MULTI-HAZARD MITIGATION PLAN

Prepared for:

Hancock County, Indiana
City of Greenfield, Indiana
Town of Cumberland, Indiana
Town of McCordsville, Indiana
Town of Spring Lake, Indiana

September 2007

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CBBEL Project Number 05-154

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TABLE OF CONTENTS

1.0 INTRODUCTION 2
1.1 PROJECT SCOPE AND PURPOSE 2
1.2 PLANNING PROCESS 3
1.3 PLANNING COMMITTEE 3
1.4 PUBLIC INVOLVEMENT IN THE PLANNING PROCESS 5
1.5 INVOLVEMENT OF OTHER INTERESTED PARTIES 5
2.0 COMMUNITY INFORMATION 6
2.1 NFIP PARTICIPATION 6
2.2 POPULATION AND DEMOGRAPHICS 5
2.3 LAND USE AND DEVELOPMENT TRENDS 5
2.4 EMPLOYMENT 6
2.5 CRITICAL AND NON CRITICAL FACILITIES 7
2.6 MAJOR WATERWAYS AND WATERSHEDS 8
2.7 TOPOGRAPHY 10
2.8 CLIMATE 10
3.0 RISK ASSESSMENT 12
3.1 HAZARD IDENTIFICATION 13
3.2 HAZARD PROFILES 16
3.2.1 HAILSTORM, THUNDERSTORM, WINDSTORM 16
3.2.2 HAZARDOUS MATERIALS 21
3.2.3 TORNADO 26
3.2.4 SEVERE WINTER STORM/ICE 32
3.2.5 EARTHQUAKE 37
3.2.6 FLOODING 40
3.2.7 EXTREME TEMPERATURES 47
3.2.8 DAM FAILURE 51
3.2.9 DROUGHT 54
3.3 HAZARD SUMMARY 56
4.0 MITIGATION GOALS AND PROJECTS 59
4.1 MITIGATION GOALS 59
4.2 MITIGATION PROJECTS 59
5.0 IMPLEMENTATION PLAN 66
6.0 PLAN MAINTENANCE PROCEDURES 72
6.1 MAINTENANCE PROCESS 72
6.2 INCOPRORATION INTO EXISTING PLANS 72
6.3 CONTINUED PUBLIC INVOLVEMENT 72

LIST OF TABLES

Table 1-1: Planning Committee 3
Table 1-2: Additional Attendees 3
Table 2-1: NFIP Participation 5
Table 2-2: Land Use in Hancock County 7
Table 2-3: List of Major Waterways 8
Table 2-4: List of 14-Digit HUC Watersheds 10
Table 3-1: Hazard Identification 13
Table 3-2: Determination of Weighted Value for NFIP Communities 13
Table 3-3: Calculated Priority Risk Index (CPRI) for Hancock County 14
Table 3-4: Comprehensive Hazard Analysis Scores 14
Table 3-5: Historic Hailstorm, Thunderstorm, and Windstorm Events 16
Table 3-6: Calculated Priority Risk Index (CPRI) for Hailstorm, Thunderstorm, and Windstorm 18
Table 3-7: 2004 United States Hazardous Materials Incidents by Transportation Mode 22
Table 3-8: Calculated Priority Risk Index (CPRI) for Hazardous Materials 28
Table 3-9: Hazardous Materials Facilities, Neighboring Facilities, and Replacement Costs 28
Table 3-10: Fujita Scale of Tornado Intensity 29
Table 3-11:Historic Tornado Data 27
Table 3-12: Calculated Priority Risk Index (CPRI) for Tornado 29
Table 3-13: Summary of Hypothetical Tornado Damage and Estimated Costs 30
Table 3-14: Calculated Priority Risk Index (CPRI) for Severe Winter Storm/Ice 33
Table 3-15: Calculated Priority Risk Index (CPRI) for Earthquake 39
Table 3-16: Historic Flood Data 41
Table 3-17: Calculated Priority Risk Index (CPRI) for Flooding 43
Table 3-18: Residential Strucutres within the 100-year Floodplain 44
Table 3-19: Historic Extreme Temperature Events 48
Table 3-20: Calculated Priority Risk Index (CPRI) for Extreme Temperature 49
Table 3-21: Inventory of Dams 52
Table 3-22: Calculated Priority Risk Index (CPRI) for Dam Failure 52
Table 3-23: Calculated Priority Risk Index (CPRI) for Drought 55
Table 3-24: Comprehensive Hazard Rankings, Hancock County 57
Table 4-1: Summary of Mitigation Projects 61

LIST OF EXHIBITS

1 Critical Facilities
2 Hazardous Materials: Storage and Transportation Routes
3 Historic Tornado Activity and Warning Siren Locations and Coverage Areas
4 Flood Zones, USGS Stream Gages, and Dams

LIST OF APPENDICES

1 List of Acronyms
2 MHMP Planning Committee Meeting Agendas and Meeting Summaries
3 List of Critical Facilities
4 Media Releases, Coverage, Public Survey, and Summary of Responses
5 Promulgation Authorities
6 Resolutions for Adoption
7 Potential Funding Sources for MHMP Mitigation measures

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 United States Department of Homeland Security (DHS) Region V offices administer the MHMP program in Indiana.

The Hancock County MHMP is a multi-jurisdictional planning effort led by the Hancock County Emergency Management Agency (EMA). This Plan was prepared in partnership with Hancock County, the City of Greenfield, the Town of Cumberland, the Town of McCordsville, and the Town of Spring Lake. While representatives from the Town of Cumberland and the Town of Spring Lake were unable to attend Planning Committee meetings, valuable information was obtained from them through electronic and personal correspondence. Further, information regarding meeting announcements and previous meeting summaries were provided to these community representatives. These communities also provided valuable information about their community, reviewed and commented on the draft MHMP, and assisted with local adoption of the approved plan. Since each of the communities participating had an equal opportunity for participation and representation in the planning process, the process used to develop the Hancock County MHMP satisfies the requirements of DMA 2000 in which multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the planning process.

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 Hancock County. The intent of this planning effort was to identify the hazards and the extent that they affect Hancock County, 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 DHS programs including the NFIP Community Ratings System (CRS), additional detailed studies will need to be completed prior to applying for these grants or programs.

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 is 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, Hancock County has achieved a Level 8 in the CRS program that provides residents a 10% discount on Flood insurance.

Funding to prepare this MHMP was made available through a PDM grant that the IDHS awarded to the Hancock County Board of Commissioners. Christopher B. Burke Engineering, Ltd. (CBBEL) was hired to facilitate the planning process and prepare the Hancock County MHMP under the direction of an AICP Certified Planner.

1.2 PLANNING PROCESS

Preparation for the Hancock County MHMP began March of 2005 when the Hancock County EMA Director requested PDM funds from IDHS to prepare a MHMP for the County and NFIP communities. The Hancock County Commissioners hired CBBEL in March 2005.

In April of 2006, the EMA Director compiled a list of Planning Committee members that would meet in May, July, September, and October. From May through July 2006 CBBEL researched and compiled historic hazard data necessary to prepare the MHMP. In September 2006, a media release describing the development of the MHMP was distributed to local media outlets. In December 2006, CBBEL provided the draft Hancock County MHMP to the Planning Committee for their review and comment. A public meeting was scheduled for February 27, 2007 to present the draft Plan to the public and other interested parties. Public comments were accepted through March 16, 2007 and the Plan was forwarded to the DHS for their review and comment. Comments from IDHS were incorporated into the draft Plan and reviewed by the Planning Committee. Local adoption of the MHMP by Hancock County, City of Greenfield, Town of Cumberland, Town of McCordsville, and the Town of Spring Lake was complete in [date] 2007.

1.3 PLANNING COMMITTEE

The Hancock County MHMP Planning Committee was a new committee specifically formed to develop this Plan. Members included representatives from Hancock County, Greenfield, Cumberland, McCordsville, and Spring Lake that were knowledgeable of local hazards; been involved in hazard mitigation; and/or had the tools necessary to reduce the impact of future hazard events. The Planning Committee included representatives from emergency management, fire, law enforcement, planning, zoning and code enforcement, public health, public utilities, and elected officials. **Table 1-1** lists the individuals that participated on the Planning Committee and the entity they represented.

The Planning Committee convened at the Hancock County Regional Hospital in Greenfield and met on May 24, July 27, September 28, and October 26, 2006. Representatives from the NFIP communities attended the meetings and worked efficiently to discuss and make decisions on the information presented. 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. Representatives from the Town of Cumberland and the Town of Spring Lake were unable to attend the Planning Committee meetings. However, they were able to provide important information via email and telephone conversations. The communities also provided comments and suggestions on the draft documents throughout the process. Meeting agendas and summaries are included in **Appendix 2**. Several members of the Planning

Committee attended the public meeting in February 2007 and assisted with adoption of the Hancock County MHMP.

Table 1-1: MHMP Planning Committee

Name	Title	Representing
Roy Ballard	Extension Educator	Hancock Co – Purdue University Extension
Randy Brandlein	Liaison	Hancock County Firefighters Mutual Aid
Joe Copeland	Engineer-Superintendent	Hancock County Highway Department
Mike Dale	County Planning Director	Hancock County Planning Commission
Wayne DeLong	Floodplain Administrator	City of Greenfield
Sue Denneman	Floodplain Administrator	Town of Spring Lake
Larry Ervin	Director	Hancock County Emergency Management
Mike Fruth	Engineer	Greenfield City Engineering Department
Nick Gulling	Sheriff	Hancock County Sheriff's Department
Terri Held	Director	Hancock County Service Center-American Red Cross
Lewis McQueen	Chief	Greenfield Fire Department
Misty Moore	Public Health Emergency Coordinator	Hancock Co. Health Dept.
Mike Renfro	Line Supervisor	Central Indiana Power
Jamie Robinson	Building Official	Hancock Building & Planning Department
Gary Sargent	Line Superintendent	Central Indiana Power
David Smoll	Surveyor	Hancock County Surveyor's Office
Dawn Torok	GIS Coordinator	Hancock County Surveyor's Office
Jeff Vanderwal	Deputy Director	Hancock County Emergency Management
Katherine Wampler	Coordinator	Hancock Solid Waste District
Ken Whisman	Manager of Safety and Security	Hancock Memorial Hospital
Cory Wilson	Floodplain Administrator	Town of Cumberland

Several additional local leaders attended for the Planning Committee meetings. These individuals are listed in **Table 1-2** below.

Table 1-2: Additional Attendees

Name	Title	Representing
Cindy Beckner	District Coordinator – Education	Hancock County SWCD
Susan Bodkin	Chief Deputy Surveyor	Hancock County Surveyor's Office
Gracy Chelly	GIS Technician	Hancock County GIS Department
Dan O'Connor	Environmental & Safety	Keihin
Steve Schmidt	Environmental Health Specialist	Hancock County Health Department
Stephan Schulz	District 5 FOC	Indiana Department of Homeland Security

1.4 PUBLIC INVOLVEMENT IN THE PLANNING PROCESS

In September 2006, a media release was distributed to the newspapers, radio stations, and television stations in Hancock County and was titled, "How do tornadoes, floods, and severe winter storms affect you?" The article identified the communities participating in the MHMP effort, the requirements of DMA 2000, and 5 questions about hazard awareness to which interested residents could respond.

The questions regarding hazard awareness in Hancock County were also distributed in the form of a survey and provided to local stakeholders through the Planning Committee as well as the SWCD display at the Hancock County 4-H Fair. Nineteen surveys were completed and returned to the Planning Committee. The majority of respondents reported having experienced one or more of the hazards affecting Hancock County. The majority of these also reported having experienced financial losses due to these hazards, primarily due to hailstorms and tornadoes. **Appendix 4** includes a copy of the media release as well as associated coverage, public survey and a summary of survey responses.

A draft of the Hancock County MHMP was placed in the Greenfield Public Library in Greenfield Indiana. This was an attempt to provide the public with a copy of the MHMP and allow them to review and comment on the contents. Those in attendance for the public meeting held on February 27, 2007 were informed of the availability of the plan as well as being included in a press release provided to the Daily Reporter in Greenfield. Informational flyers announcing the public meeting were provided to the Planning Committee members to post in and around their respective offices. Several members of the Planning Committee were present to describe details of the plan as well as to answer questions presented by attendees. Attendance was moderate; however, the majority of those in attendance were interested citizens and representatives of the public.

1.5 INVOLVEMENT OF OTHER INTERESTED PARTIES

Neighboring EMA Directors in Hamilton, Henry, Madison, Marion, Rush, and Shelby Counties, as well as interested agencies, businesses, academia, and nonprofits were invited to review and comment on the draft Hancock County 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

Hancock County is a highly agricultural county with approximately 90% of land in row crop production or pasture/hay field, an additional 7% of the land is classified as deciduous forest and less than 1% is low intensity residential. Hancock County ranks 79 in 92 counties in Indiana regarding size, and the City of Greenfield is the county seat and county's largest urban center. Greenfield is home of the Riley Festival, drawing over 50,000 visitors annually, and the birthplace of poet James Whitcomb Riley. The City of Greenfield is centrally situated in Hancock County and is approximately 15 miles east of the City of Indianapolis.

2.1 NFIP PARTICIPATION

The City of Greenfield, the Town of Cumberland, the Town of McCordsville, the Town of Spring Lake and Hancock County participate in the NFIP. At the time of preparing this MHMP, Hancock County participates in CRS program having achieved a Class 8 rating. This allows a 10% savings on floodplain insurance to those residents in the unincorporated areas of Hancock County. **Table 2-1** lists the NFIP number and the date they joined the program for each community.

Table 2-1: NFIP Participation

NFIP Communities	NFIP Number	Join Date
Hancock County	180419	10/15/1982
City of Greenfield	180084	11/04/1981
Town of Cumberland	180510	03/10/1993
Town of McCordsville	180468	03/18/2005(R)
Town of Spring Lake	180346	09/03/1985

(FEMA, 2006)

2.2 POPULATION & DEMOGRAPHICS

Hancock County has an above average population growth for Indiana, and ranks 6 among 92 counties with a growth rate of 21.7% between 1990 and 2000. The most recent census data for Hancock County estimates that the 2004 population was 60,915. Of the 92 counties in Indiana, Hancock County is the 79th largest in geographical size and 25th largest for population in Indiana. Approximately 26% of the population in Hancock County lives in the City of Greenfield.

In 2004, the median age of the population in Hancock County was 37.7 years. Similar to the rest of Indiana, the largest demographic age groups in the county were young adults (25 - 44 years), older adults (45 - 64 years), and school aged (5 -17 years) with a distribution within the county of 27.3%, 26.4%, and 19.0%, respectively. The ethnic majority in Hancock County is white which comprises 97.0% of the county population followed by growing Hispanic or Latino, and Black ethnicities. Similar to the rest of Indiana, 30.5% of the population in Hancock County is married with children. The average household size in Hancock County is 2.7 persons compared to the average family size of 3.0. Homeownership is higher in Hancock County than elsewhere in the state. Approximately 77.6% of the population owns their home compared to 65.9% statewide.

2.3 LAND USE AND DEVELOPMENT TRENDS

The most common land use classification is row crop and pasture land which collectively covers roughly 90% of all land area in Hancock County. Following agricultural production areas in

geographic extent is forested land use, covering approximately 7% of the County. Residential development is relatively sparse and covers slightly more than 1% of the total land use in the County and is concentrated primarily in the in the City of Greenfield. The remaining land uses include transition areas, open water, and wetlands. **Table 2-2** displays the distribution of land-use types within Hancock County.

Table 2-2: Land Use in Hancock County

Description	Acres	% of County
Row Crops	248,093.80	76.17
Pasture/Hay	43,594.57	13.38
Deciduous Forest	22,951.88	7.05
Low Intensity Residential	2,936.64	0.90
Urban/Recreational Grasses	1,536.87	0.47
Evergreen Forest	1,280.06	0.39
Commercial/Industrial/Transportation	1,060.80	0.33
Open Water	835.99	0.26
High Intensity Residential	448.24	0.14
Emergent Herbaceous Wetlands	338.69	0.10
Grasslands/Herbaceous	327.57	0.10
Mixed Forest	30.24	0.01
Small Grains	15.94	< 0.01
Bare Rock/Sand/Clay	0.15	< 0.01
TOTAL	**325,721.50**	**100.00**

(USGS, 2004)

According to census records, the population of Hancock County has increased 9.4% between 2000 and 2004. The majority of this growth has been experienced by the western-most three townships of Buck Creek, Sugar Creek and Vernon. Of those three counties, Sugar Creek has seen a 40% increase in housing between 1990 and 2000. Hancock County using a Comprehensive Land Use Plan encourages future development in the areas of existing transportation, utilities, and social services (police, fire, schools, etc.). Based on land use and development patterns, Hancock County has highlighted 5 critical areas for directed growth. Those areas are Mount Comfort Airport, U.S. 40 West, U.S. 36 – S.R. 67 Corridor and U.S. 52 Corridor. As a result, the majority of any future development will likely take place within these areas, maintaining the rich agricultural land use of the eastern portion of the county.

2.4 EMPLOYMENT

Census data from 2003 shows that, of the total working force in Hancock County, 86.6% 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 2003 was $34,016 and the median household income in 2003 was $58,866. The number of individuals commuting out of the County for work was significantly higher (19,596) than those commuting into the County for work (5,493). Approximately 53% of resident workers work in the County. In 2003, employment numbers were 32,902 individuals and in November 2005, the unemployment rate for Hancock County was 4.1%.

Approximately 1,200 commercial establishments employ roughly 18,764 individuals in the County. Manufacturing employs 16.2% of the workforce, retail trade is the next largest employer with 11.6%, and Health Care & Social assistance has approximately 10.4% of the county's workforce. Almost 87% of all workers are employed in the private sector, with the remaining 12% in local government and public administration positions.

