,000. It should also be noted that perhaps not all property owners have reported damages caused by the events recorded by the NCDC. In order to better assess community vulnerability, future property and crop damage caused by thunderstorm/ high wind events should be carefully recorded by the City of Hammond.

Thunderstorm/ High Winds: Existing Mitigation Practices

Mitigation practices are projects, policies, or programs that reduce the social, physical, and economic impact of hazards. As part of this planning process, the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements as well as suggested new practices. The following is a summary of the mitigation practices discussed. A chart detailing all of the mitigation practices, hazards addressed, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

The warning time associated with thunderstorm/ high wind events is very short and advanced warning systems, such as outdoor warning sirens in conjunction with the NWS Emergency Alert Systems (EAS) and Weather Radios are effective mitigation practices to reduce loss of life and property. The City of Hammond and the critical and non-critical facilities within the incorporated area are covered by 9 outdoor warning sirens. Overall, these sirens provide reasonable coverage to the City, however there are some areas of the City that could potentially benefit from the installation of additional sirens. The Planning Committee determined that the addition of a new siren near the intersection of Indianapolis Boulevard and Interstate 80/94 would be beneficial. In order to provide siren coverage to all residents and businesses within the City, it is estimated that the addition of four outdoor warning sirens would need to be installed. It is important to note that outdoor warning sirens are only one method of alerting residents and visitors of impending weather conditions. Typically, the outdoor warning sirens are only activated for tornado watches and warnings and are not activated for thunderstorm/ high wind events. However, as a result of discussions at Planning Committee Meetings the City intends to improve consistency regarding how and when outdoor warning systems are utilized. The Planning Committee also discussed the need to formalize existing mobile home inspection procedures to maximize safety during thunderstorm/ high wind events.

In addition, to provide as much advance warning as possible to the residents of Lake County, the Lake County Primary Warning Point was created, designating the Lake County EMA as the Primary Warning Point for civil disturbances and severe weather situations. The NOAA, the Law Enforcement Information Network, and the NWS are monitored and the warning center will warn the public when information has been received. The City of Hammond is also served by the Lake County Storm Spotters and the Radio Amateur Civil Emergency Services, who can provide detailed information directly from the site of the thunderstorm/ high wind event to local emergency personnel and the NWS.

Residents and businesses should also stay abreast of current weather conditions with Weather Alert Radios. This radio continuously broadcasts NWS forecasts, warnings, and other crucial weather information and is the primary trigger for activating the EAS on commercial radio, television, and cable systems. Many of the critical facilities, including schools, hospitals and government offices in the City of Hammond currently own and operate Weather Alert Radios. However, to reduce losses, they should be required in all municipally owned critical facilities and should be recommended to all non-municipally owned critical facilities as well as local residents and businesses.

The Lake County EMA also participates in the Severe Weather Awareness Week, which was created by the NWS. The Severe Weather Awareness Week is a multi-agency education and awareness event focusing on severe weather. Along with the County representatives, the Indiana State Police, the NWS, and the IDHS provide and distribute information to county schools, hospitals, community groups and facilities, and the general public. The City of Hammond intends to take a more active role in future Severe Weather Awareness Week.

As required by the State, all buildings in the City of Hammond are constructed to meet the standards set by the International Building Code. These codes specifically address anchoring and wind forces that structures must be able to withstand.

Currently, many pubic buildings and critical facilities such as schools and hospitals have designated safe havens for occupants to gather in during thunderstorm/ high wind events. However, the City currently lacks an accurate inventory of which facilities do and do not have adequate safe havens. In addition, residential developments without basements and City Parks, which are visited by a large number of citizens every day, currently lack requirements for such facilities to be provided. To further protect the residents and visitors of public buildings, critical facilities, and other buildings with a high volume of employees or visitors, these facilities should be equipped with safe havens. These areas should be well marked for those not familiar with the area. In existing facilities, retrofits such as the addition of storm shutters should be considered whenever possible.

Much of the damage caused by thunderstorms/ high wind events is the result of fallen and broken limbs from trees. While even healthy trees may not be able to withstand high winds, maintaining trees in the road right-of-way, utility corridors, and public property will reduce the potential for dead and dying limbs from falling and damaging people, property, and utility lines during thunderstorm or high wind event. NIPSCO, an electric provider in the City of Hammond has developed an extensive tree maintenance program to maintain necessary clearance around both low voltage and high voltage utility lines, to remove trees that interfere with utility lines, and to remove those trees that are diseased and/or dead near power lines. In order to complete tree maintenance and repair damaged areas following an event, NIPSCO relies on professional subcontractors to assist with regular maintenance of the trees near to or under over-head power lines.

As mentioned, thunderstorms/ high winds can have serious affects on above ground utilities such as electricity or communication lines. To prevent a disruption of service, back-up power is essential at critical facilities especially medical care, police, fire and community shelter facilities. According to the Planning Committee, many of the critical facilities in the City have permanent power back-ups in their facilities. For those critical facilities that do not have a permanent power back-up source, the City currently owns a portable generator that can be utilized to temporarily restore service. In addition, the City should require back-up power generators in all municipally

owned critical facilities and generators should be recommended to all non-municipally owned critical facilities.

To reduce the potential of future power outages, utility lines in areas of new and re-development should continue to be buried. Although access to buried utility lines may be more difficult when the ground is frozen, they are less likely to be damaged by thunderstorms/ high winds. The benefit to retrofit existing above ground utility lines may not currently outweigh the associated cost. However, it does make sense for new development and reconstruction projects.

The Planning Committee also discussed the need to develop a public awareness campaign encouraging local residents to coordinate with and assist neighbors during thunderstorms/ high winds and other emergency events. The City should also coordinate and meet regularly with representatives from the Red Cross of Northwest Indiana and the Salvation Army to ensure that local emergencies are handled as efficiently as possible.

In addition, the City should also ensure that all building inspectors, fire fighters, police officers, and other emergency responders are appropriately immunized. This will help ensure that emergency responders are well prepared to efficiently respond to all emergency situations. Currently St. Margaret Mercy Hospital provides the Hammond Fire Department with the following Comprehensive Care services: Physical, Sprometry, Respirator Evaluation, Chest X-ray, Electrocardiogram, Audiogram, Vision Exam, CBC, Chemical Profile, Hemoglobin A1C, and Urinalysis. In addition, the Hammond Fire Department is offered the following optional services: Prostate Specific Antigen, Hemoccult, HIV testing, Tuberculosis testing, Tetanus testing, and Hepatitis B and C testing.

Social, physical, and economic losses from thunderstorm/ high wind events will most likely increase as more people choose to live, work and visit the City of Hammond. Increases in damages, losses and injuries can be expected as the population and number of facilities continues to increase within the City. Ensuring that residents and visitors are well informed about the potential impacts from thunderstorm/ high wind events as well as proper methods to protect themselves and their property will help to reduce future losses and damage.

3.2.4 EXTREME TEMPERATURES

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 and can have a 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. Excessively dry and hot conditions can provoke dust storms and low visibility. Droughts occur when a long period passes without substantial rainfall. A heat wave combined with a drought is a very dangerous situation. In a normal year, approximately 175 Americans die from extreme heat.

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 a week or more. Sustained extreme cold poses a physical danger to all individuals in a community and can affect infrastructure function as well.

Extreme Temperature: Historic Data

The effects of extreme temperatures extend across large regions, typically affecting several counties, or states, during a single event. According to the NCDC data, 6 recorded cases of extreme temperature have affected the City of Hammond between 1994 and 2004. These events include 4 extreme cold events and 2 heat wave events. These events have resulted in approximately 18 deaths and more than $6 Million in property damages. The impacts of these events are not limited to the City of Hammond or Lake County and in most cases expand across multiple counties.

Of those 6 events, 3 stand out as having the largest economic impact. The first event was a State-wide extreme cold event that started the week of January 14, 1995 when bitter cold weather settled over most of Indiana. Many locations around the state recorded daily minimum temperatures below zero each day from January 14 to January 21. The impacts of this event extended well beyond the City of Hammond, but in total, the storm resulted in 3 deaths and more than $5 Million in property damages. The second event occurred in July of 1995. This event brought heat wave conditions across most of the State and resulted in 14 deaths and approximately $1 Million in damages. In addition, the August 1995 heat wave resulted in temperatures exceeding 95 degrees for several days across the most of the state, and greatly reduced turn out to the annual Indiana State Fair. Some estimates have indicated that the low turnout resulted in approximately $400,000 in lost revenues.

In addition to events reported by the NCDC, the Northwest Indiana Times reported that extreme cold weather impacted the City of Hammond in February of 1994. High temperatures during this period were often 10-15 degrees below zero, with wind chills approaching negative 80 degrees. The cold temperatures caused many Lake County Public School systems to close, and several hospitals were treating patients of frostbite.

Another event not recorded in NCDC data was a January 1997 event, which resulted in power outages for thousands of residents in Lake and Porter County. A 1998 severe winter storm event also resulted in power outages, traffic congestion, and closed schools across Northwest Indiana. The storm brought more than 10 inches of heavy snow to the area and also resulted in snapped power lines and emergency declarations in the City of Hammond.

It is difficult to predict extreme temperatures for a given year; however, the likelihood of extreme temperatures in the City of Hammond is highly likely and the magnitude and severity of these events are considered limited. Additionally, the warning time associated with extreme

temperatures is typically greater than 24 hours and the duration of the event typically lasts more than a week.

