

# Multi-Hazard Mitigation Plan

## Kosciusko County



Kosciusko County Emergency  
Management Agency  
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100 W. Center Street  
Warsaw, Indiana 46580

# Hazard Mitigation Plan

## Kosciusko County, Indiana

**Adoption Date:** -- \_\_\_\_\_ --

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## Table of Contents

<b>1. Section 1 - Introduction</b>	9
1.1. Narrative Description	9
1.2. Project Scope and Purpose	10
<b>2 Section 2 - Public Planning Process</b>	11
2.1 Planning Team Information	11
2.2 Public Involvement in Planning Process	12
2.3 Neighboring Community Involvement	12
2.4 Review of Technical and Fiscal Resources	13
2.5 Review of Existing Plans	13
<b>3 Section 3 - Jurisdiction Participation Information</b>	14
3.1 Adoption by Local Governing Body	14
3.2 Jurisdiction Participation	14
<b>4 Section 4 - Jurisdiction Information</b>	15
4.1 General County Description	15
4.2 Topography	15
4.3 Climate	16
4.4 Demographics	16
4.5 Economy	16
4.6 Industry	17
4.7 Commuter Patterns	18
4.8 Land Use and Development Trends	18
4.9 Agriculture	20
4.10 Managed Lands	20
4.11 Endangered and Threatened Species	20
4.12 Major Lakes, River, Watersheds and Aquifers	21
4.12.1 Unconsolidated Aquifer Systems of Kosciusko County, Indiana	22
4.13 Water Pollution	23
<b>5 Section 5 - Hazard Identification and Risk Assessment</b>	24
5.1 Hazard Identification/Profile	24
5.1.1 Existing Plans	24
5.2 National Hazard Records	25
5.2.1 National Climatic Data Center (NCDC) Records	25
5.2.2 FEMA Disaster Information	26
5.3 Hazard Ranking Methodology	27

5.4	GIS and HAZUS-MH .....	32
5.5	Vulnerability Assessment .....	33
5.5.1	Asset Inventory .....	33
5.6	Hazard Profiles.....	35
5.6.1	Tornado Hazard .....	35
5.6.2	Flood Hazard.....	45
5.6.3	Earthquake Hazard.....	55
5.6.4	Thunderstorm Hazard .....	66
5.6.5	Drought and Extreme Heat Hazard.....	78
5.6.6	Winter Storm Hazard .....	82
5.6.7	Hazardous Materials Storage and Transport Hazard .....	88
5.6.8	Fire Hazard.....	99
5.6.9	Infectious Disease Outbreak .....	102
<b>6</b>	<b>Section 6 - Mitigation Strategy .....</b>	<b>103</b>
6.1	Community Capability Assessment.....	103
6.2	National Flood Insurance Program (NFIP).....	104
6.3	Stormwater Management Stream Maintenance Ordinance .....	105
6.4	Zoning Management Ordinance .....	106
6.5	Erosion Management Program/ Policy .....	106
6.6	Fire Insurance Rating Programs/ Policy .....	107
6.7	Land Use Plan .....	107
6.8	Building Codes.....	107
6.9	Mitigation goals .....	107
6.10	Mitigation Actions/Projects .....	108
6.11	Implementation Strategy and Analysis of Mitigation Projects .....	110
6.12	Multi-Jurisdictional Mitigation Strategy.....	118
<b>7</b>	<b>7 - Plan Maintenance .....</b>	<b>119</b>
7.1	Monitoring, Evaluating, and Updating the Plan .....	119
7.2	Implementation through Existing Programs .....	119
7.3	Continued Public Involvement .....	119

## List of Tables

Table 2-1: Multi-Hazard Mitigation Planning Team Members .....	11
Table 2-2: Neighboring Community Participation .....	12
Table 2-3: Key Agency Resources Provided .....	13
Table 2-4: Planning Documents Used for MHMP Planning Process .....	13
Table 3-1: Participating Jurisdictions .....	14
Table 3-2: Jurisdiction Participation .....	14
Table 4-1: Population by Community.....	16
Table 4-2: Industrial Employment by Sector .....	17
Table 4-3: Major Employers .....	17
Table 4-4: Watersheds .....	21
Table 5-1: Climatic Data Center Historical Hazards .....	25
Table 5-2: FEMA-Declared Emergencies in Kosciusko County (1998-2017).....	27
Table 5-3: Updated Kosciusko County Hazards 2017.....	28
Table 5-4: Address-Matching For Kosciusko County .....	33
Table 5-5: Essential Facilities List.....	34
Table 5-6: Building Exposure.....	34
Table 5-7: Fujita Tornado Rating .....	35
Table 5-8: Kosciusko County Tornadoes* .....	36
Table 5-9: Tornado Path Widths and Damage Curves .....	38
Table 5-10: F4 Tornado Zones and Damage Curves .....	39
Table 5-11: Estimated Numbers of Buildings Damaged by Occupancy Type .....	42
Table 5-12: Estimated Building Losses by Occupancy Type (X 1000) .....	42
Table 5-13: Estimated Critical Facilities Affected .....	42
Table 5-14: Kosciusko County Previous Occurrences of Flooding*.....	46
Table 5-15: Kosciusko County Repetitive Loss Structures .....	48
Table 5-16: National Inventory of Dams .....	49
Table 5-17: Kosciusko County HAZUS-MH Building Damage.....	51
Table 5-18: Kosciusko County Damaged Critical Facilities .....	52
Table 5-19: Abbreviated Modified Mercalli Intensity Scale .....	56
Table 5-20: Earthquake Magnitude vs. Modified Mercalli Intensity Scale.....	56
Table 5-21: Kosciusko County Hailstorms* .....	67
Table 5-22: Kosciusko County Lightning Strikes* .....	69
Table 5-23: Kosciusko County Wind Storms* .....	69
Table 5-24: Kosciusko County Property Damage (2008-2017) .....	76
Table 5-25: Kosciusko County Drought/Heat Wave Events* .....	79
Table 5-26: Winter Storm Events* .....	83
Table 5-27: Kosciusko County Property Damage (1998-2017) .....	86
Table 5-28: Kosciusko County Historical HAZMAT Releases .....	88
Table 5-29: Estimated Exposure for all AEGL Levels (al pp Table: Estimated Exposure for AEGL Level 3 ( $\geq 20$ ppm) .....	96
Table 5-30: Estimated Exposure for AEGL Level 3 ( $\geq 20$ ppm) .....	97
Table 5-31: Estimated Exposure for AEGL Level 2 ( $\geq 2$ ppm) .....	97
Table 5-32: Estimated Exposure for AEGL Level 1 ( $\geq .5$ ppm) .....	97
Table 5-33: Critical Facilities within Plume Footprint .....	98
Table 5-34: Kosciusko County Historical Structural Fires.....	100
Table 6-1: Additional Information on Communities Participating in the NFIP .....	105