2.5 CRITICAL AND 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, information from the Hancock County Geographic Information System (GIS) Department and the MHMP Planning Committee was utilized to identify preliminary types and locations of critical facilities. These 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. After further discussion, the Planning Committee modified the existing list and added or modified the locations of critical facilities.

There are 150 critical facilities in Hancock County identified using the HAZUS-MH database, Hancock County GIS information, and input from the MHMP Planning Committee. These facilities are 2 dams, 10 private airports, 2 communications facilities, 13 fire stations, 6 police stations, 1 emergency operations facility, 13 hazardous materials handlers, 14 medical care facilities, 35 schools, 7 potable water systems, 3 natural gas facilities, 6 electric power facilities, 4 highways, 4 railroads, and 10 wastewater treatment plants. **Exhibit 1** illustrates the location of critical facilities and **Appendix 3** lists the critical facilities within Hancock County.

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 identified using the HAZUS-MH database includes 18,600 buildings in Hancock County. These include 18,423 residential, 113 commercial, 22 industrial, and 8 religious.

Critical facilities are in addition to the total number of non-critical buildings identified here; adding all structures together yields 18,750 structures.

The development of this MHMP focused on critical facilities; thus, non-critical facilities are not individually mapped or listed. HAZUS-MH data are conditional in that HAZUS-MH is currently populated based on general national data. Future updates to the County's MHMP should consider updating the HAZUS default data with more accurate, locally based statistics. Local information regarding assessed property and land values were utilized for estimating replacement costs for at risk structures.

2.6 MAJOR WATERWAYS AND WATERSHEDS

According to the Indiana Department of Environmental Management (IDEM), there are 91 waterways in Hancock County. The Hancock County Surveyor's Office has provided locally known names for many of the waterways listed below. **Table 2-3** lists the waterways identified. Hancock County has one major river, the Big Blue River and two large creeks, Sugar Creek and Brandywine Creek. Predominant drainage patterns for Hancock County are to the south, with the bulk of the surface water ultimately entering the East Fork of the White River drainage basin. A small portion of surface water drains to and is stored in the Geist Reservoir in the northwest corner of Vernon Township.

Table 2-3: List of Major Waterways

Amity Branch	Heinrich Ditch	Pee Dee Ditch [Howerin McCray Ditch]
Andis Ditch	Jackson Ditch Arm [Cal Jackson Drain]	Perry Brook [Staley Ditch]
Anthony Creek [Anthony, Smith & Morris Drain]	Jay Ditch	Potts Ditch
Ashcraft Ditch	Jones Ditch [F.L. Jones Drain]	Powers Ditch [Catherine Powers Ditch]
Barretts Ditch [Thomas Barrett Drain]	Kirkhoff Ditch	Prairie Branch [Thomas Miller Ditch]
Bee Camp Creek [Jonathon Stansbury Drain]	Kuhn Ditch	Putter Ditch [Puterbaugh Ditch]
Beeler Ditch [Arm of McFadden Drain]	Lead Creek [Skinner & Ploenges Drain]	Rash Ditch
Big Blue River	Leary Ditch	Redskin Brook [Arm of B.F. Ham]
Bills Branch	Little Brandywine Creek	Richey Ditch
Boots Ditch [Sophia Boots Drain	Little Sugar Creek [W.F. Wilson Drain]	Shirley Drain [O.P. Moore Ditch]
Boyd Ditch	Maize Run	Sixmile Creek
Brandywine Creek	Marsh and Trees Ditch	Smith Ditch [Smith, Kitterman & Cronk Ditch]
Brandt Ditch [Sophia Brandt Drain]	Maxwell Ditch [Mary Maxwell Drain]	Smith Johnson Ditch
Brier Ditch [Charles Brier Drain]	Mc Cray Run [Mary Gilbreth Drain]	Snider Branch [Snider & King Ditch]
Brown Ditch	Mc Fadden Ditch	Stansbury Ditch

[Arm of Brandywine Creek]		[Thomas Stansbury Ditch]
Buck Creek	Merlau Ditch [Merlau Hack Drain]	Steele Ditch [Jay Ditch]
Burris Ditch	Middle Fork [William Morrison Drain]	Sugar Creek
Corn Run	Million Brook [Arm of Six Mile Ditch]	Sugar Run [Kraft Ditch]
Dilly Creek	Mingle Ditch [Arm of McFadden Drain]	Sweet Creek
Doe Creek	Morris Creek [Anthony, Smith & Morris Drain	Thompson Ditch [Thompson Hamilton Ditch]
Dry Branch [James Schultz Drain]	Nameless Creek [Wesley Williams Ditch]	Trittipo Ditch [Samuel Trittipo Ditch]
Dunn Ditch	New Ditch [William New Ditch]	Village Brook [Arm of B.F. Ham Ditch]
Dunwoody Ditch	North Fork [Schultz & Schultz Ditch]	Weber Ditch [Mary Weber Ditch]
Estes Ditch [O.M. Eastes Drain]	Oats Run	West Little Sugar Creek [Mud Creek]
Fuller Ditch [James Fuller Drain]	Ogle Ditch	Wicker Ditch [Wicker Dorman Ditch]
Grain Creek	Ohara Ditch	Williamson Ditch
Halk Ditch [Merlau Hack Drain]	Palestine Branch [Arm of Merlau Hack Ditch]	Willow Branch [Frank Martindale Ditch]
Ham Ditch [B.F. Ham Drain]	Parker Ditch [Willis Parker Ditch]	Wilson Ditch [W.F. Wilson Ditch]
Harlan Run [Arm of Sugar Creek]	Parker Estes Ditch	

(IDEM, 2006)

According to IDEM, there are 32 14-digit Hydrologic Unit Code (HUC) watersheds in Hancock County. The largest watershed is the West Little Sugar Creek-Buck Creek Watershed (112642.8 acres) and the smallest is the Dry Branch (Geist Reservoir (4905.9 acres).

Table 2-4 lists the 14-digit HUC watersheds in Hancock County.

Table 2-4: List of 14-Digit HUC Watersheds

14-Digit HUC #	14-Digit HUC NAME	Acres
05120204070060	West Little Sugar Creek-Buck Creek	112642.8
05120204060020	Sugar Creek-March & Tree Ditch	15524.8
05120204060030	Sugar Creek-Barrett Ditch	14107.6
05120201100100	Lick Creek-Headwaters (Markleville)	13761.7
05120204060010	Sugar Creek-Pee Dee Ditch	13257.6
05120204060060	Little Sugar Creek-Wilson Ditch	12481.1
05120204070030	Grassy Creek (Marion)	12033.0

14-Digit HUC #	14-Digit HUC NAME	Acres
05120204060040	Sugar Creek-Boyd Ditch	11705.0
05120201110010	Indian Creek-Steele Ditch	11727.5
05120201100150	Geist Reservoir-Bee Camp	11121.9
05120204020010	Six Mile Creek-Headwaters	10817.5
05120201100110	Lick Creek-Manifold/McFadden Ditches	10678.4
05120204020040	Nameless Creek	10516.7
05120204020050	Big Blue River-Prairie branch (Hancock)	10269.9
05120204040010	Brandywine Creek-Willow Branch	10217.9
05120204020020	Six Mile Creek-Anthony Creek	10160.4
05120204070040	Buck Creek-Brier/Doe Creeks	9735.2
05120201110020	Fall Creek-Indian lake/Lawrence Creek	9408.2
05120204070010	Buck Creek-Headwaters (Hancock)	9225.6
05120204010140	Big Blue River-Carthage	9156.2
05120204040040	Little Brandywine Creek	9151.1
05120204020030	Six Mile-Dilly Creek	9055.7
05120204020060	Big Blue River-Prairie Branch (Shelby)	8839.7
05120204040020	Brandywine Creek-Richey Ditch	8182.5
05120204080020	Snail Creek-Snodgrass Ditch	8123.3
05120204040050	Brandywine Creek-Andis Ditch	7830.3
05120204060070	Little Sugar Creek-Thompson Ditch	7811.7
05120204070020	Buck Creek-Parker Estes Ditch	7696.6
05120201100120	Fall Creek-Flatfork Creek	7645.0
05120204040030	Brandywine Creek-Potts Ditch	6748.9
05120204060050	Sugar Creek-Smith Johnson Ditch	6627.8
05120201100140	Dry Branch (Geist Reservoir)	4905.9

(IDEM, 2006)

2.7 TOPOGRAPHY

Hancock County lies within the leading edge of the Wisconsinan glacial advance that stretched across parts of Indiana approximately 21,000 years ago. The Wisconsinan glacial advance and retreat shaped the Indiana landscape leaving behind vast deposits of sand and gravel, till, silt throughout central and northern Indiana. The Hancock County landscape consists primarily of flat or gently rolling terrain built from glacial outwash materials. The difference in elevation for Hancock County is approximately 250 feet, with the highest elevation being 1,030 ft. in the northeastern portion of the county near Shirley. The lowlands of Sugar Creek, located in the southwestern portion of Hancock County are the lowest area of elevation at 780 feet.

2.8 CLIMATE

The Midwestern Regional Climate Center provided climate data that includes information retrieved from a weather station located in Greenfield identified as National Climate Date Center (NCDC) station 123527. The average annual mean temperature for Hancock County is 51.6 ºF. Mean precipitation is 43.43” a year, with the wettest month being July with 4.85” mean total, and the driest month is January, with 2.47” mean total. The highest 1-day maximum

precipitation was 5.20” on August 10, 1968. Mean snowfall is 13.6” per year. The highest monthly amount of snowfall recorded at this station is 19.8” for December 1973. On average, there are 130.7 days of rain greater than or equal to 0.01”, 29.3 days of rain greater than or equal to 0.5”, and 10.1 days of rain greater than or equal to 1.0” of depth. There are approximately 176 days in the growing season for Hancock County, based on a base temperature of 32 ºF and falls between April 21 and October 15.

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 a community is required. A risk assessment measures the potential loss from a hazard event by assessing the vulnerability of buildings, infrastructure, and people in a community. It identifies the characteristics and potential consequences of hazards, how much of the community will be affected by a hazard, and the impact on community 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 Hancock County, and agreed upon which hazards they would like to study in detail as part of this planning effort. Threats of terrorism, pandemic/epidemic outbreaks, and pipeline utility failure were also mentioned as potential hazards having a significant impact on Hancock County. However, due to the sensitive nature of the information and the fact that these events have been detailed in other non-public documents, the Planning Committee decided not to include them in this report.

As illustrated in **Table 3-1**, the Planning Committee decided to study dam failure, drought, earthquake, extreme temperatures, flooding, hailstorm/thunderstorm/windstorm, hazardous materials incidents, severe winter storm/ice, and tornado in detail as part of this planning effort. While the FEMA Region V list includes landslides and wildfires, the Planning Committee felt that these events had little local impact and were not studied as part of this planning effort.

Table 3-1: Hazard Identification

List of Hazards	Hazards with Local Impact	Hazards for Detailed Study
Dam Failure	**Yes**	**Yes**
Drought	***Yes***	***Yes***
Earthquake	**Yes**	**Yes**
Extreme Temperature	***Yes***	***Yes***
Flooding	**Yes**	**Yes**
Hailstorm/Thunderstorm/Windstorm	**Yes**	**Yes**
Hazardous Materials Incidents	***Yes***	***Yes***
Landslide	No	No
Severe Winter Storm/Ice	**Yes**	**Yes**
Tornado	**Yes**	**Yes**
Wildfire	No	No

Note: Hazards shown in bold are studied in detail. Hazards shown in Italics were added by the Planning Committee

The Planning Committee then prioritized these hazards in terms of importance and potential for disruption to the community using the Calculated Priority Risk Index (CPRI). The CPRI adopted from MitigationPlan.com, is a tool by which individual hazards are evaluated and ranked according to an indexing system. The CPRI value can be 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.

- **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, more than 50% property is severely damaged.

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

Table 3-2: Determination of Weighted Value for NFIP Communities

NFIP Community	2004 Population	% of Total Population	Weighed Value
Hancock County (w/o other NFIP)	40,762	66.9	0.669
City of Greenfield	16,048	26.3	0.263
Town of Cumberland	2,589	4.3	0.043
Town of McCordsville	1,248	2.1	0.020
Town of Spring Lake	268	0.4	0.004
TOTAL	**60,915**	**100.0**	**1.00**

Table 3-3 illustrates the combined CPRI values for Hancock County and NFIP communities. According to the combined CPRI for Hancock County and NFIP communities, hailstorm/thunderstorm/windstorm (2.9) ranked as the number one hazard in Hancock County,

followed by hazardous materials (2.8), tornado (2.7), severe winter storm (2.4), earthquake (2.4), flooding (2.1), extreme temperatures (2.0), dam failure (1.8), and drought (1.7). **Section 3.2** includes a profile of the individual hazards as well as a CPRI value for both Hancock County as a whole, and the specific NFIP communities within the County.

Table 3-3: Combined Calculated Priority Risk Index (CPRI) for Hancock County, Greenfield, Cumberland, McCordsville, and Spring Lake

	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	Weighted Average CPRI
Hailstorm / Thunderstorm / Windstorm	Highly Likely	Negligible – Limited	< 6 hrs	< 6 hrs	2.9
Hazardous Materials	Possible – Highly Likely	Negligible – Critical	< 6 hrs	< 6 hrs	2.8
Tornado	Likely	Limited – Catastrophic	< 6 hrs	< 6 hrs	2.7
Severe Winter Storm	Likely	Negligible – Critical	> 24 hrs	< 1 wk	2.4
Earthquake	Unlikely	Critical	< 6 hrs	< 1 wk	2.4
Flooding	Likely	Negligible – Limited	> 24 hrs	< 1 wk	2.1
Extreme Temperature	Possible	Limited	> 24 hrs	< 1 wk	2.0
Dam Failure	Unlikely-Likely	Negligible	>24 hrs - <6 hrs	<6 hrs - <1 wk	1.8
Drought	Unlikely	Limited – Critical	>24 hrs	> 1 wk	1.7

Similar to this type of ranking procedure, the Hancock County EMA, along with other response and support agencies within the County developed a Hancock County Comprehensive Hazard Analysis in 2003. Many of the representatives involved in developing the Comprehensive Hazard Analysis are also involved in developing the Hancock County MHMP. 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 3-4** and are compared with the CPRI values, historical losses and estimated damages for each hazard in **Table 3-24** at the end of this chapter.

Table 3-4: Comprehensive Hazard Analysis Scores*

Hazard	Score
Dam Failure	Not scored by Committee
Drought	Slight chance that incident will occur
Earthquake	Hazard is possible in the area
Extreme Temperatures	Hazard has occurred and is likely to occur again

Flooding	Slight chance that incident will occur
Hail/Thunder/Windstorm	Hazard has occurred and is likely to occur again
Hazardous Materials Events	Hazard is possible in the area
Severe Winter Weather (Ice)	Hazard has occurred and is likely to occur again
Tornado	High impact and high probability of occurrence

(Hancock County Comprehensive Hazard Analysis, 2003)
(*: Scores are listed only for the hazards studied in detail for the MHMP)

According to the 2003 Comprehensive Hazard Analysis scoring, tornadic events have the highest probability that this type of event will occur within the County, as well as having a high impact to the area. Extreme temperatures and severe winter weather (including ice) were individually scored as a hazard that has occurred and is likely to occur in the area again. Earthquake and hazardous materials events were considered a hazard that is possible in the area. Lowest in probability of affecting Hancock County are drought and flooding.

The hazards studied for this report may not be equally threatening to all communities throughout Hancock County. While it would be difficult to focus the probability of an earthquake, hailstorm, thunderstorm, windstorm, tornado or a severe winter storm affecting a specific community, it is much easier to predict where the most damage would occur in a known hazard area such as a floodplain or an area downstream from a dam. The magnitude and severity of the same hazard may cause varying levels of damages in different communities.

For example, 6 of the hazardous materials handlers are located in the City of Greenfield, while the remaining facilities are located primarily in unincorporated locations throughout Hancock County. This concentration of hazardous materials being stored and transported into and out of the individual facilities leads to a higher probability of an incident occurring in the City of Greenfield than the Town of New Palestine. Along with an increased probability, the City of Greenfield is expected to have a greater severity than other NFIP communities do do in Hancock County, as the concentration of other critical facilities, population and major transportation routes is much higher. Detailed information regarding areas of concern will be provided within each hazard profile, along with the CPRI value for each of the NFIP communities.

3.2 HAZARD PROFILES

The following sections describe in profile each of the hazards selected for additional investigation by the Planning Committee. The Committee examined each hazard in terms of the causes, effects, and characteristics that the hazard presents to the communities. Also provided was information on hazard extent, historic occurrence, and probable future event occurrence. A community vulnerability assessment follows the hazard profile and describes, in general terms, the current exposure, or risk, to the community regarding potential losses to critical facilities and infrastructure. Finally, the Planning Committee explored the future risks related to new development and land use for each hazard.

3.2.1 HAILSTORMS, THUNDERSTORMS & WINDSTORMS

Hail occurs when frozen water droplets form inside a thunderstorm cloud, then grow into ice formations held aloft by powerful thunderstorm updrafts, and when the weight of the ice formations becomes too heavy they fall as hail to the ground. Hail size ranges from smaller than a pea to as large as a softball, and can be very destructive to buildings, vehicles, and crops. Even small hail can cause significant damage to young and tender plants. Residents

should take cover immediately in a hailstorm, and protect pets and livestock, which are particularly vulnerable to hail, and should be under shelter as well.

Thunderstorms are defined as strong storm systems produced by a cumulonimbus cloud, usually accompanied by thunder, lightening, gusty winds and heavy rains. All thunderstorms are considered dangerous as lightening is one of the by products of the initial storm. In the United States, an average of 300 people are injured and 80 people are killed each year by lightening. Although most lightening victims survive, people struck by lightening often report a variety of long-term, debilitating symptoms. Other associated dangers of thunderstorms include tornadoes, strong winds, hail, and flash flooding.