Extreme Temperature: Vulnerability Assessment

Extreme temperatures are most dangerous to young children, elderly people, and those who are sick or overweight and those that have no heating/cooling source, poor insulation, or use improvised heat sources. Extreme heat and high temperatures can affect the proper function of organ and brain systems by elevating core body temperature above normal levels. Elevated core body temperatures are exhibited as heat stroke. An overheated core body temperature places additional stress on the body of individuals who already have suppressed or weak immune systems, and the body must remain hydrated in order to cool down. The elderly and infants are most susceptible to suffering from dehydration during extreme heat events.

At the other extreme, very cold temperatures also pose a threat to human health if they cause core body temperature to fall much below normal levels for an extended period. Lowered core body temperatures in individuals can lead to hypothermia. Keeping the core body temperature in the normal range of function typically requires an operational and reliable heat source other than the body. Those who are not able to access a proper heat source could be in danger.

Thirteen percent of the population in the City of Hammond is over the age of 65 and 8% of the population is under the age of 15. Additionally, 12% of the population in the City is estimated to be living below the poverty line. It is difficult to obtain accurate numbers of vulnerable sick and obese individuals living within the City of Hammond to assess the specific risk for these groups. A reasonable assumption is that a portion of these groups is at a greater risk to extreme temperatures, or health hazards associated with extreme temperatures, than the general population. The nature and complexity of this hazard makes it difficult to estimate potential injury or loss of life and any associated losses to community infrastructure. Extreme temperatures can result in death, injury, and millions of dollars in damages.

Extreme Temperature: Existing Mitigation Practices

Mitigation practices are projects, policies, or programs that reduce the social, physical, and economic impact of hazards. As part of this planning process, the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements as well as suggested new practices. The following is a summary of the mitigation practices discussed. A chart detailing all of the existing and proposed mitigation practices, hazards addressed, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

In the event of a prolonged extreme temperature event, community shelters may be needed as cooling or heating centers for those with inadequate climate control units. The location of designated cooling and heating centers should be well advertised for both residents and visitors to the City of Hammond. Both the Hammond Civic Center and the Jean Shepherd Community Center are designated heating and cooling centers within the City of Hammond. In addition, the North Township Trustee's Office offers assistance to low income households to help pay heating bills in the winter.

An extreme temperature event could result in power outages. To prevent a disruption of service, back-up power is essential at critical facilities especially medical care, police, fires, and community shelter facilities. According to the Planning Committee, many of the critical facilities and infrastructure in the City have permanent power back-up generators. For those critical

facilities that do not have a permanent power back-up source, the City currently owns a portable generator that can be utilized to temporarily restore service. In addition, the City should require back-up power generators in all municipally owned critical facilities and generators should be recommended to all non-municipally owned critical facilities.

The Planning Committee also discussed the need to develop a public awareness campaign encouraging local residents to coordinate with and assist neighbors during extreme temperatures and other emergency events. The City should also coordinate and meet regularly with representatives from the Red Cross of Northwest Indiana and the Salvation Army to ensure that local emergencies are handled as efficiently as possible.

In addition, the City should also ensure that all building inspectors, fire fighters, police officers, and other emergency responders are appropriately immunized. This will help ensure that emergency responders are well prepared to efficiently respond to all emergency situations. Currently Comprehensive Care of Indiana provides the Hammond Fire Department with the following health services: Physical, Sprometry, Respirator Evaluation, Chest X-ray, Electrocardiogram, Audiogram, Vision Exam, CBC, Chemical Profile, Hemoglobin A1C, and Urinalysis. In addition, the Hammond Fire Department is offered the following optional services: Prostate Specific Antigen, Hemoccult, HIV testing, Tuberculosis testing, Tetanus testing, and Hepatitis B and C testing.

During winter months the Lake county EMA, along with local schools and the County Council on Aging, come together to initiate programs to educate senior citizens and children on the dangers of severe cold. Additionally, the Lake County Salvation Army and the American Red Cross organizations promote clothing and blanket drives for senior citizens and provide hot meals and assistance with electrical bills for County residents who may require it.

Social, physical, and economic losses from extreme temperatures will most likely increase as more people choose to live, work, and visit the City of Hammond. Ensuring that residents and visitors are well-informed about the potential impacts from extreme temperatures and proper methods to protect themselves and their property will help reduce future losses and damages.

3.2.5 SEVERE WINTER STORM/ ICE STORM

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 severe winter storm is one that drops 4 or more inches of snow during a 12-hour period, or 6 or more inches during a 24-hour span. An ice storm occurs when freezing rain falls from clouds and freezes immediately on impact. All winter storms make driving and walking extremely hazardous. The aftermath of a winter storm can affect a community or region for days, weeks, and even months.

Storm effects such as extreme cold, flooding, and snow accumulation can cause hazardous conditions and hidden problems for people in the affected area. People can become stranded on the road or trapped at home, without utilities or other services, including food, water, and fuel supplies. The conditions may overwhelm the capabilities of a local jurisdiction. Winter storms are considered deceptive killers as they indirectly cause transportation accidents, and injury and death resulting from exhaustion/overexertion, hypothermia and frostbite from wind chill, and asphyxiation..

"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 (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 miles-per-hour are expected for several hours. Severe winter storms include freezing rain, sleet, heavy snow, blizzards, icy conditions, extreme low temperatures, and strong winds. These storm conditions are common during the winter months in the City of Hammond. Such conditions can result in substantial personal and property damage, even death.

The impact of a severe winter storm affects areas regionally, over several counties or States, rather than affecting an isolated area within a single county or municipality. Therefore, all localities within a given municipality may be subject to a severe winter storm in the future. Due to Hammond's Proximity to Lake Michigan, they are more susceptible to lake effect snowfalls.

Severe Winter Storm/Ice Storm: Historic Data

The NCDC has recorded 13 heavy snow, 8 winter storm events, and 1 ice storm event in Lake County since March 1993. In addition to these events, the Planning Committee also discussed a huge snow-storm event that occurred in 1967. On February 25, 1994, heavy and blowing snow fell on communities across Northwest Indiana. State Emergency Management Officials reported that approximately 1,400 stranded motorists were housed at shelters in the region. On the morning of April 10, 2005, freezing rain caused wide spread power outages as power lines collapsed as a result of ice accumulation. A third event occurred in March of 1998 when a strong low pressure system brought a late winter storm to northwest Indiana. The combination of strong winds and heavy snowfall brought traffic to a standstill on stretches of I-65 and Interstate 80/94 in Indiana. Some drivers were stranded for as long as 18 hours. Many homes were without electricity, as numerous power lines were downed due to the weight of the heavy, wet snow. Another event occurred on February 18, 2000 when snow, sleet, and freezing rain turned to all snow leaving 6 to 9 inches of snow across northern portions of Lake and Porter Counties. NCDC data is the best available severe winter storm data specific to the City of Hammond and Lake County Indiana.

In addition to storms recorded by the NCDC, the Lake County Comprehensive Hazard Analysis reports that a winter storm during the winter months of 1998 and 1999 brought significant ice and sleet to Lake County communities. These events resulted in two Presidential Disaster Declarations, temporary business closures, and the National Guard was activated to assist in evacuating residents from isolated neighborhoods. Another winter storm event occurred in February of 1989. This event brought heavy snow across Lake County and resulted in closings of schools, government offices, and public transportation systems in and around Lake County. Traffic along Interstate 80/94 was stopped for several hours because of accidents and hazardous conditions associated with the event.

The probability of a severe winter storm causing disruption to residents and businesses in the City of Hammond is likely, and typically, a severe winter storm will affect both the entire City and County at the same time. The magnitude/severity of severe winter storm events is expected to be limited, and with advancements in weather forecasting, the warning time associated with severe winter storms is usually between 12 and 24 hrs with the duration of the event typically lasting for more than a day but less than a week.

Severe Winter Storm/Ice Storm: Vulnerability Assessment

A severe winter storm typically affects a large regional area with potential for physical, economic, and/or social losses. Given the nature and complexity of a regional hazard event such as a severe winter storm, it is difficult to quantify potential losses to property and infrastructure. Types of loss caused by a severe winter storm event could be physical, economic, and/or social in nature. The complexity and nature of a regional hazard event such as a severe winter storm makes it difficult to quantify potential losses to property and infrastructure. However, all critical and non-critical facilities are at risk from severe winter storm and ice events. Despite wide spread damage associated with the storms identified by the NCDC in Lake County, there were no reports of personal property losses. However, for planning purposes, information collected on winter storms affecting other communities is useful in assessing the potential impact that a severe winter storm or ice storm could have on the City of Hammond.

Around the nation, severe winter storms have resulted in substantial physical, social and economic damages. For example, a March 2003 snowstorm in Denver, Colorado dropped approximately 31 inches of snow and caused an estimated $34 Million in total damages.

The most recent 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 $19 Million was spent throughout the area, with approximately $6.4 Million of that spent clearing Denver International Airport. In addition to these expenses, economic losses are realized when an event bringing up to 57 inches of snow and ice closes businesses and Denver International Airport for nearly 48 hours. Total estimates of damages, expenses, and losses are not expected to be reported until late 2007.

In addition, a February 2003 winter storm dropped an estimated 15 - 20 inches of snow in parts of Ohio. The Ohio and Federal Emergency Management Agencies and U.S. Small Business Administration surveyed damaged areas and issued a preliminary assessment of $17 Million 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 six counties.