Table 6-2: Description of Zoning Plans/Ordinances .....	106
Table 6-3: Listing of Fire Departments, Ratings, and Number of Firefighters .....	107
Table 6-4: STAPLE + E Planning Factors.....	110
Table 6-5: Mitigation Strategies .....	112

**List of Figures**

Figure 4-1: Commuter Patterns into and out of Kosciusko County .....	18
Figure 4-2: Kosciusko County urban Service Areas.....	19
Figure 5-1: FEMA-Declared Emergencies and Disasters in Kosciusko County (1998-2017)....	26
Figure 5-2: Tornado Analysis Using GIS Buffers .....	39
Figure 5-3: Hypothetical F\$ Tornado Path in Kosciusko County .....	40
Figure 5-4: Modeled F4 Tornado Damage Buffers in Kosciusko County.....	41
Figure 5-5: Critical Facilities within Tornado Path .....	43
Figure 5-6: Kosciusko County Buildings in Floodplain (100 year Flood) .....	51
Figure 5-7: Kosciusko County Urban Areas (Warsaw) Flood-Prone Areas (100 Year Flood)...	52
Figure 5-8: Boundary of 100 - Year Flood Overlaid with Critical Facilities .....	53
Figure 5-9: Historical Earthquake Epicenters.....	57
Figure 5-10: Wabash Valley Scenario-Building Economic Losses in Thousands of Dollars .....	62
Figure 5-11: Anna Ohio Scenario-Building Economic Losses in thousands of Dollars .....	63
Figure 5-12: Kosciusko County 5.5M Scenario-Building Economic Losses in Thousands of Dollars.....	64
Figure 5-13: Location of Chemical Release .....	92
Figure 5-14: ALOHA Plume Modeling Parameters .....	93
Figure 5-15: Plume Footprint Generated by ALOHA .....	94
Figure 5-16: ALOHA Plume Footprint Overlaid in ArcGIS .....	95
Figure 5-17: Kosciusko County Building Inventory Classified By Plume Footprint.....	96
Figure 5-18: Critical Facilities within Plume Footprint.....	98

GLOSSARY OF TERMS .....	120
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Appendix A: Minutes of the Multi-Hazard Mitigation Planning Team Meetings.....	122
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Appendix B: Articles Published By the Local News.....	133
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Appendix C: Adopting Resolution.....	137
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Appendix D: Historical Hazards from NCDC 1965 - 2017.....	139
---	-----

Appendix E: Hazard Maps.....	167
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Appendix F: Complete List of Critical Facilities.....	169
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Appendix G: Maps of Critical Facilities .....	180
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Sources .....	182
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## **1. Section 1 - Introduction**

### **1.1. Narrative Description**

Hazard Mitigation is defined as any sustained action to reduce or eliminate long-term risk to human life and property from hazards. The Federal Emergency Management Agency (FEMA) has made reducing hazards one of its primary goals; hazard mitigation planning and the subsequent implementation of resulting projects, measures, and policies is a primary mechanism in achieving FEMA's goal.

The Kosciusko County All Hazard Mitigation Plan is a guide for the county's assessment of its hazards, vulnerabilities, and risks. It includes the participation of a wide range of stakeholders and the public in the planning process. This plan aids the county, cities and towns in preparing for, preventing, protecting against, responding to, and recovering from disasters that may threaten the community's economic, social, and environmental well-being. This plan utilizes historical data and documents regarding previous disasters, probabilistic disasters through HAZUS-MH and GIS analyses, and addresses specific strategies to mitigate the potential impacts of these disasters.

This plan also takes into consideration the "State of Indiana Standard Multi-Hazard Mitigation Plan" and the IDHS Mission Statement "...for the enhancement of public and private partnerships and the assurance of local, state and federal collaboration to continually develop Indiana's public safety capabilities for the wellbeing and protection of our citizens, property and economy."

The original Hazard Mitigation Plan was prepared by the MACOG and the POLIS center and adopted by Kosciusko County and jurisdictions in November 23, 2010.

Clyde Avery, Consultant was contracted to define and prioritize the risks in the county and to develop this mitigation plan to minimize both the risks and the consequences of the defined hazards. Kosciusko County and Avery Emergency Preparedness Services have joined efforts to update and develop this mitigation plan, realizing that the recognition of and the protection from hazards impacting the county and its residents contribute to future community and economic development. This team will continue to work together to develop and implement mitigation initiatives developed as part of this plan.

In recognition of the importance of planning in mitigation activities, FEMA created Hazards USA Multi-Hazard (HAZUS-MH), a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to predict the estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. The Indiana Department of Homeland Security has determined that HAZUS-MH should play a critical role in Indiana's risk assessments.

## **1.2. Project Scope and Purpose**

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

A FEMA-approved Multi-Hazard Mitigation Plan is required in order to apply for and/or receive project grants under the Hazard-Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), and Severe Repetitive Loss (SRL). FEMA may require a Multi-Hazard Mitigation Plan under the Repetitive Flood Claims (RFC) program.