Windstorms or high winds can result from thunderstorm inflow and outflow, or downburst winds when the storm cloud collapses, and can result from strong frontal systems, or gradient winds (high or low-pressure systems). High winds are speeds reaching 57.5 mph (50 knots) or greater, either sustained or gusting.

Hail/Thunder/Windstorm: Historic Data

In Hancock County, 28 hailstorms, 38 thunderstorms and 31 windstorms have been recorded by the NCDC since 1965. The largest reported size was 2.75 inches in diameter and occurred during the hailstorm of April 3, 1974. The average diameter of hailstone produced by storms occurring in Hancock County is 1.3 inches. Significant windstorms are characterized by the top wind speeds achieved during the event, characteristically occur in conjunction with a thunderstorm, and have historically occurred year round with the greatest frequency and damage occurring in May, June, and July.

Table 3-5 provides detailed information regarding hailstorms, thunderstorms, and windstorms, as recorded by the NCDC that have resulted in injuries, deaths or property damages. The NCDC did not indicate any crop damages in Hancock County because of a hailstorm, thunderstorm or windstorm. Very few NCDC hailstorm reports included information specific to Hancock County as several counties were typically affected at one time. However, hail reports were also given during thunderstorm and windstorm events detailed in later paragraphs.

Total NCDC recorded damages for hailstorms, thunderstorms, and windstorms in all of Hancock County from 1965 through 2006 is $322,000 in property damages along with 8 injuries. It is possible that additional damages were experienced that were not reported to local officials, insurance companies or the NCDC. While not all hailstorms, thunderstorms, or windstorms are specifically listed, they are included in the assessment of vulnerability and future risk to the communities.

Table 3-5: Historic Hailstorm, Thunderstorm, and Windstorm Events*

Location	Date	Type	Magnitude	Death/ Injury	Property Damage**
Hancock County	09/09/1989	Thndr/Wind	0 mph	0/7	0
Hancock County	04/15/1993	Thndr/Wind	NA	0/0	$5K

Hancock County	04/27/1994	Thndr/Wind	NA	0/0	$5K
Hancock County	08/28/1994	Thndr/Wind	NA	0/0	$5K
Hancock County+ (90 counties affected)	11/21/1994	High Wind	0 mph	0/0	$50K
Hancock County+ (90 counties affected)	11/27/1994	High Wind	0 mph	0/0	$120K
Greenfield	04/19/1996	Thndr/Wind	0 mph	0/0	$2K
Wilkinson	06/14/1996	Thndr/Wind	0 mph	0/0	$1K
Greenfield	03/28/1997	Thndr/Wind	0 mph	0/0	$50K
Greenfield	05/31/1998	Thndr/Wind/Hail	101 mph	0/0	$1K
Hancock County	06/19/1998	Thndr/Wind	0 mph	0/0	$1K
New Palestine	07/19/1998	Thndr/Wind	0 mph	0/0	$2K
Hancock County	11/10/1998	Thndr/Wind	0 mph	0/0	$1K
Greenfield	07/8/2001	Thndr/Wind	0 mph	0/0	$20K
Hancock County + (20 counties affected)	03/09/2002	High Wind	72 mph	0/1	$18K
Greenfield	04/28/2002	Thndr/Wind	57 mph	0/0	$10K
New Palestine	05/24/2002	Thndr/Wind	57 mph	0/0	$1K
Greenfield	04/20/2003	Thndr/Wind	57 mph	0/0	$10K
McCordsville	07/11/2003	Thndr/Wind	63 mph	0/0	$20K
TOTAL				**0/8**	**$322K**

(NCDC, 2006)
(*: Only those events with reported deaths, injuries, or property damages.)
(**: K = 1,000)

There have been several key hailstorms, thunderstorms, and windstorms that have occurred throughout Hancock County resulting in injuries and several hundred thousand dollars in property damages. These events have been described in the NCDC data and in local news media reports.

On November 27, 1994, an intense low pressure area and associated cold front swept across the region with high winds both before and after the cold front. The cold front itself triggered a squall line that produced damage mainly in Indianapolis with smaller amounts of damage felt throughout central Indiana. During another thunderstorm event on March 28, 1997 a pole barn near the City of Greenfield was destroyed by high winds for a total of $50,000 in damages. A woman was injured as a gate was blown down by high winds on March 9, 2002 and the same storm resulted in approximately $18,000 in property damages. Major damages to homes and roofs in McCordsville were experienced as high winds estimated to be 63 mph traveled through Hancock County on July 11, 2003.

According to the Planning Committee the probability of a future hailstorm, thunderstorm, or windstorm occurring throughout Hancock County is highly likely and will typically affect broad portions of the county at one time. 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 hailstorms, thunderstorms, and windstorms in Hancock County is less than 6 hours. **Table 3-6** provides the CPRI for hailstorms, thunderstorms, and windstorms and their effects on Hancock County and the communities within.

Table 3-6: Calculated Priority Risk index (CPRI) for Hailstorms, Thunderstorms, and Windstorms

	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** • <6hrs • <1 day • <1 wk • >1wk	**CPRI**
Hancock County (unincorporated)	Highly Likely	Negligible – Limited	< 6 hrs	< 6 hrs	2.8
City of Greenfield	Highly Likely	Limited	< 6 hrs	< 6 hrs	3.0
Town of Cumberland	Highly Likely	Limited	< 6 hrs	< 6 hrs	3.0
Town of McCordsville	Highly Likely	Limited	< 6 hrs	< 6 hrs	3.0
Town of Spring Lake	Highly Likely	Negligible - Limited	< 6 hrs	< 6 hrs	2.8

Indicative of a regional hazard risk, the probability, warning time, and duration for hailstorm, thunderstorm, and windstorm events are the same for all NFIP communities in Hancock County. As determined by the Planning Committee, the probability of a future hailstorm, thunderstorm or windstorm is highly likely with approximately less than 6 hours of advanced warning time. An event of this nature is expected to last less than 6 hours in total length. However, the magnitude and severity of a hailstorm, thunderstorm, or windstorm occurring in the City of Greenfield, the Town of Cumberland, or the Town of McCordsville is slightly higher, limited compared to the negligible to limited severity assigned by the Planning Committee to the Town of Spring Lake and the unincorporated areas of Hancock County. This can be explained by the number of residents, the number of critical facilities located in each community, and the routes of transportation that travel through each of these communities. Hailstorms, thunderstorms, and windstorms are highly unpredictable and occurrences are distributed throughout the county. Therefore, the CPRI values reflect the near equal distribution of risk and associated priority for a hailstorm, thunderstorm, or windstorm.

Hail/Thunder/Windstorm: Vulnerability Assessment

Due to the unpredictability of these events, all 150 critical and 18,600 non-critical facilities in Hancock County 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 facility and are not required for a community to function. For hailstorms, thunderstorms, and windstorms, 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 are likely to cause monetary damages to structures in excess of $5,000-$20,000. It should be noted that perhaps not all property owners have reported damages caused by the events recorded by the NCDC. Therefore, damages to property should be expected to be significantly higher than $30,000 per event.

When comparing historical losses reported by the NCDC for hailstorms, thunderstorms, and windstorms as well as estimated future damages, this hazard should be expected to result in the

least amount of monetary damages to Hancock County. The MHMP Planning Committee determined that hailstorms, thunderstorms, and windstorms ranked as the highest hazard with the CPRI. With nearly the same considerations, hailstorms, thunderstorms, and windstorms are scored in the Comprehensive Hazard Analysis as a hazard that has occurred in the past and is likely to occur again. In order to better assess community vulnerability, future property and crop damage caused by hailstorms, thunderstorms, and windstorms should be carefully recorded.

Hail/Thunder/Windstorm: 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 address, 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 Hancock County, the Hancock County Primary Warning Point was created, designating the Sheriff's Department/911 as the Primary Warning Point for civil disturbances and severe weather situations. The National Oceanic and Atmospheric Administration (NOAA), the Law Enforcement Information Network, and the National Weather Service (NWS) are monitored and the warning center will warn the public when information has been received. Hancock County also maintains a direct link with the IDHS during times of significant weather events. Furthermore, emergency management volunteers such as the Hancock County Storm Spotters and the Radio Amateur Civil Emergency Services (RACES) provide detailed information directly from the field for rapid public warning. This is an effort to protect the public and minimize damages to public and private properties in Hancock County.

The warning time associated with hailstorms, thunderstorms, and windstorms is very short and advanced warning systems, such as outdoor warning sirens in conjunction with the NWS Emergency Alert Systems (EAS) is an effective mitigation practice to reduce loss of life and property. The outdoor warning sirens are only activated for tornado warnings at this time and are not activated for hailstorms, thunderstorms, or windstorms. Each jurisdiction in Hancock County is responsible for routine testing and maintenance, activation of the outdoor warning sirens, and determining where new outdoor warning sirens will be located.

Residents and businesses should stay abreast of current weather conditions with a weather radio. 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 Hancock County currently own and operate weather radios. However, to reduce losses, they should be required in all critical facilities.

Hancock County 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 Hancock County 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. In addition, mobile homes need to be certified that the minimum installation standards set forth by the manufacturer are being met to ensure the safety of those residents.

Currently, pubic buildings such as schools, hospitals, and government facilities have designated safe areas for occupants to gather during a hailstorm, thunderstorm or windstorm if conditions become severe. However, in areas such as mobile home parks, campgrounds, developments without basements, and community parks, there are no requirements for such facilities to be provided. To further protect the residents and visitors of Hancock County all public buildings, critical facilities, and other buildings with a high volume of employees or visitors should be equipped with safe rooms. Mobile home facilities, campgrounds, and community parks also need to have severe weather shelters in place and well marked for those not familiar with the area.

Much of the damage caused by hailstorm, thunderstorms, and windstorms 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 to fall and harm people, property, and utility lines during a hailstorm, thunderstorm, or a windstorm. Duke Energy and Central Indiana Power, electric providers in Hancock County, have 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 prior to a hailstorm, thunderstorm or windstorm and to repair damaged areas following an event, many of the utility providers rely on professional subcontractors to assist with regular maintenance of the trees near to or under over-head power lines.

Hailstorms, thunderstorms, and windstorms can have serious effects 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 Hancock County EMA, many of the critical facilities in the county have permanent power back ups in their facilities.

To further reduce the potential of future power outages, utility lines in areas of new development should be buried. Areas of new development in Hancock County, the City of Greenfield, and the Town of McCordsville are encouraged to bury utility lines and many are doing so in

conjunction with the installation of fiber optic lines. Although access to buried utility lines may be more difficult when the ground is frozen, they are less likely to be damaged by windstorms. The benefit to bury all existing above ground utility lines does not outweigh the associated cost. However, it does make sense for new development and reconstruction projects.

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

3.2.2 HAZARDOUS MATERIALS

Materials classified as hazardous may 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.

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.

Hazardous Materials: Historic Data

Historically, Hancock County has 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 County level.

Additionally, there are several facilities located in Hancock County 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. It is possible that other facilities in Hancock County 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 2**, along with the major transportation routes and rail lines located within Hancock County.

Smaller incidents have occurred throughout the years that have required mobilization of neighboring HazMat teams, local Fire and Police departments and the Hancock County EMA. While Hancock County does not currently have a designated HazMat team, a mutual aid agreement has been established with Warren Township Fire Department, Indianapolis Fire Department, and Marion County EMA. The Greenfield Fire Department, Warren Township Fire Department, and the Hancock County EMA were involved in a hydrochloric acid release at the

Indiana Automotive Fasteners facility. The majority of the contaminant was released into the secondary containment area. However, some of the substance was released over the berm. Although it was difficult to gage the amount of acid that was released, it is estimated that between 50 and 1,500 gallons in total were lost. Other incidents occurring in Hancock County included a mercury release in a residence because of juveniles and several minor fuel spills along Interstate 70.

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 3-7** identifies hazardous materials incidents in the United States by mode of transportation for the year 2004.

Table 3-7: 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)

Interstate 70 divides Hancock County as it travels east/west. Other major vehicular transportation routes in Hancock County are US 36, US 40, and US 52 and the heavily traveled SR 9. Rail lines bisect nearly all of the communities in Hancock County increasing the overall risk of exposure to hazardous materials in transport.

According to the Planning Committee, the probability of a hazardous material release or event is highly likely for the City of Greenfield and the Town of McCordsville due to the number of hazardous materials handlers located in those communities and the concentration of population in those areas. Similarly, the Planning Committee considered a hazardous materials event likely to occur in the Town of Cumberland and in unincorporated areas of Hancock County, while a hazardous materials spill or release in the Town of Spring Lake is considered possible. **Table 3-8** identifies the CPRI for a hazardous materials event within the County and the other NFIP Communities.

Table 3-8: Calculated Priority Risk Index (CPRI) for Hazardous Materials

	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** • <6hrs • <1day • <1wk • >1wk	**CPRI**
Hancock County (unincorporated)	Likely	Limited	< 6 hrs	< 6 hrs	2.6
City of Greenfield	Highly Likely	Critical	< 6 hrs	< 6 hrs	3.4
Town of Cumberland	Likely	Limited	< 6 hrs	< 6 hrs	2.6

Town of McCordsville	Highly Likely	Critical	< 6 hrs	< 6 hrs	3.4
Town of Spring Lake	Possible	Negligible	< 6 hrs	< 6 hrs	1.9

As shown in the table, warning time and duration for a hazardous materials incident in any location is equal throughout Hancock County. Hazardous materials incidents primarily occur with little to no warning, usually far less than 6 hours, and the duration of the event, focusing on primary response and containment efforts, is usually less than 6 hours. However, the magnitude and severity vary by municipality based on the diffuse locations of hazardous materials handlers, and the proliferation of transportation routes such as rail lines and vehicle routes, including Interstate 70 and numerous State Roads. Therefore, the City of Greenfield and the Town of McCordsville have been estimated to have a highly likely probability of a hazardous materials incident occurring. Furthermore, the unincorporated areas of Hancock County and the Town of Cumberland are considered as likely, and the Town of Spring Lake is listed as possible for the occurrence of a hazardous materials spill or release. If a spill or release of hazardous materials were to happen in the City of Greenfield or the Town of McCordsville, the expectation is that the damages would be critical due to the population of these municipalities and the locations of other critical facilities in reference to transportation routes and hazardous materials handlers. Similarly, the Town of Cumberland and the unincorporated areas of Hancock County are estimated to receive limited damages, while the Town of Spring Lake is estimated to receive negligible damages.

Hazardous Materials: Vulnerability Assessment

According to IDEM's Hazardous Waste Notifiers List, there are 85 hazardous waste handlers within Hancock County. Thirty eight (38) of those facilities are considered active generators, of which 29 are located in the City of Greenfield, 4 are located within the Town of Fortville, and within the Town of Charlottesville, the Town of Maxwell, the Town of McCordsville, the Town of New Palestine, and the Town of Shirley, there is 1 facility in each municipality. Within the county, 8 facilities are considered active transporters of hazardous materials and 7 of those are located in the City of Greenfield. Of those original 85 facilities, only 4 are considered Large Quantity Generators (LQGs) and these hazardous materials facilities, along with other facilities identified by the Planning Committee are identified on Exhibit 2, as well as the major transportation routes and rail lines located within Hancock County.

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

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

In 1990, Congress enacted a compliment to EPCRA, known as the Risk Management Program (RMP), which is found under Section 112(r) of the Clean Air Act (CAA). This program makes information available to the public on how accidental releases of hazardous chemicals could affect communities. While EPCRA focuses on response once an emergency occurs, the RMP focuses on facility planning before an emergency occurs. The RMP seeks to reduce the risk of airborne chemical accidents by instituting measures to prevent hazardous chemical releases. The RMP addresses the management of 77 acutely toxic chemicals and 63 flammable gasses and volatile liquids. According to the regulation, any facility producing, processing, handling, or storing these substances in amounts above the threshold quantities is required to develop and implement an RMP. The RMP must include a hazard assessment as it relates to the release of a regulated substance, which include off site consequences, programs to prevent accidental losses, emergency action in response to accidental releases, and communication with federal, state, and local governments and the public. There are 4 facilities in Hancock County regulated under Section 112(r) of the CAA.

Predicting potential losses associated with hazardous materials incidents is subjective and difficult. However, based on a study conducted by the Federal Motor Carrier Safety Administration, the average cost per year per hazardous material transportation accident and incident that results in the release of a hazardous material is $536,000. When hazardous material accidents and incidents result in fire, the average cost per event increases to $1.2 million, and when the accident or incident results in an explosion, the cost per event increases to $2.1 million. While no historical damages were reported, these costs are indicative of the economic impact that can result from hazardous materials incident in Hancock County. Hazardous materials incidents, based on potential damages, should be expected to result in the higher monetary damages than any other hazard anticipated to affect Hancock County. Based on the scoring parameters for the Comprehensive Hazard Analysis, a hazardous materials incident is possible for Hancock County.

To estimate the physical and economic cost of a hazardous materials incident at any of the LQGs, a 500-yard radius buffer zone was imposed around each facility. The numbers of critical and non-critical facilities within those areas were estimated and a replacement cost was derived by assuming that 25% of all critical and non-critical structures in the buffer areas would be severely damaged, 35% would be 50% damaged, and 40% would have only 25% damage. **Table 3-9** below indicates the critical and non-critical facilities located within the buffer areas for each LQG and the graduated replacement costs.

Table 3-9: Hazardous Materials Facilities, Neighboring Facilities, and Replacement Costs

Facility	Critical Facilities	Replacement Cost	Non-Critical Facilities	Replacement Cost
SF Landfill	0	$0	10	$871,000
Ag-One (6)	9	$1.5M	849	$75.2M
Lilly	20	$4.5M	174	$15.7M
Roll Coater	1	$191,000	256	$22.7M
Old Landfill	0	$0	5	$435,000

IPT	2	$624,000	47	$6.0M
IAF	2	$381,000	1	$191,000
TOTAL	**34**	**$7.2M**	**1,342**	**$121.1M**

(M = $1,000,000)

The Planning Committee determined that a hazardous materials incident had the second highest CPRI based on the probability, magnitude and severity, the associated warning time, and the duration of the event. Nearly the same parameters were considered during the development of the Comprehensive Hazard Analysis, where an incident of this nature is possible. Historical losses associated with hazardous materials incidents having occurred in Hancock County have not been reported and estimations of potential damages place this hazard as having the ability to result in the highest damages.