While the above examples indicated the wide-ranging and large-scale impact that severe winter storms can have on a community or region, in general, severe 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, severe winter storms resulted in an average of 47 deaths and more than $1 Billion 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 time period.

However, severe winter storms can also result in substantial indirect costs. According to a report by the National Center for Environmental Predictions, 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 nations Gross Domestic Product (GDP) from an estimated growth rate of between 6% and 7% during the first three quarters of 1977 to approximately -1% in the last quarter of 1977 and 3% during the first quarter of 1978.

Severe Winter Storm/ Ice Storm: Existing Mitigation Practices

Mitigation practices are projects, policies, or programs that reduce the social, physical, and economic impact of hazards. As part of this planning process, the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements as well as suggested new practices. The following is a summary of the mitigation practices discussed. A chart detailing all of the existing and proposed mitigation practices, hazards addressed, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

To provide as much advance warning as possible to the residents of Lake County, the Lake County Primary Warning Point was created, designating the Lake County Emergency Management Agency as the Primary Warning Point for civil disturbances and severe weather situations. The NOAA, the Law Enforcement Information Network, and the NWS are monitored and the warning center will warn the public when information has been received.

Residents and businesses should stay abreast of current weather conditions with Weather Alert Radios. This radio continuously broadcasts NWS forecasts, warnings, and other crucial weather information and is the primary trigger for activating the EAS on commercial radio, television, and cable systems. Many of the critical facilities, including schools, hospitals and government offices in the City of Hammond currently own and operate Weather Alert Radios. However, to reduce losses, they should be required in all municipally owned critical facilities and should be strongly encouraged in all non-municipally owned critical facilities, as well as other non-critical residents and privately owned businesses.

It is unlikely that safe rooms or community shelters would be necessary during a severe winter storm. However, the location of these facilities should be well advertised for both residents and visitors to the City of Hammond. Both the Hammond Civic Center and Jean Shepherd facility are available to be utilized as

temporary shelters. Further, the Lake County EMA along with local schools and the County Council on Aging, work in a collaborative effort to initiate educational programs focused on providing information regarding the dangers of severe cold to senior citizens and children. Additionally, the Lake County Salvation Army and the American Red Cross of Northwest Indiana promote clothing and blanket drives for senior citizens and provide hot meals and utility assistance for county residents in need.

A severe winter storm, especially with heavy snow or ice, could affect above ground utilities such as electricity or communication lines. To prevent a disruption of service, back-up power is essential at critical facilities especially medical care, police, fire and community shelter facilities. According to the Planning Committee, many of the critical facilities in the City have permanent power back-up generators. For those critical facilities that do not have a permanent power back-up source, the City currently owns a portable generator that can be utilized to temporarily restore service. Back-up generators should be required in all municipally owned critical facilities, and should be strongly encouraged in all non-municipally owned critical facilities, as well as other non-critical residents and privately owned businesses.

To reduce the potential of future power outages, utility lines in areas of new development should be buried. Although access to buried utility lines may be more difficult when the ground is frozen, they are less likely to be damaged by a severe winter storm/ ice storm. The benefit to bury all existing above ground utility lines may not currently outweigh the associated cost. However, it does make sense for new development and reconstruction projects to bury new lines.

The Lake County EMA also participates in Severe Weather Awareness Week, which was created by the NWS. Severe Weather Awareness Week is a multi-agency education and awareness event focusing on severe weather. Along with the County representatives, the Indiana State Police, the NWS, and the IDHS provide and distribute information to county schools, hospitals, community groups and facilities, and the general public.

The Planning Committee also discussed the need to develop a public awareness campaign encouraging local residents to coordinate with and assist neighbors during severe winter storms and other emergency events. The City should also coordinate and meet regularly with representatives from the Red Cross of Northwest Indiana and the Salvation Army to ensure that local emergencies are handled as efficiently as possible.

In addition, the City should also ensure that all building inspectors, fire fighters, police officers, and other emergency responders are appropriately immunized. This will help ensure that emergency responders are well prepared to efficiently respond to all emergency situations. Currently Comprehensive Care of Indiana provides the Hammond Fire Department with the following health services: Physical, Sprometry, Respirator Evaluation, Chest X-ray, Electrocardiogram, Audiogram, Vision Exam, CBC, Chemical Profile, Hemoglobin A1C, and Urinalysis. In addition, the Hammond Fire Department is offered the following optional services: Prostate Specific

Antigen, Hemoccult, HIV testing, Tuberculosis testing, Tetanus testing, and Hepatitis B and C testing.

Social, physical, and economic losses from severe winter storms/ ice storms will most likely increase as more people choose to live, work and visit the City of Hammond. Increases in damages, losses and injuries can be expected as the population and number of facilities continues to increase within the City. Ensuring that residents and visitors are well informed about the potential impacts from severe winter storms/ ice storms as well as proper methods to protect themselves and their property will help to reduce future losses and damage.

3.2.6 TORNADO

Tornados are defined as violently rotating columns of air extending from thunderstorms to the ground. Funnel clouds are rotating columns of air not in contact with the ground. However, the violently rotating column of air 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 it is a tornado event.

A tornado is generated when conditions in a strong thunderstorm cell are produced that exhibit a mass of cool air that overrides a layer of warm air. The underlying warm air is forced to rise rapidly and cool air to drop –sparking the swirling action. The damage from a tornado is a result of the high wind velocity and wind-blown debris. Tornado season is generally April through June in Indiana, although tornados can occur at any time of year. They tend to occur in the afternoons and evenings: over 80 percent of all tornados strike between 3 pm and 9 pm, but can occur at any time of day or night. Tornados occur most frequently in the United States east of the Rocky Mountains.

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

Tornado: Historic Data

According to the NCDC, there is record of only one tornado impacting the City of Hammond in the last 50 years, and no damage estimates were reported with this tornado event. However, 21 tornados have impacted Lake County since 1951. Tornado intensity is classified using the Fujita Scale of tornado intensity shown in **Table 3-11**. Tornado intensity ranges from low intensity (F0) tornados with effective wind speeds of 40-70 miles-per-hour (mph) to high intensity (F5+) tornados with effective wind speeds of 261 to over 318 mph. Tornados recorded for Lake County include 2 - F0, 9 - F1, 7 - F2, and 3 - F3, and 0 - F4 tornados.

Table 3-11: Fujita Scale of Tornado Intensity

F-Scale	Winds	Character of Damage	Relative Freq.
F0 (weak)	40-72 mph	light damage	29%
F1 (weak)	73-112 mph	moderate damage	40%
F2 (strong)	113-157 mph	considerable damage	24%

F-Scale	Winds	Character of Damage	Relative Freq.
F3 (strong)	158-206 mph	severe damage	6%
F4 (violent)	207-260 mph	devastating damage	2%
F5 (violent)	261-318 mph	incredible damage	< 1%

According to the NCDC, the most significant tornado to impact Lake County, Indiana was a June 30, 1977 F2 event, which resulted in a $2.5 Million in damages and one injury. In addition to that event there have been 4 other tornado events that have resulted in more that $100,000 in storm damages. The most recent of these was an August 25, 2001 event in Merrillville, Indiana. This tornado touched down at the intersection of Merrillville Road and 84th Street, and resulted in spotty minor structural damage in an industrial park with some small trees broken or pushed over. There was also damage to signs and a few broken windows. Many structures and trees in the path received no damage**.** However**,** just west of I-65, the roof and walls of a commercial building were damaged, while east of I-65, and just south of US Route 30, there was more damage to signs, and a semi was overturned. Additionally, two people were injured by broken glass at a restaurant in Hobart, Indiana.

NCDC data does not provide details regarding the other historic tornado events. However, nation-wide tornados have resulted in billions in dollars in damages and thousands of deaths. In fact, according to the Lake County Comprehensive Hazard Analysis, the mean nation-wide annual death toll for tornado events is between 80 and 100 people, likewise according to FEMA, the mean annual death toll for tornados in Indiana is between 3 and 6.

The Planning Committee discussed the probability, magnitude or severity, warning time, and duration of tornado events in the City and decided that a tornado is possible and that the severity of an event could be critical. The warning time typically provided prior to the occurrence of a tornado event and the duration of the event itself are usually less than 6 hours.

Tornado: Vulnerability Assessment

Given that the impacted areas associated with tornados can vary greatly and considering the unpredictable nature of the hazard, all critical and non-critical facilities are at risk from a tornado event.

In an effort to evaluate the estimated economic impact that a tornado could have on the City of Hammond, a hypothetical tornado scenario was developed. The estimated economic damage associated with the hypothetical scenario was derived by assuming that 25% of all critical and non-critical structures in the path of the tornado would be destroyed, 35% would be 50% damaged, and 40% would receive only 25% damage. In this scenario, the average width of all tornados recorded in Lake County to date was used to determine the width of the hypothetical tornado's path. Finally, each estimated tornado path was overlaid on densely populated portions of the City of Hammond. **Table 3-12** identifies the number and type of structures impacted in the hypothetical scenario.