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

The Kosciusko County MHMP Update is a multi-jurisdictional planning effort led by Ed Rock with the Kosciusko County Emergency Management Agency (EMA). This Plan was prepared in partnership with representatives from Kosciusko County, the Town of Burket, the Town of Etna Green, the Town of Milford, the Town of Pierceton, the Town of Silver Lake, the Town of Syracuse, the City of Warsaw, the Town of Winona Lake, and the Whitley County Office of Emergency Management. The jurisdictions of Leesburg, Mentone and Sidney were not able to attend the meetings but were kept in the loop on the progress of the plan revision. Representatives from these communities attended the Planning Committee meetings, provided valuable information about their community, reviewed and commented on the draft MHMP, and assisted with local adoption of the approved Plan. As each of the communities had an equal opportunity for participation and representation in the planning process, the process used to update the Kosciusko County MHMP satisfies the requirements of DMA 2000 in which multi-jurisdictional plans may be accepted.

Funding to update the MHMP was made available through a FEMA/DHS PDM grant awarded to the Kosciusko County Commissioners and administered by IDHS. Kosciusko County provided the local 25% match required by the grant.

## 2.1 Planning Team Information

The Kosciusko County Multi-Hazard Mitigation Planning Team is headed by Edward Rock, who is the primary point of contact. Members of the planning team include representatives from various county departments, cities and towns, and public and private utilities. Table 2-1 identifies the planning team individuals and the organizations they represent.

**Table 2-1: Multi-Hazard Mitigation Planning Team Members**

Name	Title	Organization	Jurisdiction
Edward Rock	County EMA	Kosciusko County Emergency Management	Kosciusko County
Bill Holder	GIS Coordinator	Kosciusko County GIS	Kosciusko County
Matt Sandy	Assistant Planner	Kosciusko County Area Plan Commission	Town of Atwood
Jim Moyer	Deputy Surveyor	Kosciusko Surveyors Office	Kosciusko County
Marvin McClone	Council Member	Town of Burket	Town of Burket
Keith Claassen	Council Member	Town of Etna Green	Town of Etna Green
Doug Jones	Council Member	Town of Leesburg	Town of Leesburg
Travis Marsh	Town Marshall	Town of Milford	Town of Milford
Matt Brubaker	Council Member	Pierceton Town Board	Town of Pierceton
John Conley	Fire Chief	Town of Silver Lake	Town of Silver Lake
Larry Martindale	Council Member	Town of Syracuse	Town of Syracuse
Craig Allebach	Town Coordinator	Town of Winona Lake	Town of Winona Lake
James Emans	City Engineer	City of Warsaw	City of Warsaw
Ryan Workman	MS4 Coordinator	City of Warsaw	City of Warsaw
Theresa Sailor	Director	Urban Water Resources	Kosciusko
Nate Bosch	Director	Lilly Center for Lakes and Streams	Grace College
Alex Hall	Assistant Director	Lilly Center for Lakes and Streams	Grace College

The Disaster Mitigation Act (DMA) planning regulations and guidance stress that planning team members must be active participants. The Kosciusko County MHMP committee members were actively involved on the following components:

- Attending the MHMP meetings
- Providing available GIS data and historical hazard information
- Reviewing and providing comments on the draft plans
- Coordinating and participating in the public input process
- Coordinating the formal adoption of the plan by the county

An MHMP kickoff meeting was held in Warsaw, Indiana on August 23, 2017. Avery explained the rationale behind the MHMP program and answered questions from the participants. Avery also provided an overview of the timeline and the process of the mitigation planning project, and presented Kosciusko County with a Memorandum of Understanding (MOU) for sharing data and information.

The Kosciusko County Multi-Hazard Mitigation Planning Committee met on August 23, 2017, September 27, 2017, November 2, 2017 and December 7 2017. Each meeting was approximately one to two hours in length. The meeting agendas, minutes, and attendance sheets are included in Appendix A. During these meetings, the planning team successfully identified critical facilities, reviewed, updated and approved threat and risk assessments, reviewed hazard data and maps, identified and assessed the effectiveness of existing mitigation measures, established mitigation projects, and assisted with preparation of the public participation information.

## 2.2 Public Involvement in Planning Process

An effort was made to solicit public input during the planning process by providing a survey for the public to provide input. A public meeting was held during the formation of the plan on November 2, 2017 Appendix A contains the agendas and minutes from the public meeting. Appendix B contains articles published by the local newspaper throughout the public input process.

## 2.3 Neighboring Community Involvement

The Kosciusko County planning team invited participation from various representatives of county government, local city and town governments, community groups, local businesses, and universities. The team also invited participation from adjacent counties to obtain their involvement in the planning process. Details of neighboring stakeholders’ involvement are summarized in Table 2-2.

**Table 2-2: Neighboring Community Participation**

Person Participating	Neighboring Jurisdiction	Organization	Participation Description
Clyde Avery	Marshall County	Marshall County EMA	Attended Regional organizational/kick-off meeting
Ed Scott	Whitley County	Whitley County EMA	Attended Regional organizational and planning meeting
Dan Richards	Kosciusko County	County Area Plan Commission	Discussed City, Town and County ordinances
Theresa Sailor	Kosciusko County	Urban Water Resources	Managed public survey and provided input for projects
Marsha McSherry	Kosciusko County	County Administrator	Provided support and input for plan revise
Bill Holder	Kosciusko County	GIS	Provided data and GIS support
Alex Hall Dr. Nate Bosch	Kosciusko County/ Grace College	Lilly Center for Lakes and Streams	provided discussion on hazards and input for projects
Kevin Smith	North Webster	Operator North Webster Dam	Invited
Josh Shepherd	Town of Mentone	Street Superintendent	Invited
	Town of Claypool	Council Member	Invited
	Town of Sidney	Council Member	Invited
Keith Walters	Wabash County	Wabash County EMA	Invited
Jennifer Tobey	Elkhart County	Elkhart County EMA	Invited
Larry Hoover	Fulton County	Fulton County EMA	Invited
Michael Newton	Noble County	Noble County EMA	Invited

## 2.4 Review of Technical and Fiscal Resources

The MHMP planning team has identified representatives from key agencies to assist in the planning process. Technical data, reports, and studies were obtained from these agencies. The organizations and their contributions are summarized in Table 2-3.