Hazardous Materials: 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 Hancock County LEPC is the local entity responsible for planning, training, and implementing exercise activities within the county. An annual exercise, field or tabletop is completed to provide responding personnel with valuable insight and “what if” scenarios. Following each exercise and training session, a debriefing is completed to account for any shortcomings or areas in need of more preparation.

Approximately 65 facilities in Hancock County are subject to SARA Title III provisions due to the presence of listed hazardous materials in quantities at or above the minimum threshold established by the Act. These facilities are also required to create and distribute emergency plans and facility maps to local emergency responders such as the LEPC, Fire departments and Police departments. With this knowledge on hand, emergency responders and other local government officials can be better prepared to plan for an emergency, the response it would require, and prevent serious affects to the community involved.

Currently, all City of Greenfield Firefighters are trained in compliance with the Occupational Safety and Health Administration (OSHA) Level II Operations level. This includes training on methods for identifying hazardous materials and securing the scene in response to a hazardous materials incident. Furthermore, 2 firefighters are trained in compliance with OSHA Level III Technician level. This level of training provides in-depth practical experience with detection devices, personal protection equipment, and control, containment, and confinement of the hazardous material. Hancock County does not currently have a Hazardous Materials Response

Team (HMRT) but a mutual aid agreement has been established between the Marion County EMA, the Indianapolis Fire Department, the Warren Township Fire Department, and the Madison County EMA.

Depending on the significance of the hazardous material incident, safe havens and community shelters may be needed to provide temporary shelter to evacuated residents and visitors to Hancock County. The Red Cross of Hancock County currently has agreements with facilities such as schools and community centers throughout Hancock County for both temporary and long-term shelter. According to the Hancock County Red Cross, a temporary shelter has not been activated within the county for the last 9 years, perhaps longer. However, if needed, each community in Hancock County would be well covered for temporary housing.

Social, physical, and economic losses from hazardous materials incidents will most likely increase as more people choose to live, work, and visit Hancock County. Ensuring that residents and visitors are well informed about the potential impacts from hazardous materials and proper methods to protect themselves and their property will help reduce future losses and damage.

3.2.3 TORNADO

Tornadoes are defined as violently rotating columns of air extending from thunderstorms to the ground. Funnel clouds are rotating columns of air not in contact with the ground. However, the 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 tornadoes can occur at any time of year. They tend to occur in the afternoons and evenings: over 80 percent of all tornadoes strike between 3 PM and 9 PM, but can occur at any time of day or night. Tornadoes occur most frequently in the United States east of the Rocky Mountains.

While most tornadoes (69%) have winds of less than 100 miles per hour, they can be much stronger. Although violent tornadoes (winds greater than 205 mph) account for only 2% of all tornadoes, they cause 70% of all tornado deaths. In 1931, a tornado in Minnesota lifted an 83-ton 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

Hancock County has experienced 18 tornadoes since January 1950. The classification of tornadoes utilizes the Fujita Scale of Tornado Intensity, described in **Table 3-10**. Tornado

intensity ranges from low intensity (F0) tornadoes with effective wind speeds of 40-70 mph to high intensity (F5+) tornadoes with effective wind speeds of 261 to over 318 mph. Tornadoes recorded for Hancock County include 4 – F0, 1 – F1, 8 – F2, 2 – F3, and 3 – F4 tornadoes. **Table 3-11** lists the historical tornado data available from the NCDC. Historical data identified by the NCDC is the best available data specific to Hancock County and the NFIP communities. **Exhibit 3** illustrates the historical tornado activity in Hancock County and the existing outdoor warning siren coverage. Tornadoes in Indiana generally come from the south through the west and move to the north through the east. In Hancock County, the predominant tornado path seems to be from the southwest to the northeast.

Table 3-10: 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%
F3 (strong)	158-206 mph	severe damage	6%
F4 (violent)	207-260 mph	devastating damage	2%
F5 (violent)	261-318 mph	incredible damage	< 1%

Table 3-11: Historic Tornado Data*

Location	Date	Magnitude	Death/Injury	Property/Crop Damage
Hancock County	03/29/1951	F2	0/2	$250K/$0
Hancock County	04/26/1957	F2	0/0	$3K/$0
Hancock County	03/30/1960	F2	0/0	$3/0
Hancock County	11/26/1965	F3	0/3	$250/$0
Hancock County	07/23/1967	F0	0/0	$0/$0
Hancock County	05/14/1972	F4	0/1	$25K/$0
Hancock County	06/03/1973	F1	0/0	$25K/$0
Hancock County	04/03/1974	F3	1/23	$25M/$0
Hancock County	04/03/1974	F4	0/11	$25M/$0
Hancock County	04/08/1980	F0	0/0	$3K/$0
Hancock County	06/02/1980	F2	0/4	$0/$0
Hancock County	03/10/1986	F2	0/0	$250K/$0
Hancock County	03/10/1986	F2	1/1	$2.5M/$0
Hancock County	11/22/1992	F2	0/0	$250K/$0
Greenfield	06/11/1998	F4	0/1	$1.1M/$0
Eden	06/11/1998	F2	0/0	$400K/$0

McCordsville	09/20/2002	F0	0/0	$2.0M/$20K
TOTAL			**2/46**	**$57.06M/$20K**

(NCDC, 2006)
(*: only those events resulting in deaths, injuries or property and crop damages)
(**: K=1,000; M=1,000,000)

Table 3-11 above provides a comparative listing of the events affecting Hancock County. From here, it can be observed that tornadoes appear to be widespread throughout the county and can cause significant amounts of destruction and potential injuries and even deaths. Indiana's tornado season is typically from March through June. During this season, slightly more than 75% of the tornadoes recorded in Hancock County have occurred.

The most significant tornado in Hancock County was an F4 event on April 3, 1974 and was responsible for 1 death and approximately 34 injuries in Hancock County and surrounding areas and approximately $25 million in property damage. According to the Daily Reporter, local emergency rooms were filled with injured as local doctors assisted with treatments and off duty nurses reported back to the hospital following the tornado. The tornado remained grounded for 12 miles and was estimated to be 440 yards in width as it traveled through Hancock and Henry Counties damaging numerous residences, infrastructure and leaving hundreds of families homeless and seeking temporary shelter.

In June of 1998, an F4 tornado traveled north of the City of Greenfield destroying 5 buildings and causing severe damage to approximately 40 others resulting in 1 injury and over $1 million in property damage. The tornado first touched down in Cumberland and caused similar damage to nearly 90 buildings. This tornado finally diminished in Hancock County near the Town of Eden.

One of the longest tracking tornadoes in Indiana occurred on September 20, 2002. The F0 tornado traveled 112 miles from Monroe County to Blackford County and through several others, including Hancock County, destroying over 100 homes, several mobile homes, businesses, and apartment buildings in its path. Throughout the counties, this tornado produced F3 damages and several counties declared disaster.

The probability of a tornado touching down in Hancock County or any of the NFIP communities is likely while the magnitude and severity of the event is estimated to be limited for all areas, except the City of Greenfield, which has been estimated to be critical to catastrophic if a tornado were to pass through the city. While it is difficult to predict precisely where the tornado will touch down, advancements in meteorological technologies may provide up to 6 hours of warning time for residents and visitors to seek proper shelter. In most cases, tornadoes are short-lived hazards and may progress to other locations relatively quickly. **Table 3-12** identifies the CPRI for a tornado for all NFIP communities in Hancock County.

Table 3-12: Calculated Priority Risk Index (CPRI) for Tornado

	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**
Hancock County (unincorporated)	Likely	Limited	< 6 hrs	< 6 hrs	2.6
City of Greenfield	Likely	Critical - Catastrophic	< 6 hrs	< 6 hrs	3.1
Town of Cumberland	Likely	Limited	< 6 hrs	< 6 hrs	2.6
Town of McCordsville	Likely	Limited	< 6 hrs	< 6 hrs	2.6
Town of Spring Lake	Likely	Limited	< 6 hrs	< 6 hrs	2.6

Indicative of a regional hazard risk, the probability, warning time, and duration for tornado events are the same for all communities within Hancock County. With the exception of the City of Greenfield, the magnitude/severity also remains constant throughout the county, estimated at causing limited damages. Within the City of Greenfield, damages are expected to be higher due to the concentration of population, and the location of numerous critical facilities such as medical care facilities, schools and hazardous materials handlers. Tornados are unpredictable and could touch down in any area of the County. Thus, the CPRI values reflect the near equal distribution of risk and associated priority for a tornado.

Tornado: Vulnerability Assessment

Due to the unpredictability of this hazard, all 150 critical and 18,600 non-critical facilities in Hancock County 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. For this hazard, it is not possible to isolate specific critical or non-critical facilities that would be more or less vulnerable to a tornado.

Estimates of potential physical, economic, and/or social losses are determined through the following hypothetical exercise. One particular tornado scenario was selected because a majority of the reported tornado events in the past has been F2 tornadoes with impacted areas that have similar dimensions. This hypothetical touchdown traveled through a portion of the City of Greenfield and is intended to present a more realistic scenario of a tornado event and associated damage.

The estimated physical and economic cost of the hypothetical F2 tornado that was 300 yards wide 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 have only 25% damage. **Table 3-13** provides summary data associated with the hypothetical tornado through the City of Greenfield.

Table 3-13: Summary Hypothetical Tornado Damages and Estimated Costs

	Number of Structures	Estimated Damage Cost
City of Greenfield		
Critical Facilities	22	$5.1 M
Non-critical Facilities	584	$51.2 M
TOTAL	**606**	**$56.3 M**

The City of Greenfield's estimated damage for 584 non-critical facilities, including 552 residential, 5 commercial, 4 industrial, and 23 agricultural is $5.1 million while an additional $51.2 million in damages is estimated for the 22 critical facilities (18 industrial and 4 educational) affected by the tornado. 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. Based on comparative historical losses regarding all hazards affecting Hancock County, tornadoes result in the largest amount of monetary damages and second largest estimated future damages. Tornado was scored as having a high impact and high probability that this type of event will occur in Hancock County, the highest score given in the Comprehensive Hazard Analysis.

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 mitigation practices, hazards address, 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 a tornado is very short and advanced warning systems, such as outdoor warning sirens in conjunction with the NWS EAS is an effective mitigation practice to reduce loss of life and property. Nearly all of the critical facilities within the urbanized areas of Hancock County are well covered by the 7 sirens in the City of Greenfield and the additional 9 sirens throughout the County. The northern portion of the Town of McCordsville as well as the portion of the Town of Cumberland within Hancock County is not serviced by outdoor sirens located in Hancock County. There is overlap, however, from sirens located in the portions of the same municipalities located in neighboring Marion County.

St. Joseph County Indiana Board of Commissioners has adopted ordinance no. 50-99, which requires developers of new subdivisions with 10 or more lots to furnish and install Early Warning Systems. This type of ordinance may help to increase the coverage provided by outdoor warning sirens as the population of Hancock County continues to increase. A proposal similar to this has been presented to the Hancock County Planning Department and the Hancock County Board of Commissioner's for their consideration for future adoption. It is important to note that outdoor warning sirens are only one method of alerting residents and visitors of impending weather conditions.

To provide as much advance warning as possible to the residents of Hancock County, the Hancock County Primary Warning Point was created, designating the Sheriff's Department/9-1-1 Central Dispatch as the Primary Warning Point for civil disturbances and severe weather situations. This warning point monitors the Law Enforcement Information Network, NOAA, and NWS web sites, and will warn the public when information is received to save lives and to minimize the risk to public and private properties in Hancock County.

Residents and businesses, especially critical facilities, not covered by outdoor warning sirens should stay abreast of current weather conditions with a weather radio. 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 in Hancock County, such as government facilities, schools, and hospitals currently own and operate Total Alert Monitors however, to reduce losses; they should be required in all critical facilities. This type of measure could help to ensure that the residents and visitors to Hancock County are fully aware of approaching systems capable of developing into tornadoes.

Hancock County also participates in the Severe Weather Awareness Week, created by the National Weather Service. The 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 National Weather Service and the Indiana State Emergency Management Agency provide and distribute information to county schools, hospitals, community groups and facilities and the public.

As required by the State, all buildings in Hancock County are constructed to meet the standards set by the International Building Code. These codes specifically address anchoring and wind forces that structure must be able to withstand. In addition, mobile homes need to be certified that the minimum installation standards set forth by the manufacturer are being met to ensure the safety of those residents.

Safe rooms may be necessary during a tornado or windstorm especially for structures without basements or sound interior rooms. Many public buildings in Hancock County have designated safe areas for occupants to gather during a tornado. The location of safe rooms and shelters should be well advertised for both residents and visitors to Hancock County. 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. Provisions may also need to be made for those residential communities that are typically constructed on a slab foundation. Community rooms or buildings may be designated as a community shelter in the event of a tornado warning. Additionally, the Hancock County Red Cross has agreements with local facilities such as schools and community centers throughout the County for both temporary and long-term shelter.

Much of the damage caused by tornadoes is the result of fallen and broken limbs from trees. While even healthy trees may not be able to withstand 200 mph winds, maintaining trees in good condition in road right-of-way, utility corridors, and public property will reduce the potential for dead or dying limbs from falling and damaging people, property, and utility lines during a tornado. Duke Energy, along with other electric providers in Hancock County, have 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.

A tornado 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, fires, and community shelter facilities. To reduce the potential of future power outages, utility lines in areas of new development should be buried. New development in Hancock County, the City of Greenfield, and the Town of Cumberland are urged to bury utility lines and are finding it beneficial to bury new lines along with newly installed fiber optic lines also being provided to newly developed areas. Although access to buried utility lines may be more difficult when the ground is frozen, they are less likely to be damaged by tornadoes. Generally, benefit to bury all existing above ground utility lines does not outweigh the associated cost. However, it does make sense for new development and reconstruction projects.

Social, physical, and economic losses from tornados and windstorms will most likely increase as more people choose to live, work, and visit Hancock County. With the increased population and increase in number of critical and non-critical facilities, the potential for damage from a tornado also increases. Ensuring that residents and visitors are well informed about the potential impacts from tornados and windstorms as well as proper methods to protect themselves and their property will help reduce future losses and damage.

3.2.4 SEVERE WINTER STORM / ICE

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 rainfalls 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; house fires occur more frequently in the winter due to lack of proper safety precautions.

Wind chill is a calculation of how cold it feels outside when the effects of temperature and wind speed are combined. On November 1, 2001, the NWS implemented a replacement Wind Chill Temperature (WCT) index for the 2001/2002 winter season. The reason for the change was to improve upon the current WCT Index, which was based on the 1945 Siple and Passel Index. A winter storm watch indicates that severe winter weather may affect your area. A winter storm warning indicates that severe winter weather conditions are definitely on the way. A blizzard warning means that large amounts of falling or blowing snow and sustained winds of at least 35 miles-per-hour are expected for several hours. Severe winter storms including freezing rain, sleet, heavy snow, blizzards, icy conditions, extreme low temperatures, and strong winds; these storm conditions are common during the winter months in Hancock County. Such conditions can result in substantial personal and property damage, even death.

Severe Winter Storm: Historic Data

The NCDC has recorded 6 heavy snow, and 12 winter storm events in Hancock County since October 1993. While information on the Blizzard of 1978 was not found through the NCDC, it was the worst event on record for Indiana according to the NWS, Weather Forecast Office. This categorical event occurred from January 25, through January 27, 1978 when Hancock County, the State of Indiana, and other mid-western states experienced blizzard conditions as between 20-40 inches of snow fell throughout Indiana. In addition to the extreme measurements of snow, wind gusts reached in excess of 55 mph and the wind chill dropped to a deadly low of -50°F. The deaths of 9 people were attributed to this disaster.

A more recent severe winter storm event occurred in December of 2004, brought heavy snow to central and south-central Indiana, and resulted in a Federal Disaster Declaration. That 2004 storm event has been linked to three deaths and approximately $3.0 million in damage statewide, while Hancock County and other areas received between 20 and 30 inches of snow in 48 hours. Several Interstates, including Interstate 70, were closed, stranding several motorists. Snow drifts were reported as high as 4 feet and over 200 automobile accidents and over 1,000 slide offs were reportedly caused by the severe weather conditions associated with this storm. On December 8, 2005, the first significant storm of the 2005-2006 season reached Hancock County, depositing 4-8 inches throughout central Indiana, with most areas receiving 6-7 inches of snow.

The probability of a severe winter storm or ice storm causing disruption to residents and businesses in Hancock County is likely, and typically will affect the entire County, and possibly several surrounding counties, at one time. With advancements in weather forecasting, the warning time associated with severe winter storms is usually greater than 24-hours with the duration of the event lasting for more than a week. **Table 3-14** identifies the CPRI for a severe winter storm for all NFIP communities in Hancock County.

Table 3-14: Calculated Priority Risk Index (CPRI) for Severe Winter Storm

	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**
Hancock County (unincorporated)	Likely	Limited	> 24 hrs	< 1 wk	2.4
City of Greenfield	Likely	Critical	> 24 hrs	< 1 wk	2.7
Town of Cumberland	Likely	Limited	> 24 hrs	< 1 wk	2.4
Town of McCordsville	Likely	Critical	> 24 hrs	< 1 wk	2.4
Town of Spring Lake	Likely	Negligible - Limited	> 24 hrs	< 1 wk	2.2

As shown in the table, the probability of a severe winter storm occurring in Hancock County in the future is likely for all communities and unincorporated areas. Varying slightly, the severity of such an event would cause negligible to limited damages within the Town of Spring Lake due in part to the low population and low number of critical facilities located in the town. Further, limited damages are expected to be realized in the event that the unincorporated areas or the Town of Cumberland is affected by a severe winter storm. The City of Greenfield and the Town of McCordsville are expected to receive the most extensive damages from a severe winter storm, thus they have been ranked as critical. The warning time and duration of the severe winter storm events are the same for all communities in Hancock County due to the regional extent and diffuse severity of this hazard event.