Table 3-12: Structures Impacted By Hypothetical Tornado Scenario

	Number of Structures	Estimated Damage
Non-Critical Facilities	714	$53.3 M
Critical Facilities	4	$370.4 K
Totals	**718**	**$53.6 M**

Due to the unpredictability of this hazard, all critical and non-critical facilities in the City are at risk of future damage or loss of function. Critical facilities include those associated with emergency services, transportation systems, lifeline utility systems, high potential loss facilities, and hazardous materials handlers. Non-critical facilities include residential, industrial, commercial, and other structures not meeting the definition of a critical facility and are not required for a community to function. Social losses are likely to be related to the total disruption of living conditions, employment, and the home and are not quantified in this study.

Tornado: Existing Mitigation Practices

Mitigation practices are projects, policies, or programs that reduce the social, physical, and economic impact of hazards. As part of this planning process, the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements as well as suggested new practices. The following is a summary of the mitigation practices discussed. A chart detailing all of the existing and proposed mitigation practices, hazards addressed, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

The warning time associated with tornado events is very short and advanced warning systems, such as outdoor warning sirens in conjunction with the NWS EAS and Weather Radios are effective mitigation practices to reduce loss of life and property. The City of Hammond and the critical and non-critical facilities within the incorporated area are covered by 9 outdoor warning sirens. Overall, these sirens provide reasonably strong coverage to the City, by providing audible coverage to all critical facilities with the exception of a railway station, a bus station, a medical care facility, 2 government facilities, two schools, and nine hazardous materials facilities. **Exhibit 4** identifies the location of outdoor warning sirens within the City of Hammond.

However, there are some areas of the City that could potentially benefit from the installation of additional sirens, specifically the Planning Committee determined that the addition of an additional siren near the intersection of Indianapolis Boulevard and Interstate 80/94 would be beneficial. In order to provide siren coverage to all residents and businesses within the City, it is estimated that the addition of four outdoor warning sirens would need to be installed. It is important to note that outdoor warning sirens are only one method of alerting residents and visitors of impending weather conditions. Additionally, as a result of discussions at Planning Committee Meetings the City intends to improve consistency regarding how and when outdoor warning

systems are utilized. The Planning Committee also discussed the need to formalize existing mobile home inspection procedures to maximize safety during tornado events.

In addition, to provide as much advance warning as possible to the residents of Lake County, the Lake County Primary Warning Point was created, designating the Lake County EMA as the Primary Warning Point for civil disturbances and severe weather situations. The NOAA, the Law Enforcement Information Network, and the NWS are monitored and the warning center will warn the public when information has been received. The City of Hammond is also served by the Lake County Storm Spotters and the Radio Amateur Civil Emergency Services, who can provide detailed information directly from the site of the tornado event to local emergency personnel.

Residents and businesses should stay abreast of current weather conditions with Weather Alert Radios. This radio continuously broadcasts NWS forecasts, warnings, and other crucial weather information and is the primary trigger for activating the EAS on commercial radio, television, and cable systems. Many of the critical facilities, including schools, hospitals and government offices in the City of Hammond currently own and operate Weather Alert Radios. However, to reduce losses, they should be required in all municipally owned critical facilities and should be strongly encouraged in all non-municipally owned critical facilities, as well as other non-critical residents and businesses.

The Lake County EMA also participates in the Severe Weather Awareness Week created by the NWS. The Severe Weather Awareness Week is a multi-agency education and awareness event focusing on severe weather. Along with the County representatives, the Indiana State Police, the NWS, and the IDHS provide and distribute information to county schools, hospitals, community groups and facilities, and the public.

As required by the State, all buildings in the City of Hammond are constructed to meet the standards set by the International Building Code. These codes specifically address anchoring and wind forces that structures must be able to withstand.

Currently, many pubic buildings and critical facilities such as schools and hospitals have designated safe havens for occupants to gather during a tornado event. However, the City currently lacks an accurate inventory of which facilities do and do not have adequate safe havens. In addition, residential developments without basements and City Parks, which are visited by a large number of citizens every day, currently lack requirements for such facilities to be provided. To further protect the residents and visitors of public buildings, critical facilities, and other facilities with a high volume of employees or visitors, these facilities should be equipped with safe havens. These areas should be well marked for those not familiar with the area. In existing facilities, retrofits such as the addition of storm shutters should be considered whenever possible.

Much of the damage caused by tornado events is the result of fallen and broken limbs from trees. While even healthy trees may not be able to withstand high winds, maintaining trees in the road right-of-way, utility corridors, and public property will reduce the potential for dead and dying limbs from falling and damaging people, property, and utility lines during tornado events. NIPSCO, an electric provider in the City of Hammond has developed an extensive tree maintenance program to maintain necessary clearance around both low voltage and high voltage utility lines, to remove trees that interfere with utility lines and to remove those that are diseased and/or dead near power lines. In order to complete tree maintenance and repair damaged areas following an event NIPSCO relies on professional subcontractors to assist with regular maintenance of the trees near to or under over-head power lines.

Tornados can have serious affects on above ground utilities such as electricity or communication lines. To prevent a disruption of service, back-up power is essential at critical facilities especially medical care, police, fire and community shelter facilities. According to the Planning Committee, many of the critical facilities in the City have permanent power back-ups in their facilities. For those critical facilities that do not have a permanent power back-up source, the City currently owns a portable generator that can be utilized to temporarily restore service. Back-up generators should be required in all municipally owned critical facilities, and should be strongly encouraged in all non-municipally owned critical facilities, as well as other non-critical residents and businesses.

To reduce the potential of future power outages, utility lines in areas of new development should continue to be buried. Although access to buried utility lines may be more difficult when the ground is frozen, they are less likely to be damaged by tornado events. The benefit to retrofit existing above ground utility lines may not currently outweigh the associated cost. However, it does make sense for new development and reconstruction projects.

The Planning Committee also discussed the need to develop a public awareness campaign encouraging local residents to coordinate with and assist neighbors after tornados and other emergency events. The City should also coordinate and meet regularly with representatives from the Red Cross of Northwest Indiana and the Salvation Army to ensure that local emergencies are handled as efficiently as possible.

In addition, the City should also ensure that all building inspectors, fire fighters, police officers, and other emergency responders are appropriately immunized. This will help ensure that emergency responders are well prepared to efficiently respond to all emergency situations. Currently Comprehensive Care of Indiana provides the Hammond Fire Department with the following health services: Physical, Sprometry, Respirator Evaluation, Chest X-ray, Electrocardiogram, Audiogram, Vision Exam, CBC, Chemical Profile, Hemoglobin A1C, and Urinalysis. In addition, the Hammond Fire Department is offered the following optional services: Prostate Specific Antigen, Hemoccult, HIV testing, Tuberculosis testing, Tetanus testing, and Hepatitis B and C testing.

Social, physical, and economic losses from tornado events will most likely increase as more people choose to live, work and visit the City of Hammond. Increases in damages, losses and injuries can be expected as the population and number of facilities continues to increase within the City. Ensuring that residents and visitors are well informed about the potential impacts from tornados as well as proper methods to protect themselves and their property will help to reduce future losses and damage.

3.2.7 LEVEE FAILURE

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

As mentioned in Section 3.2., the USACE in cooperation with the Little Calumet River Basin Commission are currently constructing the Little Calumet River Flood Control and Recreation Project, which is designed to provide flood protection to City of Hammond and residents and businesses living along the Little Calumet River. In addition to the levee protection project along the Little Calumet River, there is also currently a significant number of homes within the Robertsdale Neighborhood, identified as being within the City of Hammond's regulatory floodplain associated with Wolf Lake. However, incidents of actual flooding of this area have been historically rare and have not occurred since a portion of the Wolf Lake shore were raised by slag material a few decades ago in response to flooding originating from high lake levels. Impacts associated with failures of both the Wolf Lake and Little Calumet River levees are discussed below.

Levee Failure: Historic Data

There is no known historical data associated with levee failure in the City of Hammond. However, as demonstrated by Hurricane Katrina, levees can and do fail. Damages associated with levee failures in New Orleans are difficult to separate from other hurricane related damages. However, it is known that multiple levee failures and breaches throughout the City resulted in an estimated 80% of the City flooding. Additionally, according to FEMA, approximately $13.2 Billion in federal flood insurance payments related to Hurricane Katrina have been made in Louisiana.

While the devastating impacts associated with levee failures in New Orleans are well known, impacts associated with a 1997 levee failure in the Sacramento, California area are less known. On January 2, 1997, a levee failure along the Feather River resulted in the flooding of 15 square miles of Central Valley near Marysville, California, which is located approximately 45 miles north of Sacramento. The resulting flood was responsible for the destruction of 180 homes and businesses and damage to 480 additional structures. The California Office of Emergency Services estimated damages associated with this event at $200 Million. In addition to these structural damages, approximately 80,000 residents were evacuated from their homes because of the failure.

Levee Failure: Vulnerability Analysis

As discussed in Section 3.2.1, the Little Calumet River Flood Control and Recreation Project is anticipated remove thousands of structures from the City of Hammond's floodplains. In fact, it is estimated that upon completion, the number of structures in the City's 500-year floodplain boundaries will decrease from approximately 8,663 to 30. However, it is important to consider the

fact that while structures located behind the levee will be removed from the regulatory floodplain, they are still are at risk to potential future flooding. As Hurricane Katrina demonstrated in New Orleans, levees can and do fail. To estimate the potential damage that could result if there was a large scale failure of the Little Calumet River Flood Control and Recreation Project, it was assumed that 25% of structures located in the "levee protection zone" would be 100% damaged, 35% of structures would be 50% damaged, and 40% of structures would be 25% damaged. Based on this estimate, a levee failure could result in damage to approximately 8,633 structures and could result in approximately $634 Million in damages. Of this total, 10 of the structures would be critical facilities. Damage associated with critical facilities is estimated at approximately $7.18 Million in damages. The ten critical facilities that would be impacted by a levee failure include the E.B. Hayward Library, Columbia Medical Center, National Guard Armory, Sawyer College, Woodland Childcare, four hazardous materials handlers, and the Jean Shepherd Community Center.