**Table 2-3: Key Agency Resources Provided**

Agency Name	Resources Provided
Indiana Department of Homeland Security	Provided repetitive loss information
Indiana Department of Natural Resources, Division of Water	Digital Flood maps and levee information
Indiana Geological Survey	GIS data, digital elevation models
National Climatic Data Center	Past weather events

## 2.5 Review of Existing Plans

Kosciusko County and its associated local communities utilized a variety of planning documents to direct community development. These documents include land use plans, master plans, emergency response plans, municipal ordinances, and building codes. The MHMP planning process incorporated the existing natural hazard mitigation elements from previous planning efforts. Table 2-4 lists the plans, studies, reports, and ordinances used in the development of the plan.

**Table 2-4: Planning Documents Used for MHMP Planning Process**

Author(s)	Year	Title	Description	Where Used
USDA	2003 – 2007	Comprehensive Economic Development Strategy (CEDS)	Lists economic and community projects for local governments. Includes mitigation to prevent developing in floodplain and building safer structures to withstand a potential earthquake.	Mitigation strategies from this plan were incorporated
Kosciusko County	1996	Comprehensive Plan	Comprehensive plan for land use, transportation, and public facilities.	Sections related to hazards incorporated into MHMP.
Kosciusko County	2015	Flood Insurance Maps	measure for reducing flooding hazard impacts	County wide in unincorporated areas
Kosciusko County	1975 Revised 2016	Zoning Ordinance	identify areas/requirements that could be improved to assist in reducing the potential for hazard	County wide in unincorporated areas
Kosciusko County	1975 Amended 2004	Subdivision Ordinance	Assist in managing development of and regulates the division of privately owned real property into smaller parcels.	County wide in unincorporated areas
Kosciusko County	2000 Amended 2006	Stormwater and Erosion Control Ordinance	diminish threats to public health, safety, and welfare caused by increases in stormwater runoff from new development and redevelopment.	County wide in unincorporated areas
Syracuse Lake Control Structure	2009	Engineering Report	Assess existing conditions	Current and future repairs

The jurisdictions included in this multi-jurisdictional plan are listed in Table 3-1.

**Table 3-1: Participating Jurisdictions**

Jurisdiction Name
Kosciusko County
Town of Burket
Town of Etna Green
Town of Mentone
Town of Milford
City of Nappanee*
Town of Pierceton
Town of Silver Lake
Town of Syracuse
City of Warsaw
Town of Winona Lake & Grace College

\* The city of Nappanee is shared between Kosciusko and Elkhart counties. Nappanee participated in Elkhart County's MHMP and did not participate in Kosciusko County's.

### 3.1 Adoption by Local Governing Body

The DRAFT Plan was made available on November 2, 2017 to the planning team and the public for review. Comments were then accepted. The Kosciusko County hazard mitigation planning team presented and recommended the plan to the County Commissioners, who adopted it on January 8<sup>th</sup>, 2019. Resolution adoptions are included in Appendix C of this plan.

### 3.2 Jurisdiction Participation

It is required that each jurisdiction participates in the planning process. Table 3-2 lists each jurisdiction and describes its participation in the construction of this plan.

**Table 3-2: Jurisdiction Participation**

Jurisdiction Name	Participating Member	Participation Description
Kosciusko County EMA	Edward Rock	Member, MHMP planning committee
Kosciusko County GIS	Bill Holder	Prepared maps and data
Kosciusko County Area Plan	Matt Sandy	Provided flood and ordinance info
Kosciusko County Surveyor	Jim Moyer	Provided flooding risk and project suggestions
Town of Burket Town Board	Marvin McClone	Member, MHMP planning committee
Town of Etna Green Town Board	Keith Claassen	Member, MHMP planning committee
Town of Leesburg Town Board	Doug Jones	Member, MHMP planning committee
Town of Mentone Fire Department	Edward Rock	Member, MHMP planning committee
Town of Milford Town Marshal	Travis Marsh	Member, MHMP planning committee
Town of Pierceton Fire Department	Matt Brubaker	Member, MHMP planning committee
Town of Silver Lake Fire Department	John Conley	Member, MHMP planning committee
Town of Syracuse Town Board	Larry Martindale	Member, MHMP planning committee
Town of Winona Lake Town Board	Craig Allebach	Member, MHMP planning committee

Jurisdiction Name	Participating Member	Participation Description
City of Warsaw City Engineer	James Emans	Member, MHMP planning committee
City of Warsaw City Planner	Ryan Workman	Member, MHMP planning committee
Urban Water Resources NGO	Theresa Sailor	Member, MHMP planning committee
Grace College, & Lilly Center for Lakes and Streams	Nate Bosch	Member, MHMP planning committee
Grace College, & Lilly Center for Lakes and Streams	Alex Hall	Member, MHMP planning committee

All members were actively involved in the development of the plan by attending the MHMP meetings, providing available GIS data and historical hazard information, reviewing and providing comments on the draft plans, coordinating and participating in the public input process, and coordinating the formal adoption of the plan by the county. The Lilly Center for Lakes and Streams is a part of Grace College (private) and was a part of the Planning Team as Consultants based on their knowledge of the waterways of Kosciusko County.

<b>4</b>	<b>Section 4 - Jurisdiction Information</b>
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#### 4.1 General County Description

Organized in 1837, Kosciusko County was named for Revolutionary War hero, General Thaddeus Kosciuszko. General Kosciuszko was born in Warsaw, Poland, which is why Warsaw was suggested as the name for the Kosciusko county seat.