Severe Winter 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. Only 1 severe winter storm, December 22, 2004, as recorded by the NCDC has losses associated with it (3 injuries and $3 million in property damages). Based on this event, Hancock County communities should expect similar losses as well as significant disruption to all community functions, and should anticipate that all functions will be affected simultaneously. Thus, mitigation measures should consider that the extent and severity of this hazard could render many, and possibly all, facilities non-functional during a severe winter storm event.

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

However, severe winter storms can also result in substantial indirect costs. According to a report by the National Center for Environmental predictions, the cold and snowy winter in late 1977 and early 1978, which impacted several heavily populated regions of the country, was partially responsible for reducing the nation's Gross Domestic Product (GDP) from an estimated growth rate of between 6% and 7% during the first three quarters of 1977 to approximately -1% in the last quarter of 1977 and 3% during the first quarter of 1978.

Severe winter weather was scored in the Comprehensive Hazard Analysis as a hazard that has occurred in the County in the past and is likely to occur again. Damages reported to the NCDC were not specific to Hancock County, although $3 million in damages was reported statewide, placing severe winter weather as the 4th most damaging hazard, historically.

Severe Winter 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 mitigation practices, hazards address, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

The probability of at least one severe winter storm in Hancock County per year is likely. Fortunately, the warning time associated with a severe winter storm is generally more than 24 hours, which should give residents, business owners, and visitors enough time to protect themselves and their property. To provide as much advance warning as possible to the residents of Hancock County, the Hancock County Primary Warning Point was created, designating the Sheriff's Department/911 Central Dispatch 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. This is in effort to protect the public and minimize damages to public and private properties in Hancock County.

Residents and businesses, especially critical facilities, should stay abreast of current weather conditions with a weather radio. 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 in Hancock County, such as government facilities, schools and hospitals currently own and operate Total Alert Monitors. However to reduce losses, they should be required in all critical facilities. This type of comprehensive measure could help to ensure that the residents of Hancock County are fully aware of impending severe winter weather.

It is unlikely that safe rooms or community shelters would be necessary during a severe winter storm. However, if needed, the location of these facilities should be well advertised for both residents and visitors to Hancock County. The Hancock County Red Cross has agreements

with local schools and community centers throughout the County for both temporary and long-term shelter. For long-term needs, agreements should be developed for sheltering of domestic pets. Residents may be more prone to seek shelter if there are options for their pets as well. Further, the Hancock County Red Cross 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 Hancock County Chaplains Association promotes clothing and blanket drives for senior citizens and provides hot meals and utility assistance for county residents in need.

The President of the Hancock County Commissioners has the ability, by the authority of section 70 of the County Code to declare either a snow advisory or a snow emergency within the unincorporated sections of Hancock County. During a snow advisory local motorists are advised to proceed with caution when operating motorized vehicles on County Roads. In more severe instances, a snow emergency may be issued to indicate that current weather conditions are not conducive, and residents should not travel. This declaration may be extended for more than seven days only with the approval of the Board of Commissioners. While designated snow routes have not been developed for Hancock County, no vehicle may block or impede the clearing of snow from County Roads. These vehicles may be forcefully removed or towed under the owner's responsibility. When weather conditions become severe trucks equipped with snowplows will be routed to local fire stations. This is to provide fire trucks or EMS vehicles with safe travel when responding to alarms or emergency calls.

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, fires, and community shelter facilities. 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. The benefit to bury all existing above ground utility lines does not outweigh the associated cost. However, it does make sense for new development and reconstruction projects to bury new lines.

Hancock County also participates in the Severe Weather Awareness Week created by the National Weather Service. 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 National Weather Service, and the IDHS provide and distribute information to county schools, hospitals, community groups and facilities and the public.

Social, physical, and economic losses from severe winter storms will most likely increase as more people choose to live, work, and visit Hancock County. Ensuring that residents and visitors are well informed about the potential impacts from severe winter storms and proper methods to protect themselves and their property will help reduce future losses and damage.

3.2.5 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.

Earthquake: Historical Data

Hancock County is located on the periphery of the New Madrid Seismic Zone and parts of the eastern portion of the county are located in the Fort Wayne Rift zone. There is also a major, high-angle fault located in the northwestern corner of Hancock County, just west of Fortville. The vertical displacement along the fault is estimated at 50 feet. It has been estimated that approximately 150 earthquakes per year happen along the New Madrid Zone. However, they are too weak to be felt by residents. Earthquakes with a range of 3.0 to 5.0 on the Richter Scale do occur approximately once every 20 years.

Although there has not been a previous occurrence of an earthquake epicenter recorded for Hancock County, it is possible that because of the County's proximity to the New Madrid fault line, the Fort Wayne Rift zone, and the Fortville fault, the County could experience an earthquake or the aftershock of an earthquake at some point in the future. It can be expected that Hancock County experiences several periodic earthquake events. However, most are so minor that they are rarely felt. The most recent earthquake recorded in central Indiana was on 12 September 2004 in Shelbyville, Indiana. The earthquake recorded 3.6 on the Richter scale of earthquake intensity.

Earthquake related damages may also be the result of earthquakes occurring in neighboring states. An earthquake centered near Dale, Illinois on November 9, 1968 was felt throughout

Indiana and 22 other states. Damages ranged from groceries falling off shelves in Fort Branch Indiana, toppled chimneys in Cynthiana Indiana, and fish jumping out of the rivers, ponds and lakes.

The probability of an earthquake event in Hancock County is unlikely. The magnitude and severity of the hazard is estimated to be critical for all communities and the unincorporated areas of Hancock County. The warning time associated with an earthquake is minimal at best and realistically less than 6 hours, with the duration estimated to last < 1 week. **Table 3-15** identifies the CPRI for an earthquake event for all NFIP communities in Hancock County.

Table 3-15: Calculated Priority Risk Index (CPRI) for Earthquake

	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**
Hancock County (unincorporated)	Unlikely	Critical	< 6 hrs	< 1 wk	2.4
City of Greenfield	Unlikely	Critical	< 6 hrs	< 1 wk	2.4
Town of Cumberland	Unlikely	Critical	< 6 hrs	< 1 wk	2.4
Town of McCordsville	Unlikely	Critical	< 6 hrs	< 1 wk	2.4
Town of Spring Lake	Unlikely	Critical	< 6 hrs	< 1 wk	2.4

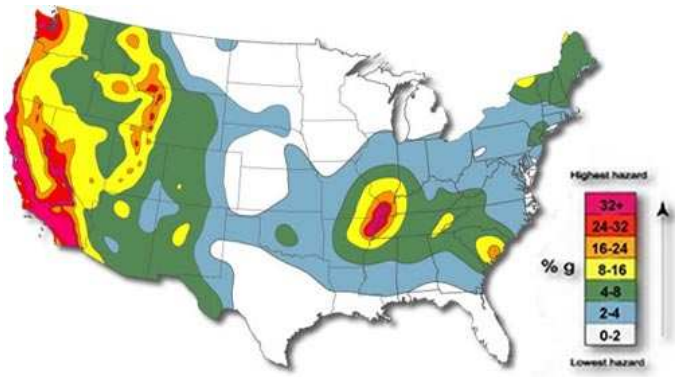
As shown in the CPRI table, all communities share the same value due to the large-scale regional impact of this hazard. With the complexity of this hazard, it is difficult to determine the probability and the magnitude and severity of the event. However, as fault lines are near to Hancock County and there have been recorded earthquakes in Indiana in the past, the probability of an earthquake occurring in the future is possible. The magnitude and severity of the earthquake in Hancock County would be far less than those communities located near to the epicenter or along the fault lines. However, as many communities in central Indiana are not prepared for an earthquake of any significant magnitude, damages and related injuries are expected to be critical in nature for all communities in Hancock County.

Earthquake: Vulnerability Assessment

All structures in Hancock County, both critical and non-critical, are potentially vulnerable to an earthquake. There are 150 critical facilities identified and 18,600 non-critical facilities identified by the Planning Committee and the GIS based HAZUS-MH program data for Hancock County. In order to best assess the vulnerability of Hancock County, the HAZUS-MH earthquake model was used to develop a hypothetical earthquake scenario throughout the area and the results were summarized.

The hypothetical scenario assessed estimated damage according to a single earthquake event with a magnitude of 5.0. Results show that no critical facilities would lose functionality, including infrastructure. Utility systems that use pipes will likely develop several leaks and breaks. Results show that potable water and electricity service are expected to remain at full service. However, it may be best to plan for at least minor interruptions. Indirect damage would include a fire that would ignite and burn approximately 13 acres. Several injuries to County residents

should be expected, but these injuries should not be life-threatening, requiring minimal treatment by medical professionals. Economic losses for all building and business interruption are estimated to be $13.3 million. Transportation and infrastructure losses are estimated to be about $3.0 million, and overall utility loss would be $6.7 million. Estimation of social losses is difficult to quantify and are likely to be related to the interruption of typical community functions.



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.

Scientists are currently studying the New Madrid fault area paying close attention to seismic activity and have predicted that the chances of another earthquake in the 8.0 range occurring within the next 50 years are approximately 7-10%. However, the chances of an event 6.0 or greater are at 90% within the next 50 years. According to some scientists, this provides the needed justification for further structure protection, additions to building codes, and education and outreach for earthquake awareness in the Mid-west states.

While no historical losses associated to earthquake damages in Hancock County have been reported to the NCDC, the potential estimated damages of $13.3 million place earthquakes as the 6th most damaging hazard having the possibility of affecting Hancock County. Accordingly, earthquake was scored in the Comprehensive Hazard Analysis as a hazard that is possible in the area.

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 address, 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 all buildings in Hancock County to 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 locations of these facilities should be well advertised for both residents and visitors to Hancock County, in the event that they are needed. The Hancock County Red Cross has agreements

with local schools and community facilities throughout the County for both temporary and long-term shelter. 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.

To provide as much information as possible to the residents of Hancock County, the Hancock County Primary Warning Point was created, designating the Hancock County Sheriff's Department/911 Central Dispatch 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. This is in effort to protect the public and minimize damages to public and private properties in Hancock County.

An earthquake 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, fires, and community shelter facilities. Information provided by the Hancock County EMA indicates that most facilities have their own back up power capabilities.

Social, physical, and economic losses from earthquake will most likely increase as more people choose to live, work, and visit Hancock County. 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.

3.2.6 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.

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

The standard index for 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

The NCDC has identified 20 significant floods in Hancock County between January 1993 and April 2006. Estimated total property and crop loss figures reported for all flood events is approximately $7.9 million of property damage and $500,000 of crop damage during the 11-year period. Of the total number of reported flood events, 5 were flash floods and one event is classified as Urban/Small Stream Flood. Additionally, 3 deaths throughout Indiana were attributed to flooding during January of 2004. **Table 3-16** lists flood events listed by the NCDC for Hancock County. Historical flood data as identified by the NCDC is the best available flooding data specific to Hancock County and the NFIP communities.

The primary sources of flooding in Hancock County are the Buck Creek, Brandywine Creek, and Sugar Creek, along with various tributaries, as shown in **Exhibit 4**. In addition to these larger streams, many flat river bottom and prairie pothole areas also are prone to flooding. The flat agricultural areas and prairie pothole regions in the County do not drain very quickly and contribute to flash flooding.

Table 3-16: Historic Flood Data*

Location	Date	Type	Death/Injury	Property/Crop Damage**
Central and Southern (53 counties affected)	11/14/1993	Flood	0/0	$5M/$500K
Hancock County (3 counties affected)	01/22/1999	Flood	0/0	$50K/0
Hancock County (5 counties affected)	01/22/1999	Flood	0/0	$100K/0
Hancock County	05/12/2002	Flash Flood	0/0	$50K/0
Greenfield	7/19/2002	Flash Flood	0/0	$150K/0
Hancock County (33 counties affected)	09/01/2003	Flood	0/0	$2.5M/0
Hancock County (39 counties affected)	01/04/2004	Flood	3/0	0/0
TOTAL			**3/0**	**$7.9M/$500K**

(NCDC, 2006)
(*: Only those events with reported deaths, injuries, or property damages.)
(**: K=1,000; M=1,000,000)

The most significant damages because of flooding were a result of flooding that occurred on November 14, 1993. Approximately $5 million in property damages and an additional $500,000 in crop damages were reported, as 53 counties in Central and Southern Indiana were flooded. In many of the affected areas, flood levels reached 50-year record highs. Several stretches of roads were closed due to high water including Mount Comfort Road from CR 200N to I-70 and

the SR 67 span between Fortville and McCordsville, and numerous roads in Blue River Township were submerged. Riley Park was flooded by nearly 5 feet of water overflowing from Brandywine Creek. Few families were forced to leave their homes and seek shelter with friends and family members and 200-300 sandbags were distributed to areas threatened.

In September of 2003, over $2.5 million in property damages was realized as 8-10" of rain fell in approximately 30 hours, flooding hundreds of basements in the affected 33 county area. The heaviest rains fell nearby to Hancock County in the neighboring counties of Marion, Hamilton and Madison. The western and northern borders, including the Town of Cumberland, the Town of McCordsville and the Town of Fortville were heavily affected as well. Numerous residential evacuations occurred as well as vehicle rescues for those stranded by high and rushing waters.

The majority of Hancock County is expected to experience flooding in low-lying areas with poor drainage and very little topography. This leads to ponding or standing water in several locations throughout the county leading to increased damages not associated with typical river or creek flooding events. It has been mentioned that both of the repetitive loss properties in Hancock County are not located within the floodplain and have experienced damages due to low permeability of the soil, high water table and slow drainage.

A repetitive loss property is defined as a property having received two insurance claim payments for flood damages totaling at least $1,000, paid by the NFIP within any 10-year period since 1978. These properties are important to the NFIP because they account for one-third of the country's flood insurance payments. Within Hancock County, there are 2 properties designated as repetitive loss properties; 1 property is located in the unincorporated area of Hancock County and the other is located within the City of Greenfield. Total NFIP claims for the 2 properties in approximately $42,800.

Currently, total flood insurance coverage for Hancock County is $35.5 million. Flood insurance is for 265 structures located in A-zones. This is the 100-year floodplain, or the area with a 1-percent annual chance of flooding. These areas are determined in the Flood Insurance Study by approximate methods of analysis. Mandatory flood insurance purchase requirements apply to structures in this delineated area. Of that total, $19,533,400 is flood insurance coverage for the City of Greenfield, and additional $17.7 million is flood insurance for Hancock County and the remaining $250,000 protects structures in the Town of Cumberland. There have been 45 claims related to damage caused by floods since 1978. Approximately $280,307 has been disbursed in all of Hancock County. Of the 45 total claims, the City of Greenfield made 20 claims for a total of $120,737.

The probability of a future flood event occurring in Hancock County is 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 is critical to limited. Through the accuracy of the NWS Doppler Radar, there can be as much as a 24-hour or greater warning time that a flood event will occur. However, the volume of water is often greater than prevention measures can withstand resulting in only 6-12 hours of warning time.

In Hancock County, the duration of a rain event or snowmelt that results in flood event has the potential to disrupt normal activities and businesses in the County for less than a week at a time. **Table 3-17** identifies the CPRI for a flood in Hancock County and other NFIP communities within the County.

Table 3-17: Calculated Priority Risk Index (CPRI) for Flooding

	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**
Hancock County (unincorporated)	Likely	Negligible	< 6 hrs	< 1 wk	2.0
City of Greenfield	Likely	Limited	< 6 hrs	< 1 wk	2.4
Town of Cumberland	Likely	Negligible	< 6 hrs	< 1 wk	2.0
Town of McCordsville	Likely	Negligible	< 6 hrs	< 1 wk	2.0
Town of Spring Lake	Likely	Negligible	< 6 hrs	< 1 wk	2.0

As shown in the table, index values differ only slightly by community. The Planning Committee assessed the communities separately to arrive at the calculated index values. The County, in general, experiences frequent floods in more rural, sparsely populated regions due to the nearly flat topography and poor drainage. The City of Greenfield has been estimated to receive slightly higher, yet still limited; damages were a flood event to occur. This is in part due to the dense population, the number of critical facilities located within the municipality and the length of stream miles as the Brandywine Creek flows through nearly the entire length (north-south) of the City of Greenfield. While other municipalities have significant watercourses near to them, damages from flooding events are expected to remain negligible. For example, Sugar Creek borders the Town of Spring Lake to the west, Buck Creek bisects the Town of Cumberland's eastern region, and Sugar Creek cuts into the eastern edge of the Town of New Palestine. (For the purposes of this plan, the Town of New Palestine is included in the Hancock County totals as it is covered by the Hancock County NFIP membership).

Flooding: Vulnerability Assessment

Based on visual inspection of digital aerial photography and FEMA 2006 preliminary floodplain maps, there are 11 critical facilities throughout Hancock County, located within the FEMA 100-year floodplain, including 8 public wells, 2 wastewater treatment plants and an aged landfill. Additionally, there are approximately 489 other non-critical facilities that are identified as being within the 100-year FEMA floodplain. Of the 489 non-critical structures, 413 or 84% are residential and of those, approximately 296 or 72% are located throughout the unincorporated areas of Hancock County.