A similar analysis was conducted for the slag levee at Wolf Lake. According to GIS data there are approximately 1,402 structures that would be impacted by a failure of the levee. Of those facilities, one is a critical facility (Medical Care). Estimated damages that would result in a failure of the slag levee at Wolf Lake were calculated with the assumption that 25% of structures would be 100% damaged, 35% of structures would be 50% damaged, and 40% of structures would be 25% damaged. In total, it is estimated that flooding associated with a failure of the Wolf Lake Levee's would result in $101.9 Million in damages.

Levee Failure: Existing Mitigation Measures

Mitigation practices are projects, policies, or programs that reduce the social, physical, and economic impact of hazards. As part of this planning process, the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements as well as suggested new practices. The following is a summary of the mitigation practices discussed. A chart detailing all of the existing and proposed mitigation practices, hazards addressed, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

While the Little Calumet River Flood Control and Recreation Project is of great benefit to the City, efforts will need to be made to ensure that landowners living and working in the "levee protection zone" are aware that their properties are still at risk of being impacted by future flooding events. In addition, the City should encourage these landowners to purchase flood insurance at the lower, preferred rates despite the fact that their home mortgages will no longer require flood insurance. In addition, the City will need to develop and implement an effective long-term levee Operation, Maintenance, and Inspection Plan that minimizes the potential for future levee failures. Once levee construction is completed and all work is certified, the USACE will cease levee inspections and future inspections will be the responsibility of local jurisdictions, such as the City of Hammond.

It will also be important for the City to keep new residents and businesses living and operating in the "levee protection zone" abreast of the inherent risks that are associated with living within the area as well as what they can do to keep the City aware of potential problems associated with the structural integrity of the levee.

The Planning Committee also discussed the need to develop a public awareness campaign encouraging local residents to coordinate with and assist neighbors during severe winter storms and other emergency events. The City should also coordinate and meet regularly with

representatives from the Red Cross of Northwest Indiana and the Salvation Army to ensure that local emergencies are handled as efficiently as possible.

In addition, the City should also ensure that all building inspectors, fire fighters, police officers, and other emergency responders are appropriately immunized. This will help ensure that emergency responders are well prepared to efficiently respond to all emergency situations. Currently Comprehensive Care of Indiana provides the Hammond Fire Department with the following health services: Physical, Sprometry, Respirator Evaluation, Chest X-ray, Electrocardiogram, Audiogram, Vision Exam, CBC, Chemical Profile, Hemoglobin A1C, and Urinalysis. In addition, the Hammond Fire Department is offered the following optional services: Prostate Specific Antigen, Hemoccult, HIV testing, Tuberculosis testing, Tetanus testing, and Hepatitis B and C testing.

Social, physical, and economic losses from levee failure events will most likely increase as more people choose to live, work and visit the City of Hammond. Increases in damages, losses and injuries can be expected as the population and number of facilities continues to increase within the City. Ensuring that residents and visitors are well informed about the potential impacts from levee failure events as well as proper methods to protect themselves and their property will help to reduce future losses and damage.

3.2.8 EARTHQUAKE

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

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

Earthquakes strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night. On a yearly basis, 70 to 75 damaging earthquakes occur throughout the world. Estimates of losses from a future earthquake in the United States approach $200 Billion.

There are 45 states and territories in the United States at moderate to very high risk from earthquakes, and they are located in every region of the country. California experiences the most frequent damaging earthquakes; however, Alaska experiences the greatest number of large earthquakes—most located in uninhabited areas. The largest earthquakes felt in the United States were along the New Madrid Fault in Missouri, where a three-month long series of quakes from 1811 to 1812 included three quakes larger than a magnitude of 8 on the Richter scale. These earthquakes occur over the entire Eastern United States, with Missouri, Tennessee, Kentucky, Indiana, Illinois, Ohio, Alabama, Arkansas, and Mississippi experiencing the strongest

ground shaking. The City of Hammond and Lake County, Indiana lie within an area predicted to be impacted by either the New Madrid Fault Line or the Wabash Fault Line.

Earthquake: Historical Data

Although there has not been a previous occurrence of an earthquake epicenter recorded for the City of Hammond, it is possible considering the City's proximity to the New Madrid and Wabash Fault Line, that the City could experience an earthquake or the aftershock of an earthquake at some point in the future. The most recent earthquake recorded in central Indiana was on September 12, 2004 in Shelbyville, Indiana. The earthquake recorded 3.6 on the Richter scale of earthquake intensity. The most significant earthquake originating in the State of Indiana was a September 27, 1909 event that originated near the Illinois border between Vincennes and Terre Haute, the event was estimated at magnitude 5.0.

Based on the limited historical precedence and impact the Planning Committee determined that the probability of an earthquake event occurring within the City of Hammond was unlikely, and that the extent of its impact would be negligible. The warning time and duration of an earthquake event were identified as being less than 6 hours.

Earthquake: Vulnerability Assessment

All critical and non-critical facilities and structures in the City of Hammond are potentially vulnerable to earthquakes. Types of loss caused by an earthquake event could be physical, economic, or social in nature. In order to determine the potential physical, economic, and social loss that an earthquake can potentially result in, an arbitrary magnitude 5 earthquake was evaluated utilizing HAZUS-MH software. The epicenter of the site was the nearest known existing earthquake epicenter which occurred in Porter County, Indiana.

A HAZUS-MH scenario based on a single hypothetical magnitude 5.0 earthquake estimates that one building will be damaged beyond repair, 7 buildings will be extensively damaged, 62 buildings will be at least moderately damaged, and 252 buildings will be slightly damaged. The model also indicates that the event would result in approximately $5.48 Million in economic losses, which includes structural losses, capital losses, and infrastructure losses.

Since the HAZUS-MH Earthquake Model is still under development, the data generated should be used with some reservation. Estimated losses for an individual building are actually averages for a group of similar buildings and although the buildings are similar, they may experience vastly different damage and losses during an earthquake. The damage estimated for small earthquakes (less than M6.0) centered within an urban region tend to be overestimated. Future releases may address these limitations.

Earthquake: Existing Mitigation Practices

Mitigation practices are projects, policies, or programs that reduce the social, physical, and economic impact of hazards. As part of this planning process, the Planning Committee discussed the strengths and weaknesses of existing mitigation practices and made recommendations for improvements as well as suggested new practices. The following is a summary of the mitigation

practices discussed. A chart detailing all of the mitigation practices, hazards addressed, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

There are few mitigation practices to reduce losses in the event of an earthquake. The State requires that all buildings in the City of Hammond be constructed to meet the standards set by the International Building Code. These codes specifically address the seismic energy that each structure must be able to withstand in this region.

Due to the short warning time with earthquakes there may not be enough time to utilize safe rooms or community shelters unless to protect people from the aftershock impact. The location of these facilities should be well advertised for both residents and visitors to the City of Hammond. Safe rooms should be incorporated into all new public facilities since these facilities are typically centrally located, are accessible for all levels of mobility, and regularly occupied by a large percentage of the population that may need to seek shelter.

An earthquake could affect utilities such as electricity or communication lines. To prevent a disruption of service, back-up power is essential at critical facilities especially medical care, police, fire and community shelter facilities. According to the Planning Committee, many of the critical facilities in the City have permanent power back-ups in their facilities. For those critical facilities that do not have a permanent power back-up source, the City currently owns a portable generator that can be utilized to temporarily restore service. Back-up generators should be required in all municipally owned critical facilities, and should be strongly encouraged in all non-municipally owned critical facilities, as well as other non-critical residences and privately owned businesses.

To reduce the potential of future power outages, utility lines in areas of new development should continue to be buried. Although access to buried utility lines may be more difficult when the ground is frozen, they are less likely to be damaged by an earthquake. The benefit to bury all existing above ground utility lines may not currently outweigh the associated cost however; it does make sense for new development and reconstruction projects.

The Planning Committee also discussed the need to develop a public awareness campaign encouraging local residents to coordinate with and assist neighbors after earthquakes and other emergency events. The City should also coordinate and meet regularly with representatives from the Red Cross of Northwest Indiana and the Salvation Army to ensure that local emergencies are handled as efficiently as possible.

In addition, the City should also ensure that all building inspectors, fire fighters, police officers, and other emergency responders are appropriately immunized. This will help ensure that emergency responders are well prepared to efficiently respond to all emergency situations. Currently Comprehensive Care of Indiana provides the Hammond Fire Department with the following health services: Physical, Sprometry, Respirator Evaluation, Chest X-ray, Electrocardiogram, Audiogram, Vision Exam, CBC, Chemical Profile, Hemoglobin A1C, and Urinalysis. In addition, the Hammond Fire Department is offered the following optional services: Prostate Specific Antigen, Hemoccult, HIV testing, Tuberculosis testing, Tetanus testing, and Hepatitis B and C testing.