The county consists of 17 townships: Clay, Etna, Franklin, Harrison, Jackson, Jefferson, Lake, Monroe, Plain, Prairie, Scott, Seward, Tippecanoe, Turkey Creek, Van Buren, Washington, and Wayne. In addition to having a host of natural resources, the city of Warsaw is considered the “Orthopedic Manufacturing Capital of the World.”

Sources: <http://www.kcgov.com/>

#### 4.2 Topography

Kosciusko County is located in the north central part of the state of Indiana. The landscape of the county is mostly level and dotted with many lakes, most of them located in the north-western part of the county. Kosciusko County is primarily agricultural and has excellent soil, especially in the northern part of the state. Some portions of land are underlain with large deposits of marl, a calcium carbonate limestone that occurs as a loose sediment compound of carbonate and clay. Kosciusko is bounded by Elkhart County to the north, Fulton County to the southwest, Marshall County to the west, Noble County to the northeast, Wabash County to the south, and Whitley County to the southeast. With a total land area of over 538 square miles, Kosciusko is the fourth largest county in the state.

Sources: [http://www.city-data.com/county/Kosciusko\\_County-IN.html](http://www.city-data.com/county/Kosciusko_County-IN.html); <http://www.kcgov.com/>

### 4.3 Climate

In Kosciusko County, mid-summer temperatures can be excessively hot and the winter snowfall can vary greatly from one year to the next. Humidity averages 60% for the mid-afternoon and rises during the evening with dawn humidity around 80%. The possibility for sunshine is 75% during the summer and 45% during the winter. Rainfall is moderately heavy and averages 35 inches annually, falling mostly during the spring and summer months. The average seasonal snowfall is 45 inches. The prevailing wind is from the south-southwest at an average speed of 10 miles per hour.

Sources: <http://www.city-data.com/city/Warsaw-Indiana.html>

### 4.4 Demographics

Kosciusko County has a population of 79,092. According to STATS Indiana, from 2000-2016, Kosciusko County experienced a population increase of 6.5%. The population is spread through 17 townships including Clay, Etna, Franklin, Harrison, Jackson, Jefferson, Lake, Monroe, Plain, Prairie, Scott, Seward, Tippecanoe, Turkey Creek, Van Buren, Washington, and Wayne. The largest town in Kosciusko County is Warsaw, which has a population of approximately 14,472. The breakdown of population by incorporated areas is included in Table 4-1.

**Table 4-1: Population by Community**

Community	2015 Population	% of County
Burket	148	0.2%
Claypool	361	0.5%
Etna Green	751	0.9%
Leesburg	589	0.7%
Mentone	937	1.2%
Milford	1,683	2.1%
North Webster	1,196	1.5%
Pierceton	1,074	1.4%
Sidney	81	0.1%
Silver Lake	1002	1.3%
Syracuse	2,864	3.6%
Warsaw	14,385	18.2%
Winona Lake	4,935	6.2%
Winona Lake	4,935	6.2%

Source: STATS Indiana, 2015

### 4.5 Economy

STATS Indiana reported for 2015 that 89.2% of the workforce in Kosciusko County was employed in the private sector. The breakdown is included in Table 4-2. Manufacturing represents the largest sector, employing approximately 33.1% of the workforce and generating approximately 55.0% of the earnings. The 2015 annual per capita income in Kosciusko County is \$44,864 compared to an Indiana average of \$43,097.

**Table 4-2: Industrial Employment by Sector**

Industrial Sector	% of County Workforce (2015)
Agriculture, forestry, fishing, hunting, and mining	7.4%
Construction	2.8%
Manufacturing	38.5%
Wholesale trade	4.1%
Retail trade	10.2%
Transportation, warehousing and utilities	1.6%
Information	1.0%
Professional and technical services	1.4%
Educational, health, and social services,	11.0%
Arts, entertainment, recreation,	0.8%
Accommodation and Food Services	7.4%
Other services(except public administration)	3.2%
Public administration	2.3%

Source: STATS Indiana, 2015

#### 4.6 Industry

Kosciusko County's major employers and number of employees are listed in Table 4 -3. The largest employer is Zimmer Biomet, which has nearly 4,000 employees. Warsaw Community School is the second largest, with 1,311 full-time employees. DePuy, Inc (Johnson & Johnson) is the third largest, with 1,100 full-time employees.

**Table 4-3: Major Employers**

Company Name	City/Town	# of Employees	Type of Business
Zimmer Biomet	Warsaw, IN	4000	Orthopedic Goods
Warsaw Community Schools	Warsaw, IN	1311	Education
DePuy, Inc. (Johnson & Johnson)	Warsaw, IN	1100	Orthopedic Goods
LSC Communications	Warsaw, IN	950	Printed Material
Kosciusko Community Hospital	Warsaw, IN	822	Hospital
Nautic Global Group	Syracuse, IN	805	Boats
Maple Leaf Farms	Milford, IN	750	Chicken/Ducks Products
Cardinal Center	Warsaw, IN	415	Sheltered Workshop
CTB, Inc.	Milford, IN	385	Farm Feeding Equipment
Wawasee Community School Corp.	Syracuse, IN	381	Education
Walmart	Warsaw, IN	346	Department Store
Kosciusko County Government	Warsaw, IN	340	Government

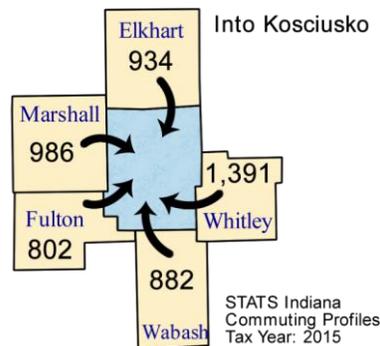
Source: Kosciusko Economic Development Corp, 2017

## 4.7 Commuter Patterns

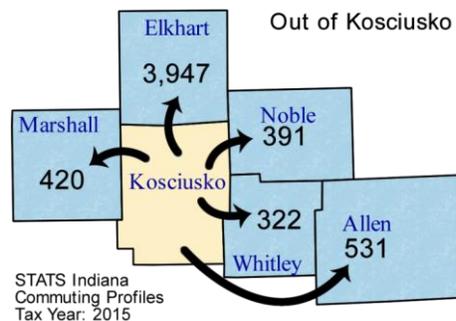
According to STATS Indiana information from 2015, Kosciusko County has approximately 54,646 residents who are in the work force. Of these, approximately 47,589 work in the county. Roughly 7,059 residents commute outside the county for work and 7,799 non-residents commute into the county to work. Figure 4-1 depicts the commuting patterns into and out of the top five surrounding jurisdictions.