The City of Greenfield has an approximate 79 residences (19%) within the 100-year floodplain, while the remaining residences are located in the Town of Cumberland: 29 structures (7%); the Town of Spring Lake: 6 structures (1.5%), and the Town of McCordsville: 3 structures (0.7%) residential structures. These structures were identified using aerial photography and noting the presence of driveway, a box-like shape, and a difference in color from surrounding vegetation that suggested a structure. This information is provided for reference in **Table 3-18** below.

Table 3-18: Residential Structures within the 100-year Floodplain

NFIP Community	Residences in 100 year Floodplain	Percentage of All Residences in 100-year Floodplain
Hancock County (unincorporated)	296	72.0%
City of Greenfield	79	19.0%
Town of Cumberland	29	7.0%
Town of Spring Lake	6	1.5%
Town of McCordsville	3	0.7%
TOTAL	**413**	**100.0%**

Types of loss caused by a hazard event could be physical, economic, or social in nature. The estimated physical and economic cost of a 100-year flood event was derived by assuming that structures identified in the 100-year flood zones in recent aerial photography would be impacted by the flood event. Thus, of all identified structures in the 100-year floodplain, 25% of all critical and non-critical structures would be destroyed, 35% would be 50% damaged, and 40% would have only 25% damage. Thus, replacement and repair cost for critical facilities in the 100-year floodplain is estimated to be as much as $1.5 million. The estimated replacement and repair costs for non-critical facilities, such as residential, commercial, and other structures is $37.5 million. Social losses are difficult to quantify, though interrupted services associated with critical facilities would cause hardship for many residents.

The HAZUS-MH Flood Model provided another estimate of the physical, economic, and social costs. The model predicts that as many as 5,800 households could be displaced from their homes and that approximately 13,500 people could need to seek shelter with friends, family, or in public shelters. HAZUS-MH estimates economic loss because of business interruption (income, relocation, rental income, and wages) at $82.2 million. Infrastructure losses were not included in this HAZUS-MH analysis. Infrastructure losses, however, could raise the estimated loss due to a 100-year flood substantially.

The HAZUS-MH Flood Model is still under development, thus, the data generated should be used with some reservation. Replacement costs of schools and transportation facilities used in the HAZUS-MH analyses were derived from national data and may not accurately represent actual local conditions. In order to provide a more accurate estimation of associated damages, local information may be entered into the program. However, this is a very intensive process and it outside the scope of this project.

Estimated damages of $3.5 million, provided by CBBEL, place flooding as the 3rd most potentially damaging hazard affecting Hancock County. Based on damages reported to the NCDC, flooding is the second most damaging hazard and has been scored in the Comprehensive Hazard Analysis as having a slight chance that an incident such as this will occur within the County.

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 mitigation practices,

hazards address, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

As designated Stormwater Phase II communities, the City of Greenfield, the Town of Cumberland, Town of Fortville, the Town of McCordsville, the Town of New Palestine, and the unincorporated areas of Hancock County surrounding those urbanized areas will be required to enforce erosion and sediment control practices during construction and post-construction activities. Without proper systems in place to trap soil carried by stormwater, soil will settle at the bottom of streams and detention basins restricting the volume of floodwaters held and cause localized flooding.

As part of the Stormwater Ordinance found in Section 152 of the Hancock County Code, the construction of new homes and businesses is strictly controlled and monitored. This ordinance is an effective method to control development activity within the outlined floodplains by prohibiting development unless it has been deemed a permitted use, such as a public well, golf course, or sewage treatment plant. The ordinance also takes measures to prevent increased damages by outlining that no developmental activities within the flood hazard are may increase the flood height or velocity. The ordinance also includes requirements for no net loss of floodplain storage and requires a 1:1 ratio of floodplain compensation. It has been determined that proper land use management along with strict enforcement of the building codes can lower the risks associated with flood hazards and reduce overall losses and damages as a result of flooding.

Detailed flood studies, including hydrology and hydraulic modeling and watershed management planning, should continue to be completed for the unstudied streams in Hancock County. The Big Blue River, Brier Creek, Buck Creek, Doe Creek, Little Sugar Creek, and approximately half of Sugar Creek have completed detailed flood studies. The majority of unstudied areas are in the unincorporated areas of the county and have been prioritized to undergo further modeling and floodplain delineation. Hancock County is a Cooperative Technical Partner (CTP) with FEMA. As a result, it has been continually performing needs assessment studies, detailed floodplain studies, and floodplain refinement studies. The County and NFIP communities should allocate additional budget for cost sharing the noted studies so that a larger number of detailed studies can be conducted each year. In addition, these studies can provide the needed data to regulatory agencies to update the local Flood Insurance Rate Maps (FIRMs). As of the development of this plan, Hancock County is reviewing recently updated FIRMs.

The Comprehensive Land Use Plan is a powerful planning tool for flood mitigation as it defines how and where a community should focus or restrict development efforts, as the goals and objectives identified in the Plan become the foundation for all development ordinances in the community. As Hancock County, both in the unincorporated areas and in the communities within, continues to grow, the Comprehensive Plans of each municipality will help to prevent flood losses by restricting development, especially of critical facilities, in flood hazard areas.

Future development of critical and non-critical facilities in Hancock County will likely take place within the 2-mile buffer zone around the City of Greenfield, and the corridor surrounding I-70 between Marion County and the City of Greenfield. Development adjacent to Sugar Creek and Buck Creek is prohibited throughout the County however; flooding could be exacerbated by new development in the upland portions of those watersheds if runoff volumes were to increase due to newly created impervious areas. Flooding impacts created by new development are definitely possible in low-lying and poorly drained areas.

Regulated drains and channels within Hancock County should be routinely inspected, inventoried, and prioritized for maintenance to provide optimum conveyance of stormwater. Regular maintenance may also alleviate damages to residences and structures located in areas outside of the flood zones and within areas of poorly drained soils. The detention of stormwater or diversion of stormwater may also serve useful in low-lying areas in Hancock County.

Digital maps of the County's natural and cultural resources stored in a GIS greatly aid the development and successful implementation of the countywide Comprehensive Land Use Plan. Hancock County has a well developed GIS department that they actively use to aid planning and land use decision making. Available GIS information includes 100-year and 500-year floodplain boundaries, watersheds, soils information, transportation routes, land use classifications, parcel data and topographical overlays. These layers can be utilized in conjunction to provide "what if" scenarios on an individual watershed and collectively throughout the County.

In 2004, Indiana Department of Natural Resources (IDNR)-Division of Water reported $171,608 flood insurance premiums in Hancock County ($106,983 in the City of Greenfield). The total coverage for the County was estimated at $35 million. These flood insurance premiums may be reduced further through participation and advancement in FEMA's Community CRS. The CRS is a voluntary incentive program that recognizes and encourages community floodplain activities that exceed the minimum NFIP requirements. At this time, the unincorporated area of Hancock County has achieved a class rating of 8, allowing up a 10% reduction in flood insurance premiums. CRS classes for municipalities are based on 18 creditable activities, organized under four categories: (i) Public Information, (ii) Mapping and Regulations, (iii) Flood Damage Reduction, and (iv) Flood Preparedness.

There are several FEMA programs encouraging communities to identify and mitigate repetitive loss properties. The City of Greenfield and the unincorporated areas of Hancock County each have one property identified as a repetitive loss property. It should be noted that both of these properties are not located within the 100-year floodplain and the damages have been realized because of poor drainage in a localized area.

Flood monitoring systems such as United States Geological Survey (USGS) stream gages, field observation, and vigilant attention to local weather systems are used in Hancock County 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 and

mobilize emergency response personnel. Currently there are two active stream gages within Hancock County and the County has signed a contract to have three additional gages installed. One of the gages is located on the Leary Weber Ditch near it's confluence with the Sugar Creek, near Mohawk Indiana. The second gage is located on the Sugar Creek near the southeastern boundary of the Town of New Palestine, prior to exiting Hancock County. As Hancock County continues to grow there may be a need for additional stream gages to provide sufficient flood warning for vulnerable areas, or to provide more accurate information regarding flood levels for enhanced flood plain management and protection.

To provide as much advance warning as possible to the residents of Hancock County, the Hancock County Primary Warning Point was created, designating the Sheriff's Department/911 Central Dispatch 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. This is in an effort to protect the public and minimize damages to public and private properties in Hancock County.

Hancock County 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, including flooding. Along with the County representatives, the Indiana State Police, the National Weather Service, and the Indiana State Emergency Management Agency provide and distribute information to county schools, hospitals, community groups and facilities and the public.

Social, physical, and economic losses from flooding could be significantly reduced with better land use planning, floodplain management, and stormwater management in Hancock County. The NCDC date reports nearly $8 million in flood damage in Hancock County, while CBBEL has estimated potential damages to be approximately $37.5 million. The HAZUS-MH reports a potential of nearly $742 million. This creates a vast range of potential for damages caused by flooding. As the population of the County and the individual communities continues to grow, the potential for damages to facilities, infrastructure, and human losses will also increase. Actions should be taken to ensure that both critical and non-critical facilities alike are located beyond the 100-year flood plain. Ensuring that residents and business owners are well informed about the potential impacts from flooding and proper methods to protect themselves and their property will help reduce future losses and damage.

3.2.7 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 for the duration of several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a dome of high atmospheric pressure traps water-laden air near the ground. In a normal year, approximately 175 Americans die from extreme heat.

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. Five (5) recorded cases of extreme temperature have affected Hancock County between 1994 and 2006. These events include 2 heat waves, 1 excessive heat, and 2 extreme cold events. **Table 3-19**, identifies the extreme temperature events, which have resulted in deaths, injuries, or property damage. The 3 extreme heat events have resulted in a combination of 15 deaths and more than $1 million dollars in economic damages. The 2 extreme cold events have resulted in 3 deaths and a reported $5 million in economic losses. The deaths associated with these events did not occur in Hancock County, and it is unclear to what extent the reported property damages occurred in Hancock County.

The January 1994 extreme cold event resulted in numerous low temperature records between January 14th and January 21st. Temperatures ranged from -17°F to -36°F, throughout Indiana, including a state record low of -36°F recorded in New Whiteland. Because of the extremely cold temperatures, three people in Vanderburgh County died a 46-year-old male and a 77-year-old male due to exposure, and a 79-year-old female due to hypothermia. The July 1995 heat wave resulted in temperatures exceeding 95°F, with heat indices between 100°F and 120°F for several days across the most of the state. Nearly all of the heat related deaths occurred in northwest Indiana among the sick and the elderly population. In addition, Rose Acre Farms in Seymour Indiana reported that nearly 800,000 baby chickens died because of the extreme heat, totaling more than $1 million in losses.

In August of that same year, heat wave conditions affected nearly all of Indiana between August 12th and August 21st, 2005. Heat index values ranged between 100°F and 115°F. An elderly male suffered from heat stroke and ultimately died as a result. It is estimated that the Indiana State Fair experienced over $400,000 in economic losses due to greatly reduced attendance during these temperature conditions.

Table 3-19: Historic Extreme Temperatures*

Location	Date	Type	Death/ Injury	Property/ Crop Damage**
Entire State	1/14/1994	Extreme Cold	3/0	$5 M/0
Entire State	7/13/1995	Heat Wave	14/0	$1 M/0
Entire State	8/21/1995	Heat Wave	1/0	0/0
Entire State	02/02/1996	Extreme Cold	0/0	0/0
Entire State	07/26/1997	Excessive Heat	0/0	0/0

Location	Date	Type	Death/ Injury	Property/ Crop Damage**
TOTAL			**19/0**	**$6 M/0**

(NCDC, 2006)
(*: Only those events with reported deaths, injuries, or property damages.)
(**: M=1,000,000)

It is difficult to predict the probability that an extreme temperature event will affect Hancock County residents in any given year. However, based on historic information an extreme temperature event is certainly possible in any given year. Although the warning time associated with extreme temperatures is typically greater than 24 hours, it can be expected that the duration of the event could last for more than a week. **Table 3-20** identifies the CPRI for extreme temperature events for all NFIP communities in Hancock County.

Table 3-20: Calculated Priority Risk Index for Extreme Temperature

	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**
Hancock County (unincorporated)	Possible	Limited	> 24 hours	< 1 week	2.0
City of Greenfield	Possible	Limited	> 24 hours	< 1 week	2.0
Town of Cumberland	Possible	Limited	> 24 hours	< 1 week	2.0
Town of McCordsville	Possible	Limited	> 24 hours	< 1 week	2.0
Town of Spring Lake	Possible	Limited	> 24 hours	< 1 week	2.0

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

Extreme Temperature: Vulnerability Assessment

Certain portions of the population may be more vulnerable to extreme temperatures. For example, outdoor laborers, very young and very old populations, low income populations, populations in poor physical condition, and people without heat and air conditioning are at an increased risk to be impacted by extreme temperatures. The affects of extreme temperatures are also experienced by livestock within Hancock County and may adversely effect crop production as well during times of extreme heat.

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

Extreme heat can affect the proper function of organ and brain systems by elevating core body temperatures above normal levels. Elevated core body temperatures, usually in excess of 104°F are often exhibited as heat stroke. For weaker individuals, an overheated core body temperature places additional stress on the body, and without proper hydration, the normal mechanisms for dealing with heat, such as sweating in order to cool down. Elderly people and infants are most susceptible to suffering from extreme heat events and it is important that these populations keep well hydrated and cool during these 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 (98.6°) for an extended period. Lowered core body temperatures can lead to hypothermia and eventually cardiac arrest or respiratory failure resulting in death. Keeping the core body temperature in the normal range 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 as well as individuals over 65, young children, those with impaired mental status or substance abusers.

Due to the nature of extreme temperature events, it is difficult to assess the economic losses that might result from an extreme temperature event in Hancock County. However, based on historic losses reported to the NCDC, extreme temperatures have been the cause of the third highest amount of monetary damages in Hancock County. The effects of extreme temperatures on agricultural production for both crop and livestock will also greatly affect associated businesses and industries. Further, extreme temperatures have been scored in the Comprehensive Hazard Analysis as a hazard that has occurred in the County in the past and will likely occur in the area again.

Many times, losses or damages are attributed to associated events such as extreme cold temperatures during an ice storm or severe winter storm. Extremely high temperatures and resulting losses or damages may be reported as an effect of drought, increased field or forest fires, and/or electrical outages.

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 mitigation practices, hazards address, 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 Hancock County. The Hancock County Red Cross currently has agreements with schools and churches throughout the County for both temporary and long-term shelter. Shelter agreements may need to include provisions for domestic pets. Residents may be more prone to seek shelter if there are resources for their pets as well. An extreme temperature event could

also 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.

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

3.2.8 DAM FAILURE

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

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

Of the approximately 80,000 dams identified nationwide in the National Inventory of Dams, the majority are privately owned. Federal agencies own 2,131; States own 3,627; local agencies own 12,078; public utilities own 1,626; and private entities or individuals own 43,656. Ownership of over 15,000 is undetermined. The Inventory categorizes the dams according to their primary function: Recreation (31%), Fire and farm ponds (17%), Flood control (15%), Irrigation (14%), Water supply (10%), Tailings and other (8%), Hydroelectric (3%), and Undetermined (2%).

Each dam in the National Inventory of Dams is assigned a downstream hazard classification based on the potential loss of life and damage to property should the dam fail. The three classifications are high, significant, and low. With changing demographics and land development in downstream areas, hazard classifications are updated continually. The hazard classification is not an indicator of the adequacy of a dam or its physical integrity. Dam failures typically occur when spillway capacity is inadequate and excess flow overtops the dam, or when internal erosion (piping) through the dam or foundation occurs.

Dam Failure: Historic Data

There are 2 dams in Hancock County as shown in Exhibit 4. The Eagle Land Lake Dam, also known as Baker Dam, is a low hazard dam, is located on an Un-named tributary of Six Mile Creek, and is 31.5 feet in height. IDNR rates dams as Good, Fair, Conditionally Poor, and Poor according to a set of criteria that is evaluated for each dam during periodic inspections. As of the last inspection date, October 2004, the Eagle Land Lake dam was given a fair rating. The Sugar Hills Lake Dam, also in Hancock County, is located on the New Ditch and is 12 feet in

height. As of the last inspection, June 2006, this dam was rated as conditionally poor. The Sugar Hills Lake Dam is the only high hazard dam in the County. **Table 3-21** provides a summary of these dams in Hancock County and they are further identified on Exhibit 4.

Table 3-21: Inventory of Dams

Name	Type & Height	Condition[1]	Waterway & Downstream Community	Owner	Hazard Potential (EAP)[2]
Eagle Land Lake Dam	Earth 38.5'	Fair	UNT Six Mile Creek (Freeport)	Eagle Land Christian Ministries	Low (No)
Sugar Hills Lake Dam	Earth 15'	Conditionally Poor	New Ditch (Mohawk)	Sugar Hills Property Owners Association	High (No)

(National Inventory of Dams Database, 2005)
[1] IDNR Earth Dam Visual Inspection Report
[2] Emergency Action Plan (EAP)

There have been no recorded dam failure events in Hancock County. However, the probability of a dam failure is estimated to be possible to likely of occurring within the unincorporated areas of Hancock County. Both of the aforementioned dams are located within this area. For all other NFIP communities in Hancock County, it is anticipated that negligible damages would occur, either due to the absence of a dam upstream, or the limited number of structures in the inundation areas. In the event of a dam failure, expected warning time is less than 6 hours with the duration of the event estimated at less than one week. **Table 3-22** identifies the CPRI for dam failure for all NFIP communities in Hancock County.

Table 3-22 Calculated Priority Risk Index (CPRI) for Dam Failure

	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
Hancock County (unincorporated)	Possible-Likely	Negligible	< 6 hrs	< 1 wk	2.3
City of Greenfield	Unlikely	Negligible	> 24 hrs	< 6hrs	1.0
Town of Cumberland	Unlikely	Negligible	> 24 hrs	< 6hrs	1.0
Town of McCordsville	Unlikely	Negligible	> 24 hrs	< 6hrs	1.0
Town of Spring Lake	Unlikely	Negligible	> 24 hrs	< 6hrs	1.0

The CPRI index for Hancock County is increased due to the location of both dams. As noted in the inspection report, if the Sugar Hills Lake dam failed or the emergency spillways operated during a flood, there could be loss of life and/or damage to homes. Furthermore, Sugar Hills Drive provides the only access for the homes located north of the spillway. During discharge events, waters are discharged via the spillway, over the Sugar Hills Drive, through residential lots and into Sugar Creek, thus putting this area at a greater risk of damage due to dam failure.