Social, physical, and economic losses from earthquake will most likely increase as more people choose to live, work, and visit the City of Hammond. Ensuring that residents and visitors are well-

informed about the potential impacts from earthquake and proper methods to protect themselves and their property will help reduce future losses and damage.

3.3 HAZARD SUMMARY

For the development of the MHMP, the Planning Committee utilized the CPRI method to prioritize the hazards that they felt affected the City of Hammond. Hazards were assigned values based on the probability or likelihood of occurrence, the magnitude or severity of the event, as well as warning time and duration of the event itself. **Table 3-13** indicates the results of the CPRI values for each hazard affecting the City of Hammond

In 2003, the Lake County EMA completed a similar process as part of the Comprehensive Hazard Analysis to provide an overall ranking of hazards within the County. These rankings are also based on probability of the hazard occurring, although a different set of parameters were utilized throughout the process. These results are also found in Table 3-13.

Furthermore, rankings based on historic losses as reported to the NCDC, as well as ranking according to the CBBEL estimated potential damages for each of the hazards, are provided within the table for comparative purposes.

Table 3-13: Comparative Hazard Rankings

Hazard	MHMP CPRI	County Hazard Analysis	Historic Losses*	Estimated Potential Damages
Earthquake	8	1	$0	$5.48 M
Extreme Temperature	4	4	$6.0 M	NA
Flooding	1	4	$14 M	$1.2 B
Hazardous Materials	2	5	NA	$5.2 M
Levee Failure	7	NA	NA	$634 M
Winter Storm	5	5	$0	NA
Thunder/Windstorm	3	5	$240 K	$100 K
Tornado	6	5	$4.1 M	$53.6 M

*Damage estimates not limited to the City of Hammond.

As the Table shows, the estimated losses associated with natural hazards can be very extensive. Although the ranking in the MHMP and Hazard Analysis very somewhat between hazards, both indicate that all of the listed hazards could potentially result in economic, physical, or social losses in the City of Hammond.

The CRS program credits NFIP communities a maximum of 55 points for mapping flooding as well as other known natural hazards; summarizing the impact of natural hazards; identifying the number, type, and estimated value of buildings subject to natural hazards; and development, the community.

4.0 MITIGATION GOALS & PRACTICES

This Section identifies the mitigation goals and a summary of the mitigation practices discussed in the Risk Assessment section of this MHMP.

4.1 MITIGATION GOALS

The overall goal throughout the development of the City of Hammond MHMP has been to protect the citizens, visitors, and properties within the City of Hammond from the impacts of hazards through actions associated with emergency services, natural resource protection, prevention, property protection, public information, and structural controls.

4.2 MITIGATION PRACTICES

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

The Planning Committee reviewed the list of mitigation ideas from FEMA for each of the hazards studied as part of this planning effort and identified which of these they felt best met their needs as a community.

The Planning Committee evaluated the mitigation practices 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.

Table 4-1 lists a summary of mitigation practices, local status, local priority, benefit-cost ratio, project location, responsible entity, funding source, and hazard addressed as identified by the MHMP Planning Committee. Mitigation projects identified as "on-going" and "proposed enhancement" will be implemented within the 5-year term of this MHMP. However, depending on availability of funding, some proposed mitigation projects may take longer to implement. The proposed mitigation projects are organized in terms of importance to the City of Hammond Planning Committee.

As part of the process to identify mitigation practices, the Planning Committee weighed the benefit derived from each mitigation practice with the estimated cost of that practice. The Planning Committee identified the mitigation practices as having a high, medium, or low benefit cost ratio based on their experience and professional judgment. Preparing detailed benefit cost ratios was beyond the scope of this planning effort and the intent of the MHMP. The development of this MHMP is the necessary first step of a multi-step process to implement programs, policies, and projects to mitigate the effect of hazards in the City of Hammond. The intent of this planning effort was to identify the hazards and the extent to which they affect the City of Hammond and to determine what type of mitigation strategies or practices may be undertaken to mitigate for these hazards. Although this MHMP meets the requirements of DMA 2000 and eligibility requirements of the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Act (FMA), Pre-Disaster Mitigation (PDM) Grant, as well as other FEMA programs including the NFIP's Community Ratings System (CRS), additional detailed studies may need to be completed prior to applying for these grants or programs.

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

Table 4-1: Summary of Mitigation Practices

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Detailed Flood Studies • Conduct detailed flood studies (in such a way that would exclude wave run up) to determine Base Flood Elevations for waterways connected to Lake Michigan.	☒ Prevention ☐ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☒ Public Information	☐ Earthquake ☐ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☐ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing –** Currently only unstudied floodplain areas in the City are associated with Lake George and Wolf Lake. **Proposed Enhancement** – Conduct detailed studies of all unstudied floodplains.	High	High	Lake George, Wolf Lake, and Lake Michigan floodplains in the Robertsdale Neighborhood.	Public Works IDNR FEMA USACE	Existing Budget PDM FMA
Community Rating System • Reduce flood Insurance Premiums through participation in the Community Ratings System.	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☒ Public Information	☐ Earthquake ☐ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☐ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing Activity-** In 2004, the City completed a CRS Activity Evaluation Report. **Proposed Enhancement** – The City should apply for and begin participating in the Community Ratings System.	High	High	City of Hammond	Mayor's Office Public Works Planning and Development	Existing Budget FEMA
HAZUS-MH Models • Update HAZUS-MH Flood model to predict losses and "what-if" scenarios.	☒ Prevention ☐ Property Protection ☒ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☐ Earthquake ☐ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☒ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing** – The City currently utilizes GIS in planning and zoning and has received HAZUS-MH software and advanced level training. **Proposed Enhancement** – Begin updating and enhancing HAZUS-MH with local GIS data.	High	High	City of Hammond Needed enhancements include but are not limited to elevation data, housing survey and attributes, and field verification of point address files.	Public Works (Sanitary District)	Existing Budget PDM FEMA
Building Protection • Protect existing critical facilities in floodplains. • Restrict development of new critical facilities in 100 and 500-year floodplains.	☒ Prevention ☒ Property Protection ☐ Nat. Res. Protection ☐ Emergency Services ☒ Structural Control ☒ Public Information	☐ Earthquake ☐ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing-** Little Calumet Flood Control and Recreation Project will provide flood protection to thousands of non-critical structures as well as 10 critical facilities along the Little Calumet River. **Proposed Enhancement-** Adopt or amend existing ordinances, and provide flood protection to critical facilities in floodplains. Restrict new development in floodplains.	High	Medium	Adoption of City-wide ordinances.	Mayor's Office Public Works (Sanitary District) Planning and Development	Existing Budget FEMA

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Outdoor Warning Sirens • Ensure that all outdoor warning sirens are fully operational and remain adequately maintained. • Add an additional Warning Siren near the intersection of I-94 and Indianapolis Boulevard. • Develop Standard Operating Procedures (SOP) clarifying how and when sirens are utilized.	☒ Prevention ☒ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☐ Earthquake ☐ Extreme Temps. ☐ Flooding ☐ Hazardous Materials ☐ Levee Failure ☐ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Ongoing** – The City is currently covered by nine outdoor warning sirens. **Proposed Enhancement** – There is a need for an additional warning siren near the intersection of I-94 and Indianapolis Boulevard. Ensure adequate funding for long-term maintenance of sirens. Develop an outdoor warning siren SOP.	High	High	Ultimate goal of program should be to ensure that all critical facilities are covered by outdoor sirens.	Mayor's Office Hammond EMA	Existing Budget FEMA Homeland Security
Emergency Warning System • Require Weather Alert Radios in all municipally owned critical facilities. • Encourage Weather Alert Radios in all non-municipally owned critical facilities and all other city residences and businesses.	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☒ Earthquake ☒ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Ongoing-** Weather Alert Radio's are currently located in many critical facilities. There are currently two USGS gages serving the City of Hammond. **Proposed Enhancement-** Adopt a resolution requiring Weather Alert Radios in municipally owned critical facilities. Promote Weather Alert Radios to all non-municipally owned critical facilities and all other City residents and businesses.	High	High	Require in 23 municipally owned critical facilities within the City of Hammond. Encourage use in 139 non-municipally owned critical facilities and other residences and businesses within the City of Hammond.	Mayor's Office Public Works Fire Department Police Department Hammond EMA	Existing Budget FEMA
Levee Protection Education • Develop an education program informing property owners within the "Levee Protection Zone" that their properties are still at risk from flooding. • Include information on potential threats to the structural integrity of the levee into educational materials, to increase the likelihood that potential problems are identified as early as possible.	☒ Prevention ☒ Property Protection ☐ Nat. Res. Protection ☐ Emergency Services ☒ Structural Control ☒ Public Information	☐ Earthquake ☐ Extreme Temps. ☐ Flooding ☐ Hazardous Materials ☒ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing-** Little Calumet River Flood Control and Recreation Project currently under construction. **Proposed Enhancement-** Develop and distribute educational materials on threats to structural integrity of levee, as well as the flood risks that remain for properties located within the Levee Protection Zone.	High	High	Landowners located within Levee Protection Zone.	Public Works Hammond EMA	Existing Budget FEMA