**Figure 4-1: Commuter Patterns into and out of Kosciusko County**

County Sending Workers	Workers
Whitley County	1,391
Marshall County	986
Elkhart County	934
Wabash County	882
Fulton County	802
<b>Total of above</b>	<b>4,995</b>



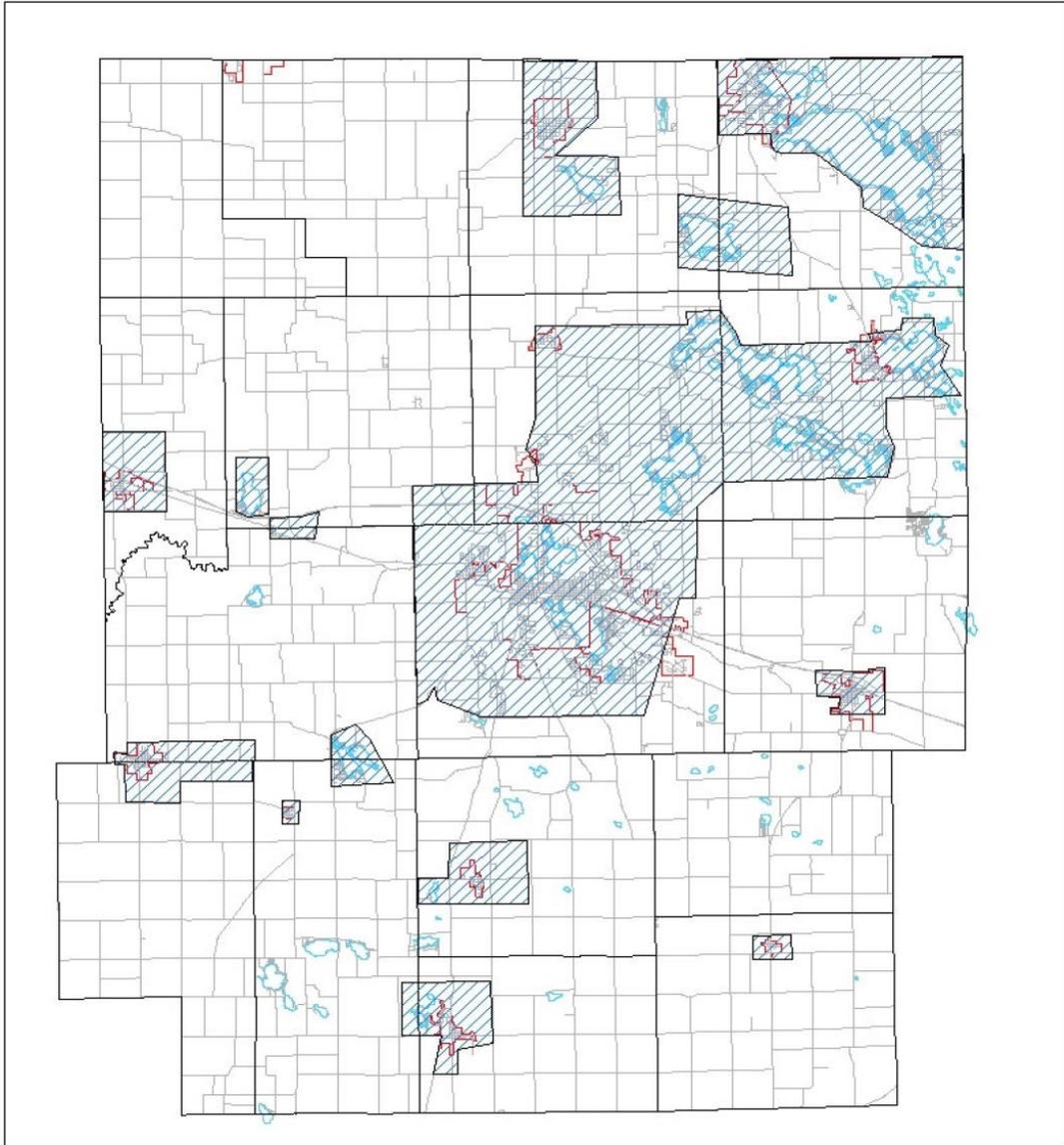
County Receiving Workers	Workers
Elkhart County	3,947
Allen County	531
Marshall County	420
Noble County	391
Whitley County	322
<b>Total of above</b>	<b>5,611</b>



## 4.8 Land Use and Development Trends

Previous land use patterns indicate that developers have gradually been converting agricultural land to other uses. From 1980 to 1987, the county re-zoned more than 3,000 acres from agricultural to other districts, mostly industrial with residential close behind. Residential uses have clustered around urban areas and lakes, allowing the county to provide services to these areas more effectively. In the future, most commercial, industrial, and residential development will be required to occur near existing urban areas to alleviate the problems of encroaching on agricultural areas. Figure 4-2 depicts the urban service areas in the county.

**Figure 4-2: Kosciusko County urban Service Areas**



This map is a close reproduction of a map produced by CEA for the Kosciusko County Transportation Plan.