Dam Failure: Vulnerability Assessment

Due to conditions beyond the control of the dam owner or engineer, there are unforeseen structural problems, natural forces, mistakes in operation, negligence, or vandalism that may cause the dam to fail. Unfortunately, none of the dams in Hancock County has an Emergency Action Plan (EAP) with a detailed dam inundation area identified. Therefore, for the purpose of this planning effort, a very rough inundation zone was delineated based on rule-of-thumb assumptions for the single high hazard dam in the County. This zone was overlaid onto recent aerial photography to estimate the number of critical and non-critical facilities that could be affected by a dam failure. The magnitude and extent of damage depends on the type of dam break, volume of water that is released, and width of the floodplain valley to accommodate the dam break flood wave. Based on preliminary analysis of vulnerable facilities in approximate dam inundation zones, 22 non-critical facilities could be affected by the Sugar Hills Lake dam failure. These do not include bridges and roadways that are in the floodway and floodplains throughout the County that could be damaged or destroyed by the Sugar Hills Lake dam breach event.

Types of loss caused by a hazard event could be physical, economic, or social in nature. The estimated physical and economic cost of the Sugar Hills Lake dam breaching was derived by assuming that 25% of all critical and non-critical structures in the downstream inundation zones would be destroyed, 35% would be 50% damaged, and 40% would have only 25% damage. Thus, damage estimates for non-critical facilities, such as residential, commercial, and other structures is $1.7 million, placing dam failure as the least damaging hazard to Hancock County. Similarly, the Comprehensive Hazard Analysis shows dam failure scored as an event that is unlikely to occur in Hancock County.

Social losses are difficult to quantify, though interrupted services associated with critical facilities would cause hardship for many residents. It is too difficult to accurately estimate the potential social cost of a dam break due to the complexity of the hazard. It is probable, though, that a dam break would occur during extreme rainfall and flood events and would likely cause damage would include structure loss, infrastructure loss, disruption to community function, and possibly injury and death.

Dam Failure: 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 address, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

IDNR requires regular inspection and maintenance of all dams throughout the State. The storage of water is a potentially hazardous activity. Under Indiana law, the owner of a dam is responsible for operating and maintaining the dam in a safe manner to prevent harm to others and their property. Dam inspection includes formal technical inspections, maintenance

inspections, informal inspections, and special inspections. Based on the last inspection report for the Sugar Hill Lake Dam, it has been classified as conditionally poor, indicating a potential safety deficiency has been recognized or that uncertainties exist necessitating further investigations and studies.

Although IDNR strongly encourages owners of high hazard dams to prepare an EAP it is not yet required them to do so. An EAP is a very good planning tool to understand the impact that a dam failure could have people and property downstream. These Plans include details about the volume and velocity of the water as well as accurately delineating the dam inundation zone. A good mitigation practice would be to require an EAP and an Emergency Response Plan (ERP) for at least the high hazard dam in Hancock County, the Sugar Hills Lake Dam. The dam inundation zone delineated as part of the EAP could be used in conjunction with the Comprehensive Land Use Plan to restrict future development downstream from a high or significant hazard dam.

Social, physical, and economic losses from dam failures will most likely increase as more people choose to live, work, and visit Hancock County. Ensuring that residents and visitors are well informed about the potential impacts from a dam failure and proper methods to protect themselves and their property downstream of a high hazard dam will help reduce future losses and damage. If future measures were undertaken to protect those structures currently located in the inundation zones of the Sugar Hills Lake Dam, and to prohibit new construction in those same areas, social, physical and economical losses could be reduced.

3.2.9 DROUGHT

Drought, in general, means a moisture deficit extensive enough to have social, environmental or economic effects. There are varied definitions of drought and may be considered in two ways; a conceptual definition, and/or an operational definition. The conceptual definition describes the climate phenomenon in terms that are general and with clear impacts to the community. For example, drought is a protracted period of deficient precipitation resulting in extensive damage to crops, resulting in loss of yield. On the other hand, an operational definition defines a drought in terms of its beginning, end, and magnitude or severity. For example, the deficiency in rainfall or moisture conditions could be compared to the long-term average for a region and identified as outside the range of typical climate pattern. Both definitions are useful for defining a climate phenomenon that is difficult to isolate from normal climate patterns for a region.

Drought is not a rare and random climate event; rather, it is a normal, naturally recurring feature of climate. Drought may occur in virtually all climatic zones, but its characteristics vary significantly from one region to another. Drought is a temporary aberration, is different from aridity, which is restricted to low rainfall regions, and is a permanent feature of climate.

There are four academic approaches to examining droughts; these are meteorological, hydrologic, agricultural, and socio-economic. Meteorological drought is based on the degree, or measure, of dryness compared to a normal, or average amount of dryness, and the duration of the dry period. Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply. Agricultural drought is

related to agricultural impacts; focusing on precipitation shortages, differences between actual and potential evapo-transpiration, soil water deficits, reduced ground water or reservoir levels, and crop yields. Socioeconomic drought relates to the supply and demand of some economic good with elements of meteorological, hydrological, and agricultural drought. This last approach relates the lack of moisture to community functions in the full range of societal function, including power generation, the local economy, and food sources.

Drought: Historic Data

There have been 6 statewide droughts since 1930. One of the most severe was between the years 1988 and 1989. Crop yields in 1988 were 50% to 86% less than in the previous year. Additionally, The IDNR issued a 90-day water conservation decree for the northwest quadrant of Indiana. State surface-water reservoirs approached, and some reached, record low water levels. Some power plants reduced, or shut down, operations temporarily where cooling reservoirs fell to a level that could not support the capacity to cool discharge waters from the plants.

The perceived probability of a drought occurring in Hancock County is likely. **Table 3-23** identifies the CPRI for a drought event for all NFIP communities in Hancock County. As the table shows, there is no significant difference in CPRI values is due to the wide regional impact of a drought event. Thus, all communities in Hancock County will share the same CPRI value.

Table 3-23: Calculated Priority Risk Index (CPRI) for Drought

	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**
Hancock County (unincorporated)	Likely	Critical	> 24 hours	> 1 week	2.8
City of Greenfield	Likely	Critical	> 24 hours	> 1 week	2.8
Town of Cumberland	Likely	Critical	> 24 hours	> 1 week	2.8
Town of McCordsville	Likely	Critical	> 24 hours	> 1 week	2.8
Town of Spring Lake	Likely	Critical	> 24 hours	> 1 week	2.8

Drought: Vulnerability Assessment

Considering agricultural losses, Hancock County typically produces approximately 7.6 million bushels of grain per year. Using crop yield decrease reported in 1988 and 1989, just after the 1988 drought period, as 50 – 86% of 1987 yields (assuming a typical year), then economic losses could range between $5 - $15 million depending on crop types produced and market demand. Estimates of other losses associated with a severe drought are difficult to determine with readily available information. However, based on estimated damages, this type of hazard can produce the 5th highest amount of monetary damages in Hancock County and has been scored in the Comprehensive Hazard Analysis as having a slight chance of occurring in Hancock County.

Drought: 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 address, local priority, benefit-cost ratio, location, responsible entity, and funding can be found in Section 4.0 of this Plan.

Although rare, it is likely that a drought could affect portions of Hancock County. There are very few mitigation practices for reducing losses associated with drought. As noted in the Indiana Water Shortage Plan, water conservation may be necessary to ensure there is adequate water for fire fighting purposes and proper operation of critical facilities. Emergency water conservation language can be added to the existing Hancock County and the City of Greenfield Ordinances. Water conservation can be accomplished day-to-day using water-saving measures such as installing low-flow water saving showerheads and toilets in all critical and non-critical facilities where applicable.

The United States Department of Agriculture (USDA) has a variety of programs that may provide assistance to landowners and agricultural businesses within Hancock County who may be adversely impacted by natural disasters; specifically drought. The USDA Farm Service Agency (FSA) can provide emergency loans to operators and landowners having suffered significant property damages or economic losses.

Social, physical, and economic losses from drought will most likely increase as more people choose to live, work, and visit Hancock County and utilize water resources. Increases in damages and losses can be expected as the population and number of facilities continues to rise in Hancock County. Ensuring that residents and visitors are well informed about the potential impacts from drought and proper methods to conserve water 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 Hancock County. 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. A weighted CPRI was calculated based on the percent of the County's population present in the individual NFIP communities. **Table 3-24** indicates the results of the CPRI values for each hazard affecting Hancock County.

Prior to developing the MHMP, the Hancock County EMA completed a similar process as part of the Comprehensive Emergency Management Plan (CEMP) 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 3-25.

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

Table 3-24: Comparative Hazard Rankings, Hancock County

Hazard	CPRI	CEMP	Historic Losses*	Estimated Damages*
Dam Failure	8	NA	$0.00	$1.7M
Drought	9	4	$0.00	$5M-$15M
Earthquake	5	3	$0.00	$22.7M
Extreme Temperature	7	2	$6.0M	NA
Flooding	6	4	$8.4M	$37.5M
Hail/Thunder/Windstorm	1	2	$322K	$30K
Hazardous Materials	2	3	NA	$128.3M
Severe Winter Storm	4	2	$3.0M	$17.0M
Tornado	3	1	$57.1M	$56.3M

(*: K=1,000; M=1,000,000)

Although different indices were utilized in the CPRI completed for the MHMP, and the CEMP completed for the Hancock County Comprehensive Hazard Analysis, the results are significantly similar. For example according to the CPRI and the CEMP, Hail/Thunder/Windstorm, Hazardous Materials, and Tornado are all within the top three hazards affecting Hancock County. Further, Tornadoes have historically produced the most damages to property and crops within Hancock County, while flooding is the second most historically damaging. Estimated damages for hazardous materials incidents tops the hazards affecting the County, while tornadoes have the potential to produce the next largest amount of damages in Hancock County.

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 GOAL & 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 GOAL

The overall goal throughout the development of the Hancock County MHMP has been to protect the citizens, visitors, and properties within Hancock County 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 Hancock County 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 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 identified for all hazards, as well as information on the local status, local priority, benefit-cost ratio, project location, responsible entity, and potential funding source associated with each proposed practice. The proposed mitigation practices are listed in order of importance to the Hancock County NFIP communities for implementation. Projects identified by the MHMP Planning Committee to be of "high" local priority may be implemented within 2-3 years from final Plan adoption. Projects identified to be of "medium" local priority may be implemented within 4-5 years from final Plan adoption, and projects identified by the Planning Committee to be of "low" local priority may be implemented within 5+ years from final Plan adoptions. However, depending on availability of funding, some proposed mitigation projects may take longer to implement.

As part of the process to identify 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 Hancock County. The intent of this planning effort was to identify the hazards and the extent to which they affect Hancock County 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 HMGP, FMA, PDM Grant, as well as other FEMA programs including the NFIP's CRS, additional detailed studies may need to be completed prior to applying for these grants or programs. Section 5 of this plan includes an implementation plan for all high priority mitigation practices identified by the Planning Committee.

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

Table 4-1: Summary of Mitigation Practices

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT - COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Stormwater Management ▪ Maintain channels and regulated drains to prevent localized flooding ▪ Implement erosion and sediment control Best Management Practices (BMP) identified in the Storm Water Quality Management Plan (SWQMP) ▪ Minimize impacts of flooding by diverting or retaining stormwater	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☒ Structural Control ☒ Public Information	☐ Hail/Thunder/Wind ☐ Severe Winter Storm ☒ Flooding ☐ Tornado ☐ HazMat Incident ☐ Pipeline Failure ☐ Earthquake ☒ Dam Failure	**Ongoing** – SWQMP implementation **Proposed Enhancement** – address local drainage problems through continued regulated drain improvements	High	High	Rule 13 requires Phase II communities of Greenfield, Cumberland, Fortville, McCordsville, New Palestine, and the unincorporated areas of Hancock County surrounding those urbanized areas to prepare and implement a SWQMP. Address flooding in low lying and urban areas due to poor drainage	Surveyor *Engineering for:* Hancock County Greenfield	Existing budget FEMA
Emergency Warning Systems ▪ Develop consistent tiered level of snow emergencies to reduce amount of vehicle traffic as severity of weather increases ▪ Require NOAA Weather Radios in all critical facilities and encourage use by residents and businesses ▪ Increase flood forecasting capabilities including stream gages, flood forecast maps, and flood alerts	☒ Prevention ☐ Property Protection ☒ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☐ HazMat Incident ☐ Pipeline Failure ☐ Earthquake ☐ Dam/Levee Failure	**Ongoing** – test and maintain outdoor warning sirens ; NWS storm warnings; NOAA weather radios; stream gages; redundancy of communication system; mobile EOC & response vehicles **Proposed Enhancement** – Add sirens and stream gages as population continues to grow	High *(consistent levels of emergency, radios)* Moderate *(flood forecasting)*	High	Create consistent levels of snow emergencies throughout Hancock County as well as surrounding counties. NOAA weather radios in all critical facilities Additional stream gages to estimate flow to Geist Reservoir Additional outdoor warning sirens to provide coverage for the areas of McCordsville that are currently not covered.	EMA Surveyor Highway	Existing budget FEMA USGS
Management of High Hazard Dam ▪ Complete Emergency Action Plan (EAP) and Emergency Response Plan (ERP) for High Hazard Dam ▪ Require EAPs for any new significant and high hazard dams ▪ Restrict development of critical facilities in dam break inundation areas ▪ Investigate options for alternate access/egress route for Sugar Hills Drive residents. ▪ Restrict unauthorized access to dam	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☒ Emergency Services ☒ Structural Control ☒ Public Information	☐ Hail/Thunder/Wind ☐ Severe Winter Storm ☒ Flooding ☐ Tornado ☐ HazMat Incident ☐ Pipeline Failure ☐ Earthquake ☒ Dam/Levee Failure	**Ongoing** – dam inspected and maintained every 2 years **Proposed Enhancement** – Complete EAP and ERP, restrict development of critical facilities, identify/alert downstream land owners and restrict access	High *(EAP/ERP, critical facilities, alternate route)* Low *(restrict access)*	High	Sugar Hills Lake Dam on Sugar Creek upstream of the City of Greenfield	Dam Owner IDNR EMA County Sheriff	Operational cost

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT - COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Public Education & Outreach ▪ Maintain hazard preparedness literature at public facilities ▪ Participate in Severe Weather Awareness Week ▪ Distribute hazard preparedness literature at community events ▪ Implement education BMP in the SWQMP ▪ Prepare and distribute information on "Ready-Go Kits" for home and businesses to ensure preparedness in a hazardous event. ▪ Become certified by NWS as a StormReady Community or County	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☒ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☒ HazMat Incident ☒ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** – literature, school and community programs, newspapers, etc. **Proposed Enhancement** – CERT for each community, add Spanish language materials	High	High	Maintain hazard preparedness literature at public libraries, Red Cross, and government offices Severe Weather Awareness Week held in March each year Rule 13 requires Phase II communities of Greenfield, Cumberland, Fortville, McCordsville, New Palestine, and the unincorporated areas of Hancock County surrounding those urbanized areas to prepare and implement a SWQMP.	EMA Red Cross *Floodplain Administrators for:* Hancock County Greenfield Cumberland Fortville McCordsville Local Media	Existing budget FEMA IDEM IDNR
Hazardous Materials Response Teams ▪ Increase number of personnel certified to OSHA III Technician level ▪ Establish Hancock County HMRT ▪ Ensure that current facility maps and response plans are on file and facility personnel are adequately trained for all SARA Title III facilities ▪ Require warnings at all rail crossings to reduce potential for HazMat incident	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☒ Emergency Services ☒ Structural Control ☐ Public Information	☐ Hail/Thunder/Wind ☐ Severe Winter Storm ☐ Flooding ☐ Tornado ☒ HazMat Incident ☐ Pipeline Failure ☐ Earthquake ☐ Dam/Levee Failure	**Ongoing** – Research funding opportunities to increase number of paid, full-time responders; Many facilities have facility maps and response plans on file **Proposed Enhancement** – Add responders; Ensure that all SARA Title III facilities have current response plans and facility maps on file with local EMAs and Fire Departments	High *(Level III, HMRT, facility maps)* Moderate *(rail crossing)*	High	Countywide	*Fire Department for:* Hancock County Greenfield Cumberland Fortville McCordsville EMA Facility Owner	Existing budget Operational cost INDOT
Immunization ▪ Develop and implement a voluntary immunization program for all emergency responders and inspection staff	☐ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☐ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☒ HazMat Incident ☒ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** – none **Proposed Enhancement** – immunize all emergency responders and inspection staff	High	High	All emergency response and inspection staff countywide	EMA Health Department *Planning, Fire and Police Departments for:* Hancock County Greenfield Cumberland Fortville McCordsville	Existing budget FEMA Citizen Corps