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Hazardous Materials Training • Increase the number of personnel certified to OSHA III Technician Level.	☒ Prevention ☒ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☐ Public Information	☐ Earthquake ☐ Extreme Temps. ☐ Flooding ☒ Hazardous Materials ☐ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing –** City of Hammond Hazardous Materials Team and Fire Department provide training to relevant staff. Currently 102 Hammond Fire Fighters have received OSHA III Technician Level Training. **Proposed Enhancement-** Develop comprehensive list of trained employees and expand training opportunities to increase City response capabilities.	High	High	City of Hammond	Fire Department Hazardous Materials Team Environmental Management Department	Existing Budget
Immunization • Enhance the City's existing voluntary immunization program for all emergency responders and inspection staff.	☐ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☐ Public Information	☒ Earthquake ☒ Extreme Temps. ☒ Flooding ☒ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Ongoing** –First responders and field staff from the Fire Department, Police Department, and Health Department receive immunizations. **Proposed Enhancement** – Expand the immunization program to include potential field staff from all City departments.	High	High	All emergency responders and inspection staff.	Public Works Fire Department Code Enforcement Environmental Management Department Health Department St. Margaret Mercy Hospital	Existing Budget FEMA Citizen Corps Existing Operational Budgets
Public Education & Outreach • Enhance hazard preparedness literature at public facilities. • Distribute hazard preparedness literature at community events. • Participate in Severe Weather Awareness Week. • Become certified as a StormReady Community • Promote existing Lake County CERT Program	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☒ Earthquake ☒ Extreme Temps. ☒ Flooding ☒ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Ongoing** – The City of Hammond, Lake County EMA, and the Red Cross of Northwest Indiana have provided a variety of emergency hazard and severe weather literature. **Proposed Enhancement** – Ensure hazard awareness literature is made available at public facilities, during local community events, and on the City's Website.	High	High	Provide and distribute hazard awareness literature at public facilities and community events and on the City Website. Annual Realtors Breakfast City Website	Public Works Fire Department Police Department Hammond EMA Red Cross of Northwest Indiana Salvation Army Human Resource Commission	Existing Budget FEMA IDNR IDHS

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Tree Maintenance and Utility Corridors • Enhance existing tree maintenance program to reduce the risk of downed utility lines and falling limbs.	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☐ Public Information	☒ Earthquake ☐ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Ongoing** – NIPSCO currently conducts tree maintenance on a 5-6 year rotating basis. **Proposed Enhancement** – Improve coordination between the City and NIPSCO and increase frequency of maintenance to every 4 years.	High	High	All ROWs and public property especially in areas with above ground utility lines.	NIPSCO Parks and Recreation Department	Existing Budgets Utility Rates
Coordination Among Organizations • Enhance coordination and collaboration between the City of Hammond and the Red Cross and Salvation Army. • Continue to re-establish shelter agreements within the City.	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☒ Earthquake ☒ Extreme Temps. ☒ Flooding ☒ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Ongoing-** The City of Hammond, the Lake County EMA, the Salvation Army, and the Red Cross currently provide City of Hammond residents with a wide range of support during emergency and hazard events. **Proposed Enhancement** – Ensure that the Red Cross and Salvation Army are promptly notified of emergency events through more frequent communication, coordination, and training.	High	High	City of Hammond	Public Works Fire Department Police Department Hammond EMA Red Cross of Northwest Indiana Salvation Army	Existing Budget
Levee Inspection Program • Conduct regular inspections and perform regular O&M on flood protection levees.	☒ Prevention ☐ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☒ Structural Control ☐ Public Information	☐ Earthquake ☐ Extreme Temps. ☐ Flooding ☐ Hazardous Materials ☒ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing-** Little Calumet River Flood Control and Recreation Project currently under construction. **Proposed Enhancement-** Once levee is constructed, the City of Hammond will need to coordinate with LCRBC, USACE, and City of Munster to clarify inspection as well as operation and maintenance guidelines**.**	High	High	Little Calumet River Flood Control and Recreation Project	Public Works	Existing Budget

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Stormwater Management • Continue to maintain channels and storm sewers to prevent localized flooding.	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☒ Structural Control ☒ Public Information	☐ Earthquake ☐ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☒ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing** - The Sanitary District currently maintains storm/sanitary sewers. **Proposed Enhancement** – Identify, prioritize, and correct local drainage problems.	High	Medium	Municipal Separate Storm Sewer System (MS4) Areas identified in City-wide Sewer Modeling Project	Public Works (Sanitary District) Lake County Surveyor's Office	Existing Budget FEMA
Power Back-up Generators • Require power back-up generators at all municipally owned critical facilities. • Encourage power back-up generators in all non-municipally owned critical facilities.	☒ Prevention ☒ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☒ Structural Control ☐ Public Information	☒ Earthquake ☒ Extreme Temps. ☒ Flooding ☒ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Ongoing** – The City has a mobile back-up generator. Many critical facilities have existing back-up generators. **Proposed Enhancement** – Adopt a resolution requiring back-up generators in municipally owned critical facilities. Promote the use of generators to all non-municipally owned critical facilities and all other City residents and businesses.	High	Medium	Require in 23 municipally owned critical facilities within the City of Hammond. Encourage in 139 non-municipally owned critical facilities and other residences and businesses within the City of Hammond.	Public Works Fire Department Police Department Hammond EMA	Existing Budget Operational Cost
Good Neighbor Program • Develop an education and outreach campaign encouraging residents to keep in contact with their neighbors during emergencies.	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☒ Earthquake ☒ Extreme Temps. ☒ Flooding ☒ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Proposed Enhancement-** Develop an education and outreach campaign encouraging residents to keep in contact with their neighbors during periods of extreme weather conditions.	Medium	High	City of Hammond	Fire Department Police Department Hammond EMA	Existing Budget
Flood Preparedness and Response • Increase flood preparedness and response upstream of and within the City of Hammond, by enhancing flood notification, evacuation, and response procedures.	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☐ Earthquake ☐ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☒ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing-** There are currently 2 USGS gages serving the City of Hammond. Police and Fire Departments notify residents in at risk neighborhoods of rising floodwaters. **Proposed Enhancement-** Ensure funding for O&M of stream gages. Prepare a flood preparedness plan to enhance flood notification, evacuation, and response procedures.	Medium	Medium	Existing gages located on Grand Calumet River. Coordinate with adjacent communities to share costs associated with operating and maintaining existing gages.	Public Works Public Works (Sanitary District)	Existing Budget USGS

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Safe Havens & Community Shelters • Encourage safe havens in new and existing developments lacking basements. • Encourage safe havens in all new public and critical facilities. • Retrofit safe havens in existing public facilities that need enhancements. • Clearly advertise location of safe havens and community shelters.	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☒ Public Information	☒ Earthquake ☒ Extreme Temps. ☒ Flooding ☒ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Ongoing** – The City has two existing sheltering facilities (Jean Shepherd Community and Hammond Civic Center). **Proposed Enhancement** – Encourage new developments lacking basements and new mobile home parks to incorporate community shelters/safe havens into development plans. Where possible promote retrofitting of existing public and critical facilities. Ensure that safe rooms and shelters are well advertised.	Medium	Medium	New public facilities in the City of Hammond. Critical facilities and large public gathering places.	Hammond Public Works Owners of critical facilities	Operational Cost Existing Budget FEMA
Mobile Homes • Certify that mobile homes meet manufacturer's minimum installation requirements.	☒ Prevention ☒ Property Protection ☐ Nat. Res. Protection ☐ Emergency Services ☒ Structural Control ☒ Public Information	☒ Earthquake ☐ Extreme Temps. ☐ Flooding ☐ Hazardous Materials ☐ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Proposed Enhancement-** Formalize mobile home inspection procedures to maximize safety during severe weather events.	Medium	Medium	All new mobile home developments.	Building Commissioner	Incorporate costs into development fees.
Combined Sewer Separations • Separate storm and sanitary sewers.	☒ Prevention ☐ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☒ Structural Control ☐ Public Information	☐ Earthquake ☐ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☐ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing-** The City is currently working to comply with State and Federal CSO requirements and is implementing the City-wide Sewer Modeling Project. **Proposed Enhancement -** Continue to pursue separation of sanitary and storm sewer lines in order to reduce CSOs and improve drainage problems and basement back-ups.	Medium	Low	City of Hammond combined sewer system service areas. Areas identified in City-wide Sewer Modeling Project CSO Storage Pond Columbia Avenue Project	Public Works Sanitary District	Existing Budget

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT -COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Utility Use & Location • Where feasible, locate utility lines outside of known hazard areas. • Bury new and retrofitted utilities to reduce exposure to hazards.	☒ Prevention ☒ Property Protection ☐ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☒ Public Information	☒ Earthquake ☒ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☒ Levee Failure ☒ Severe Winter Storm ☒ Thunderstorm/ Winds ☒ Tornado	**Ongoing** – New development is encouraged to bury utility lines. **Proposed Enhancement** – Require all new and redevelopment projects to bury utility lines.	Medium	Low	New developments within the City of Hammond.	Public Works Building Commissioner Planning and Development	Incorporate costs into development fees Existing Budgets
HAZUS MH Models • Update HAZUS-MH earthquake model to predict losses and "what-if" scenarios	☒ Prevention ☐ Property Protection ☒ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☒ Earthquake ☐ Extreme Temps. ☐ Flooding ☐ Hazardous Materials ☐ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Ongoing** – The City currently utilizes GIS in planning and zoning and has received HAZUS-MH software and advanced training. **Proposed Enhancement** – Begin updating and enhancing HAZUS-MH with local GIS data.	Low	High	City of Hammond Needed enhancements include but are not limited to elevation data, housing survey and attributes, and field verification of point address files.	Public Works (Sanitary District)	Existing Budget FEMA
Regional Detention and Stormwater Diversion • Minimize flooding by diverting or retaining stormwater.	☒ Prevention ☐ Property Protection ☒ Nat. Res. Protection ☒ Emergency Services ☒ Structural Control ☐ Public Information	☐ Earthquake ☐ Extreme Temps. ☒ Flooding ☐ Hazardous Materials ☐ Levee Failure ☐ Severe Winter Storm ☐ Thunderstorm/ Winds ☐ Tornado	**Proposed Enhancement-** Minimize flooding by diverting or retaining stormwater through regional detention.	Low	Medium	To be determined based on future problem identification.	Public Works (Sanitary District)	Existing Budget FEMA

5.0 IMPLEMENTATION PLAN

The following is a proposed plan for implementing all high priority mitigation projects 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.