## 4.9 Agriculture

The 2012 U.S. Census of Agriculture reports that there are 1,247 farms in the county, covering 254,847 acres. Of this farming land, 219,587 (86.2%) acres is cropland, 7% is woodland, and 6.9% is classified as “other uses”. In contrast, 71.5% of Indiana is harvested cropland and 45.3% of the state is woodland, but of the land on farms, 85.5% is cropland and 7.1% is woodland, meaning Kosciusko County has a higher percentage of harvested cropland on farms than the state as a whole. Kosciusko County ranked 4<sup>th</sup> in the state for the total value of agricultural products sold.

Source: U.S. Department of Agriculture:

[https://www.agcensus.usda.gov/Publications/2012/Online\\_Resources/County\\_Profiles/Indiana/cp18085.pdf](https://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Indiana/cp18085.pdf)

## 4.10 Managed Lands

The Department of Natural Resources maintains an inventory of managed properties. These natural and recreation areas are managed by either the, DNR Fish and Wildlife, DNR Nature Preserves, federal, local and non-profits and is maintained by the Indiana Natural Heritage Database. Kosciusko County has two managed properties.

Kosciusko County is home to several parks and wetland conservation areas. Tri-County Fish and Wildlife area is made up of approximately 3,456 acres of land and 650 acres of lake. The property is managed by the Indiana Department of Natural Resources. Center Lake Wetland Conservation Area is approximately 25 acres in size. By establishing conservation areas and parkland, the county is able to preserve plant and animal species and combat air, land pollution and water quality issues.

For more information visit:

<http://www.in.gov/idem/permits/water/wastewater/wetwthr/storm/rule5.html>

## 4.11 Endangered and Threatened Species

The Federal Endangered Species Act of 1973 describes two categories of declining species of plants and animals that need the Act’s protections-namely endangered species and threatened species- and provides these definitions, “Endangered species are those species that are in danger of extinction throughout all or a significant portion of its range. Threatened species are those species that are likely to become endangered species within the near future throughout all or a significant portion of it’s range”.

The following species are identified as either endangered or threatened within Kosciusko County:

- Indiana Bat (*Myotis sodalists*) – Listed as Endangered
- Northern Long-eared bat (*Myotis septentrionalis*) – Listed as Threatened
- Running buffalo clover (*Trifolium stoloniferum*) – Listed as Endangered

The U.S. Fish and Wildlife service has more information on specific species fact sheets, brochure, and pamphlets which can be found at:

Source: <https://www/fws.gov/midwest/endangered/saving/outreach.html>

## 4.12 Major Lakes, River, Watersheds and Aquifers

There are a number of natural lakes in Kosciusko County including Lake Wawasee, the largest natural lake, and Lake Tippecanoe, the deepest lake. Other lakes in the county include, but are not limited to, Dewart Lake, Chapman Lake, Webster Lake, Barbee Lake, Ridinger Lake, and Hoffman Lake. Tippecanoe River also runs through Kosciusko County.

A list of 14-digit Hydrologic Unit Code (HUC) watersheds is included in Table 4-4.

**Table 4-4: Watersheds**

<b>Watershed Name</b>	<b>HUC Code</b>
Solomon Creek-Headwaters	04050001190050
Solomon Creek-Meyer/Hire Ditches	04050001190060
Turkey Creek-Headwaters (Noble)	04050001200010
Turkey Creek-Lake Wawasee	04050001200020
Turkey Creek-Skinner/Hoopengartner Ditches	04050001200030
Wabee Lake-Dewart Lake Outlet	04050001200040
Turkey Creek-Coppes Ditch	04050001200050
Turkey Creek-Omar Neff Ditch	04050001200060
Berlin Court Ditch	04050001200070
Turkey Creek-Kieffler Ditch	04050001200080
Spring Creek-Clear Creek	05120104030050
Eel River-Mishler Ditch	05120104040010
Eel River-Hurricane Creek	05120104040020
Eel River-Plunge/Wheeler Creeks	05120104040030
Eel River-Simonton Creek	05120104040040
Eel River-Swank Creek	05120104040050
Eel River-Clear Creek-Nelson Creek	05120104040080
Eel River-Otter Creek/Long Lake	05120104050010
Silver Creek-Silver Lake/Morrett Ditch	05120104050020
Eel River-Silver Creek (lower)	05120104050030
Tippecanoe River-Webster Lake	05120106010040
Elder Ditch-Cedar Lake Branch	05120106010050
Grassy Creek-Robinson Lake/Ridinger Lake	05120106010060
Grassy Creek-Big Barbee/Sechrist Lakes	05120106010070
Tippecanoe River-James/Tippecanoe Lakes	05120106010080
Tippecanoe River-Ruple Ditch	05120106020010
Deeds Creek-McCarter Ditch	05120106020020
Deeds Creek-Heeter Dt-Chapman Lakes	05120106020030
Tippecanoe River-Deeds Creek-Pike Lake	05120106020040
Wyland Ditch-Sellers/Sherburn Lakes	05120106020050
Winona Lake-Peterson/Keefer Evans Ditches	05120106020060
Walnut Creek-Carr/Fish/Muskelonge Lakes	05120106020070
Walnut Creek-Eagle Creek/Center Lake	05120106020080
Tippecanoe River-Huffer Ditch	05120106030010
Tippecanoe River-Pyle/Pole Run Ditches	05120106030020
Ring Ditch/Adams Ditch	05120106030030
Palestine Lake-Williams Ditch/Robbins Ditch	05120106030040
Tippecanoe River-Trimble Creek/Dorsey Ditch	05120106030050
Robinson Ditch-Hoffman Lake	05120106030060