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT - COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Communication ▪ Coordinate communications and notifications between towns and agencies ▪ Install Dynamic Message Boards on I-70 to alert motorists ▪ Determine adequate location for Reverse 9-1-1 system	☐ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☒ HazMat Incident ☒ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** –1 Dynamic message board as enter Marion County **Proposed Enhancement** – Develop notification and communication protocols between municipalities and emergency response agencies	High *(coordinate notifications)* Moderate - *(message boards, reverse 911)*	High	Countywide	EMA INDOT	Existing budget INDOT
Response Training ▪ Utilize realistic training and exercises that simulate response conditions and scenarios	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☒ Emergency Services ☒ Structural Control ☒ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☒ HazMat Incident ☒ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** – Fire Department, EMA, Hospital routinely trained. **Proposed Enhancement** – Provide SARA Title III facility personnel realistic trainings within their facilities and involve appropriate local government response personnel	High	High	Countywide	EMA	Existing budget FEMA Citizen Corps
Geographic Information Systems ▪ Map known hazard areas using soils, hydrologic features, floodplain extents ▪ Use GIS in land use planning efforts ▪ Use GIS to map areas of previous damage and occurrences ▪ Use HAZUS-MH to model "what if" scenarios	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☒ HazMat Incident ☒ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** - Hancock County Surveyor's Office has extensive GIS data available **Proposed Enhancement** – Layers made more accessible to NFIP communities. Update with critical facility information	High *(map hazard areas, use GIS in planning)* Low *(what if)*	Moderate	Countywide	Surveyor *Planning for:* Hancock County Greenfield Cumberland Fortville McCordsville	Existing budget FEMA
Building Protection ▪ Develop MOA with Marion and Madison Counties to utilize sandbagging machine if needed and available. ▪ Prohibit construction of critical facilities in known hazard areas ▪ Certify that mobile homes meet manufacturer's minimum installation standards Enforce requirements of International Building Code to ensure buildings are structurally sound to withstand hazards	☒ Prevention ☒ Property Protection ☐ Nat. Res. Protection ☐ Emergency Services ☒ Structural Control ☒ Public Information	☒ Hail/Thunder/Wind ☐ Severe Winter Storm ☒ Flooding ☒ Tornado ☐ HazMat Incident ☐ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** –construction of future critical facilities in known hazards areas prohibited **Proposed Enhancement** –	High *(MOA, prohibit construction in hazard areas)* Low *(HAZUS-MH, mobile homes)*	Moderate	Areas determined to be known hazard areas.	*Planning:* Hancock County Greenfield Cumberland Fortville McCordsville	Owner FEMA

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT - COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Community Ratings System ▪ Reduce flood insurance premiums through participation in NFIP and CRS program	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☒ Public Information	☐ Hail/Thunder/Wind ☐ Severe Winter Storm ☒ Flooding ☐ Tornado ☐ HazMat Incident ☐ Pipeline Failure ☐ Earthquake ☒ Dam/Levee Failure	**Ongoing** – Hancock County (excluding Fortville and McCordsville) CRS 8 **Proposed Enhancement** – Fortville to become participant in NFIP and all NFIP communities should join CRS	High	Moderate	All NFIP communities in Hancock County	*Floodplain Administrators:* Hancock County Greenfield Cumberland Fortville McCordsville	Existing budget FEMA
Safe Rooms & Community Shelters ▪ Establish safe rooms and community shelters in vulnerable locations ▪ Require safe rooms in new public facilities ▪ Clearly advertise location of safe rooms and community shelters	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☒ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☒ HazMat Incident ☒ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** – Red Cross has agreement with local schools and other community facilities capable of sheltering numerous people **Proposed Enhancement** – add safe rooms and/or shelters to mobile home parks, multi-family dwellings, public buildings, developments without basements, add Spanish language	High	Low	Re-establish community shelters throughout Hancock County Once shelters established in all NFIP communities, establish safe rooms and/or shelters in mobile home parks, multi-family dwellings, and public buildings Investigate options for various levels of sheltering ability.	EMA Red Cross *School Superintendent for:* Hancock County Greenfield Cumberland Fortville McCordsville	Operational cost FEMA
Floodplain Management ▪ Continue to conduct hydraulic analyses of unstudied or understudied streams to determine exact flood boundaries	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☒ Public Information	☐ Hail/Thunder/Wind ☐ Severe Winter Storm ☒ Flooding ☐ Tornado ☐ HazMat Incident ☐ Pipeline Failure ☐ Earthquake ☐ Dam/Levee Failure	**Ongoing** – FIRMs **Proposed Enhancement** – conduct flood protection studies and study unstudied streams	Moderate	High	Sugar Creek, Brandywine, Nameless Creek, Anthony Creek, and West Little Sugar Creek	Surveyor IDNR *Engineering for:* Hancock County Greenfield Cumberland Fortville McCordsville	Existing budget IDNR FEMA

MITIGATION PRACTICE	MITIGATION STRATEGY	HAZARD ADDRESSED	STATUS	PRIORITY	BENEFIT - COST RATIO	PROJECT LOCATION	RESPONSIBLE ENTITY	FUNDING SOURCE
Community Emergency Response Teams ▪ Improve disaster preparedness and emergency response at the local level through the Community Emergency Response Team (CERT) program	☒ Prevention ☐ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☐ Structural Control ☒ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☒ HazMat Incident ☒ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** – Investigating initial requirements **Proposed Enhancement** – Complete establishment of program	Moderate	High	Countywide	EMA	Existing budget FEMA Citizen Corps
Land Use Planning & Zoning ▪ Incorporate hazard information into the Comprehensive Land Use Plan and Development Review to better guide future growth and development ▪ Establish hazard overlay zones in the Zoning Ordinance to restrict development, especially critical facilities, in known hazard areas	☒ Prevention ☐ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☒ Public Information	☐ Hail/Thunder/Wind ☐ Severe Winter Storm ☒ Flooding ☐ Tornado ☒ HazMat Incident ☒ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** - County enforces setbacks for flooding; **Proposed Enhancement** – improve planning and zoning in NFIP communities, create hazard overlay zones	Moderate *(Comp Plan and Review)* Low *(overlay districts)*	Moderate	Add hazard specific language and known zones to Hancock County Comprehensive Plan Establish land use planning and zoning in other NFIP communities	*Planning for:* Hancock County Greenfield Cumberland Fortville McCordsville	Existing budget
Power Back-Up Generators ▪ Require power back-up generators in all critical facilities	☒ Prevention ☒ Property Protection ☐ Nat. Res. Protection ☒ Emergency Services ☒ Structural Control ☐ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☒ HazMat Incident ☒ Pipeline Failure ☒ Earthquake ☒ Dam/Levee Failure	**Ongoing** – mobile generators available from EMA, many facilities with back up power source **Proposed Enhancement** – all critical facilities	Low	Moderate	Back up generators in all critical facilities especially medical care, police, fire, and community shelters	Building owner *(private & public)* EMA	Operational cost FEMA
Tree Maintenance ▪ Maintain trees on public property and right-of-ways (ROW) to reduce risk of downed utility lines and falling limbs	☒ Prevention ☒ Property Protection ☒ Nat. Res. Protection ☐ Emergency Services ☐ Structural Control ☐ Public Information	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☐ HazMat Incident ☐ Pipeline Failure ☐ Earthquake ☐ Dam/Levee Failure	**Ongoing** – utilities and road departments with near continuous activity, require maintenance on private property in ROW **Proposed Enhancement** – none	Low	Moderate	All ROWs and public property countywide especially in areas with above ground utility lines	Utility Provider *Road Department for:* Hancock County Greenfield Cumberland Fortville McCordsville	Existing budget Utility rate

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	☒ Hail/Thunder/Wind ☒ Severe Winter Storm ☒ Flooding ☒ Tornado ☐ HazMat Incident ☒ Pipeline Failure ☐ Earthquake ☒ Dam/Levee Failure	**Ongoing** – new and retrofitted utility lines generally buried **Proposed Enhancement** –	Low	Low	All above ground utility lines should be buried Countywide, where feasible	Utility Provider *Planning for:* Hancock County Greenfield Cumberland Fortville McCordsville	Utility Rate Existing budget

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.

Stormwater Management

In order to allow for optimum conveyance of unpolluted stormwater in Hancock County, all channels and regulated drains need to be regularly maintained.

A. Improve routine inspection of channels and regulated drains.
B. Prioritize evaluations of channels and regulated drains
C. Allocate necessary funding to complete high priority actions
D. Prepare and complete bidding/subcontractual process

To further reduce damages associated with flooding, minimize impacts of flooding by diverting or retaining stormwater.

A. Evaluate and prioritize areas prone to adverse flooding and/or ponding.
B. Investigate options for mitigation.
C. Maintain strength of current ordinances.

Implement erosion and sediment control Best Management Practices (BMP) identified in the Storm Water Quality Management Plan (SWQMP)

A. Provide information relevant to SWQMP to other County Departments (Police, Sheriff, Surveyor, etc).
B. Ensure developers and construction companies are aware of necessary BMPs in SWQMP.
C. Provide necessary authority and personnel to enforce ESC requirements.
D. Investigate options for new developments to provide necessary funding for inspection and monitoring of BMPs.

Emergency Warning Systems

Develop consistent multi-jurisdictional tiered level of snow emergencies to reduce amount of vehicle traffic as severity of weather increases

A. Discuss existing protocol for each County represented in IDHS District 5.
B. Develop protocols regarding specific situations in which district wide snow emergencies are to be declared.
C. Develop public outreach and educational component to inform residents and visitors of what conditions will prompt activation of snow emergencies.

Encourage NOAA Weather Radios to be utilized in all critical facilities and encourage use by residents and businesses.

A. Provide training and information on the use of NOAA weather radios similar to program developed to provide training regarding fire extinguishers.
B. Continue public education and outreach regarding hazard safety.

Management of High Hazard Dam

Failure or misoperation of a high hazard dam could result in significant losses for downstream residents. An EAP or an ERP is an important planning tool developed and utilized to understand and mitigate the impact that a dam failure could have on people and property.

A. Encourage dam owner to conduct a detailed study to determine the inundation area for the Sugar Hills Lake Dam and the number of structures (residences, bridges, roadways, etc.) that are within the inundation area.
B. Encourage dam owner to research and compile emergency contact information of local official responding to a dam failure.
C. Encourage dam owner to develop detailed dam failure response procedures and provide to local officials.
D. Develop education materials for those that live or work downstream of the Sugar Hills Lake Dam regarding the potential risk and options to protect themselves or their property from damages.
E. Investigate options for alternate access/egress route for affected residents.

Public Education & Outreach

It is important to provide the residents and visitors of Hancock County with up-to-date information on the potential hazards and how the area has prepared to prevent and respond to those hazards.

A. Develop, maintain, and distribute hazard preparedness literature for all public facilities and community events.
B. Implement education component of the SWQMP
C. Provide a multi-media outreach campaign for hazards affecting Hancock County and proper response actions.

Hazardous Materials Response Teams

If a hazardous materials incident were to occur anywhere in Hancock County, it would be considered critical due to the unpredictable factors of location, substance involved, time of day and weather conditions. At this time, Hancock County relies on neighboring Marion and/or Madison Counties for response teams.

A. Increase number of personnel certified to OSHA III Technician level
B. Establish Hancock County HMRT
C. Ensure that current facility maps and response plans are on file and facility personnel are adequately trained for all SARA Title III facilities
D. Utilize realistic training and exercises that simulate response conditions and scenarios

Immunization

It is important to have current immunizations for all response and inspection personnel.

A. Develop and implement a voluntary immunization program for all emergency responders and inspection staff.

Communication

Coordinated communication is critical in the time of an emergency.

A. Inventory means of communications utilized by each agency and municipality in Hancock County.
B. Determine best practical method to coordinate and overlap communication systems and notifications between municipalities and local emergency agencies.
C. Develop protocol to initiate communications based on responding agency or jurisdiction.
D. Investigate alternative communication methods for alerting public of impending or existing situations.

Geographic Information Systems

To provide the most up to date and accessible information regarding Hancock County, it is important o map the known hazard areas using soils, hydrologic features, floodplain extents, etc, and to utilize GIS information in land use planning efforts.

A. Update existing GIS layers to include most recent data sets.
B. Create and distribute relevant layers to County and Municipal offices.
C. Provide training and coordination among County and Municipal offices regarding data sharing, limited accessibility, and updates.

Building Protection

It is important to prohibit construction of new structures in known hazard areas and to protect existing structures in known hazard areas, such as floodways, areas in close proximity to hazardous materials facilities or high pressure gas lines.

A. Develop MOA with Marion and Madison Counties to utilize sandbagging machine or to have access to sandbags if needed and available.
B. Enforce requirements of International Building Code to ensure buildings are structurally sound to withstand hazards by providing adequate training and personnel to ensure structures are in compliance.
C. Include language in County and or municipal ordinances to restrict or prohibit development in areas of known hazard.

Community Ratings System

The CRS is a voluntary incentive program recognizing and encouraging community floodplain activities that exceed the minimum NFIP requirements. Participation in the CRS program improves floodplain management practices and reduces flood losses and flood insurance premiums.

A. Review application requirements and gather supporting documentation including ordinance language, proof of compliance, outreach projects, disclosure forms, repetitive loss information, flood warning program, and approved Flood Hazard Mitigation Plan (MHMP).
B. Complete application and calculate total credits.
C. To expedite the review and approval process, consult with ISO representative to review application prior to submission to local entities and the NFIP.

Safe Rooms & Community Shelters

Require tornado shelters in new and existing mobile home parks, establish safe havens and community shelters in vulnerable locations, require safe rooms in all new public facilities, and clearly advertise the location of safe havens and community shelters.

A. Identify all existing mobile home parks in Hancock County.
B. Adopt new or amend existing ordinances to require tornado shelters in all new and existing mobile home parks.
C. Initiate research on potential funding sources that would provide financial assistance for developing tornado shelters in existing mobile home parks and obtain necessary funding.
D. Adopt new or amend existing ordinances to require safe rooms in all new public facilities.
E. Inventory and prioritize local communities and neighborhoods that would benefit most from additional shelters or safe havens.
F. Develop a public information campaign, which clearly identifies local shelters and safe havens and builds public support for new requirements Coordinate with Neighborhood Liaisons, Homeowners Associations, Churches, and other community groups to maximize local support and buy-in.

Floodplain Management

Hancock County would benefit from detailed hydraulic and hydrologic analyses completed on unnumbered Zone A streams. There are currently 11 critical facilities and 489 non-critical facilities located within the delineated 100-year floodplain.

A. Prioritize unstudied streams in Hancock County and establish a timeline to complete detailed analysis.
B. Dedicate annual funding and retain a qualified engineering firm to complete floodplain studies according to FEMA guidelines.
C. Establish a template for these studies and distribute to developers to ensure a consistency from reach to reach.

Stream gages can also be useful to determine base flows and base flood elevations in areas where this information has not been fully determined. Installation of additional stream gages would assist in the collection of data necessary to provide this information.

A. Determine areas where stream gages are needed.
B. Prioritize areas according to need and benefit to Hancock County.
C. Initiate research regarding sources of funding, partnership opportunities, and monitoring modes available.

Community Emergency Response Teams

Establish a Hancock County CERT in order to educate people about disaster preparedness and improve emergency response at the local level.

A. Utilize the risk assessment information conducted for this Plan to assist with determining relative priorities for the Hancock County CERT, and to assist with determining how the Hancock County CERT can be of greatest benefit to emergency response in Hancock County.
B. Identify overall CERT needs related to personnel, equipment, training, materials, and funding.
C. Initiate research regarding sources of funding available to establish and maintain an effective CERT and obtain the necessary funding to initiate the program.
D. Develop a public information campaign to increase the public's awareness, interest, and understanding of the CERT, and to ensure that all relevant stakeholder groups have been targeted for participation.
E. Acquire local CERT training materials from FEMA, tweak training materials to local needs, establish a final training program, and implement CERT training.

Land Use Planning & Zoning

Land use planning and zoning can be utilized to restrict development and construction in previously identified hazard areas. This can also reduce damages in areas of known hazard such as flood zones and dam inundation areas.

A. Incorporate hazard information into the Comprehensive Land Use Plan to better guide future growth and development in Hancock County.
B. Provide Planning Departments and Commissions with maps of known hazard areas to be utilized during plan review.
C. Establish overlay zones to restrict developments, especially critical facilities, in known hazard areas.

Power Back-up Generators

Require power back-up generators in all critical facilities and lift stations and secure a fuel reserve to ensure that critical facilities can run on power back-up generators for extended period.

A. Identify all critical facilities and lift stations that do not have power back-up generators.
B. Adopt new or amend existing ordinances to require power back-up generators in all critical facilities and lift stations.
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 Hancock County, informing them of the new requirements. Include an informational brochure in the mailing that discusses important details on power back-up generators such as benefits, costs, and various purchasing information.

Tree Maintenance

Routine tree maintenance can be utilized to further protect property and utilities from damages associated with windstorms, ice storms, tornadoes, etc.

A. Prioritize areas in Hancock County in greatest need of tree maintenance.
B. Develop annual tree maintenance program for the most critical areas in Hancock County.
C. Retain professional tree crews to utilize following hazardous events where increased maintenance is required.
D. Develop informative materials to provide to residential landowners regarding proper placement and maintenance of trees.

Utility Use & Location

To further reduce the potential of future power outages in Hancock County, utility lines in areas of new development should be buried.

A. Establish County wide requirements for areas of new development to bury utility lines.
B. Determine areas within the County where burial of existing utilities would be feasible or could be accomplished in conjunction with installation of new utilities.

6.0 PLAN MAINTENANCE PROCEDURES

6.1 MAINTENANCE PROCESS

Throughout the 5-year planning cycle, the Hancock County EMA 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 meet between annual meetings. Depending on grant opportunities and fiscal resources, mitigation projects may be implemented independently by individual NFIP communities or through local partnerships.

This is the first MHMP that Hancock County and NFIP communities have prepared. The data used to prepare the Hancock County 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.

Updates or modifications to the Hancock County 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.

6.2 INCOPRORATION INTO EXISTING PLANS

Many of the mitigation projects identified as part of this planning process are on going with some enhancement needed. Where needed, modifications will be made to NFIP communities' planning documents and ordinances during the regularly scheduled update.

6.3 CONTINUED PUBLIC INVOLVEMENT

Continued public involvement is critical to the successful implementation of the Hancock County MHMP. Comments from the public on the MHMP will be received by the EMA Director 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 Hancock County EMA Office.

Updates or modifications to the Hancock County 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.

NFIP/CRS

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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