Detailed Flood Studies
Conduct detailed flood studies to determine Base Flood Elevations for waterways connected to Lake Michigan (Lake George, Wolf Lake).

A. Prioritize unstudied streams and water bodies in the City of Hammond and establish a timeline to complete detailed analysis of flood zones.
B. Initiate research potential funding options (PDM, FMA, etc) to assist with the development of detailed floodplain studies.
C. Dedicate annual funding and retain a qualified engineering firm to complete floodplain studies according to FEMA guidelines.
D. Establish a template for these studies and distribute to developers to ensure a consistency from reach to reach.

Community Rating System
Reduce flood insurance premiums through participation in the Community Ratings System.

A. Improve coordination and collaboration between the City of Hammond Public Works and Planning Office on CRS Program management.
B. Implement recommendations from the Community Rating System Activity Evaluation Report completed in 2004.
C. Adopt the FEMA Approved MHMP.
D. Meet with CRS Specialist to complete CRS application and calculate total credit points.
E. Submit CRS Application to FEMA for review.

HAZUS MH Models
Update HAZUS-MH Flood model to predict losses and “what-if” scenarios.

A. Ensure City staff members remain adequately trained in the latest HAZUS-MH software.
B. Enhance existing City GIS data. (housing survey and attributes, improved elevation data, field verification of point address files, etc.)
C. Update local GIS data to allow for incorporation and conversion into HAZUS-MH software.
D. Utilize local data to enhance existing social, physical, and economic loss calculations associated with flooding events within the City of Hammond.

Building Protection
Protect existing critical facilities in floodplains, and limit development of new critical facilities in 100 and 500-year floodplains.

A. Adopt new or amend existing ordinances to restrict construction of new critical facilities in known hazard areas.

B. Initiate research on potential funding sources (PDM, FMA, etc) that would provide financial assistance to assist with acquisition, relocation, elevation, and flood proofing of non-residential structures in known hazard areas.

Outdoor Warning Sirens

Ensure that all outdoor warning sirens are fully operational and remain adequately maintained and add an additional Warning Siren near the intersection of I-80/94 and Indianapolis Boulevard.

A. Research potential funding options to assist with the purchase of new sirens.
B. Apply for funding source.
C. Purchase and install sirens.
D. Include siren O&M as a line item in future budgets.

Emergency Warning Systems

Require Weather Alert Radios in all municipally owned critical facilities. Encourage Weather Alert Radios in all non-municipally owned critical facilities and all other city residences and businesses.

A. Work with the Mayor's Office to require weather radios in municipally owned critical facilities.
B. Coordinate with Weather Alert Radio distributors to discuss potential cost savings associated with purchasing a large quantity of radios.
C. Encourage Weather Alert Radios in all critical facilities, newly constructed public facilities, large employers, public housing, etc.
D. Inventory existing critical facilities and identify specific facilities in need of Weather Alert Radios.
E. Develop a mailing list inclusive of all relevant critical facilities in the City of Hammond promoting Weather Alert Radios. Include an informational brochure in the mailing that discusses important details on Weather Alert Radios such as benefits, costs, and various purchasing information.
F. Distribute informational brochure on the benefits of Weather Alert Radios to City residents and businesses.

Levee Protection Education

Develop an education program informing property owners within the "Levee Protection Zone" that their properties are still at risk from flooding. Include information on potential threats to the structural integrity of the levee into educational materials in an effort to increase the likelihood that potential problems are identified as early as possible.

A. Develop educational materials discussing the potential flood risks for residents and businesses located within the "Levee Protection Zone" as well as potential risks and threats to the structural integrity of the levee such as blockages, erosion, etc.
B. Develop a mailing list inclusive of all resident, businesses, and landowners located within the "Levee Protection Zone". Include an informational brochure in the mailing that discusses flood risks and encourages residents, businesses, and landowners to purchase flood insurance policies.
C. Target education efforts to local realtors via the Realtors Breakfast and the City's Human Relations Commission.

Hazardous Materials Training
Increase the number of personnel certified to OSHA III Technician Level.

A. Maintain a list of existing City employees trained to OSHA III Technician Level and ensure that existing OSHA III Technician Level employees attend refresher sessions.
B. Ensure that additional staff are provided with training opportunities.
C. Utilize existing Fire Department Grant Writer to help secure adequate funding for continual training.

Immunization
Enhance the City's existing voluntary immunization program for all emergency responders and inspection staff.

A. Inventory all City Departments to determine the need for immunization of field staff.
B. Promote the benefits of a voluntary immunization program and encourage all appropriate staff to participate in the immunization program.
C. Conduct an annual immunization program for all appropriate staff.

Public Education & Outreach
Enhance public education and outreach by distributing hazard preparedness literature at public facilities and community events, participating in Severe Weather Awareness Week, becoming a StormReady Community, and promoting local participation in the Community Emergency Response Teams.

A. Develop, maintain, and distribute hazard preparedness literature for use at public facilities, community events, and the City's Website.
B. Develop and implement a multi-media outreach campaign for identifying hazards affecting the City of Hammond and proper response actions associated with each hazard.
C. Research the requirements and apply to become a StormReady Community.

Tree Maintenance and Utility Corridors
Enhance existing tree maintenance program to reduce the risk of downed utility lines and falling limbs.

A. Prioritize areas in need of more frequent tree trimming activities.
B. Increase frequency of tree trimming within those priority areas.
C. Improve coordination and communication between NIPSCO and the City once a tree is removed/trimmed.
D. Increase distribution of educational materials promoting the safety and service benefits of tree trimming near utility lines.

Coordination Among Organizations
Enhance coordination and collaboration with the Red Cross of Northwestern Indiana and Salvation Army. .

A. Enhance coordination and collaboration with Red Cross and Salvation Army by enhancing the regularity with which the City meets with and consults these organizations.

Levee Inspection Program
Conduct regular inspections and perform regular O&M on flood protection levees.

A. Coordinate with the USACE and the Little Calumet River Basin Commission (LCRBC) on levee inspection and operation and maintenance recommendations.
B. Ensure adequate resources (budget/staff) are available among the Town of Munster and the City of Hammond to adequately operate and maintain levees.
C. Begin conducting regular levee inspection and maintenance procedures.

Stormwater Management
Continue to maintain channels and storm sewers to prevent localized flooding.

A. Conduct studies to identify the extent of local drainage problems.
B. Develop a comprehensive evaluation sheet to respond to complaints or investigations.
C. Prioritize channels, regulated drains, and storm sewers for maintenance
D. Allocate necessary funding to complete high priority actions.

Power Back-up Generators
Require power back-up generators at all municipally owned critical facilities. Encourage power back-up generators in all non-municipally owned critical facilities.

A. Work with the Mayor's Office to require back-up generator in municipally owned critical facilities.
B. Identify all critical facilities and infrastructure that do not have power back-up generators.
C. Initiate research regarding potential funding sources that would provide financial assistance for purchasing and implementing power back-up generators in critical facilities.
D. Develop a mailing list inclusive of all relevant critical facilities in the City of Hammond, promoting back-up generators. Include an informational brochure in the mailing that discusses important details on power back-up generators such as benefits, costs, and various purchasing information.

6.0 PLAN MAINTENANCE PROCEDURES

6.1 MAINTENANCE PROCESS

Throughout the 5-year planning cycle, the City of Hammond EMA and Sanitary District will reconvene the MHMP Planning Committee on an annual basis in order to monitor, evaluate, and update the Plan as needed. Members of the Planning Committee are readily available to engage in meetings between annual meetings.

This is the first MHMP that the City of Hammond has prepared. The data used to prepare the 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 better data becomes available, updates should be made to the risk assessment and vulnerability analysis.

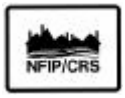
6.2 INCOPRORATION INTO EXISTING PLANS

Many of the mitigation projects identified as part of this planning process are ongoing with some enhancement needed. Where needed, modifications will be made planning documents and ordinances during their regularly scheduled updates.

6.3 CONTINUED PUBLIC INVOLVEMENT

Continued public involvement is critical to the successful implementation of the City of Hammond MHMP. Comments from the public on the MHMP will be received by the City of Hammond EMA and Sanitary District and forwarded onto the MHMP Planning Committee for discussion. Education efforts for hazard mitigation will be the focus of the annual Severe Weather Awareness Week as well as incorporated into existing stormwater planning, land use planning, and special projects/studies efforts. Once adopted, a copy of this Plan will be available for the public to review at the City of Hammond EMA Office and on the City's Website.

Updates or modifications to the City of Hammond MHMP during the 5-year planning process 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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