Watershed Name	HUC Code
Danner Ditch-Ridenour Ditch	05120106030070
Tippecanoe River-Danner Ditch(lower)-Arm #2	05120106030080
Tippecanoe River-Shatto Ditch	05120106040010
Yellow Creek-Yellow Creek Lake	05120106040050
Yellow Creek-Rickle Ditch	05120106040060
Yellow Creek-Little Yellow Creek	05120106040070
Tippecanoe River-Redinger Ditch	05120106040080
Chippewanuck Creek-Lake 16 Outlet	05120106040100
Chippewanuck Creek-Gast Ditch	05120106040110
Chippewanuck Creek-Byrant Leininger Ditch	05120106040120
Arney Ditch-Headwaters	07120001050040
Dausman Ditch-Fleugel Ditch	07120001050100
Dausman Ditch-Lemler Ditch	07120001050110
Dausman Ditch-Whishler Ditch	07120001050120

Source: U.S. Geological Survey HUC14 Watersheds, 2006 - Confirmed by Kosciusko County Surveyor 2017

#### 4.12.1 Unconsolidated Aquifer Systems of Kosciusko County, Indiana

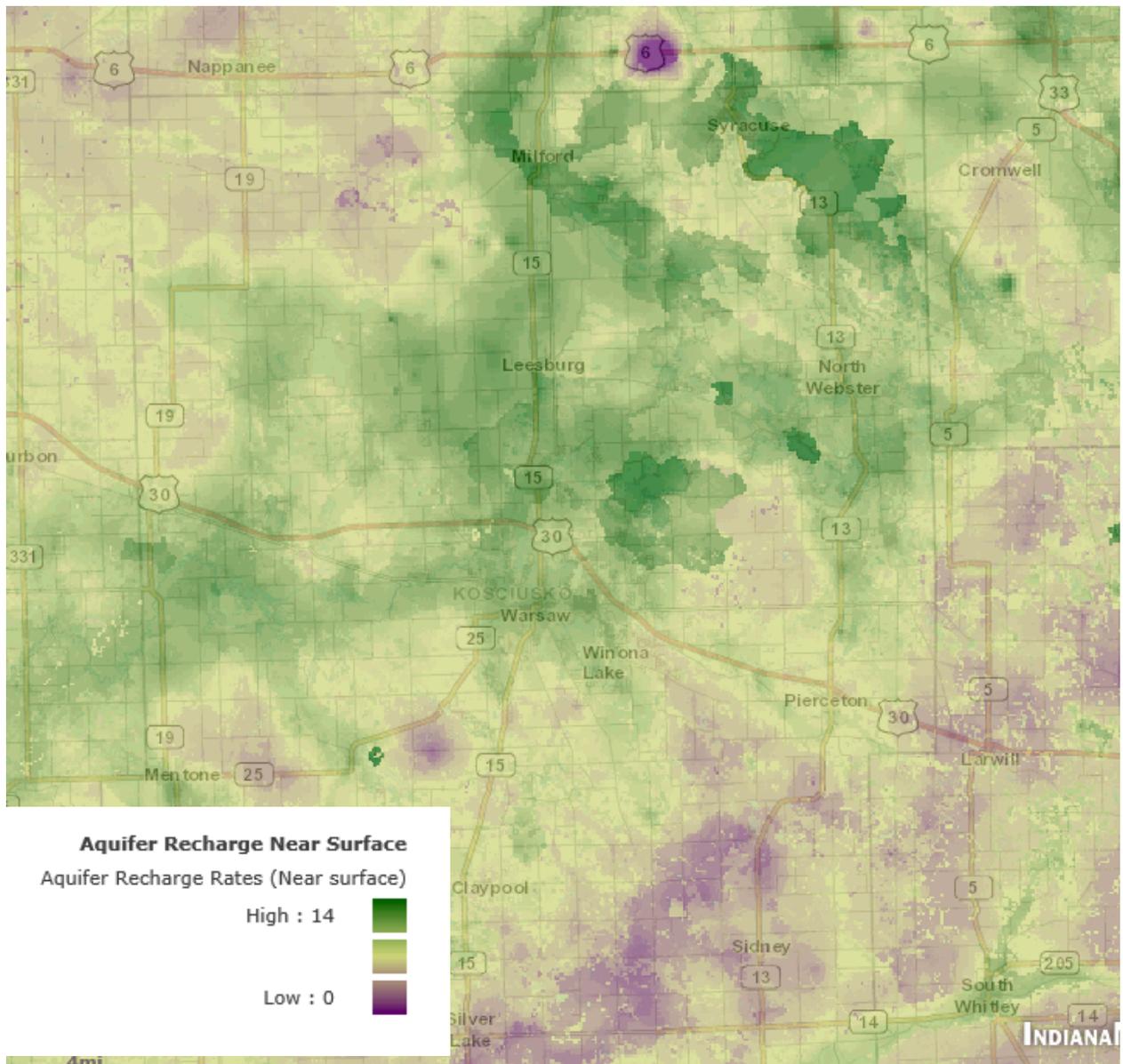
Six unconsolidated aquifer systems have been mapped in Kosciusko County: the Auburn/Bluffton/Warsaw Till; the Nappanee; the Auburn/Bluffton/Warsaw Complex; the Natural Lakes and Moraines; the Natural Lakes and Moraines Subsystem; and the St. Joseph and Tributary Valleys/Wabash River and Tributaries Outwash. The northern portion of the county has been described and mapped in two previously published regional basin study reports (Water Resource Availability in the St. Joseph River Basin, Indiana, 1987 and Water Resource Availability in the Kankakee River Basin, Indiana, 1990).

Kosciusko County has a very complex glacial history as it was subjected to multiple glacial advances from the north, northeast and east. The county lies in an interlobate area that was affected by the Saginaw lobe and Huron-Erie lobes. The dynamic interaction of the lobes resulted in a complex overlap and cross-cutting of glacial terrains. The resulting glacial landscape includes moraines, ground moraines, outwash channels, tunnel valleys (subglacial drainage channels) and outwash plains. In southeastern Kosciusko County a well developed moraine exists around the town of Packerton. The Packerton Moraine reaches an elevation of over 960 feet mean sea level (msl) and rises over 175 feet above adjacent valleys of the Tippecanoe River and the Eel River. Outwash channels and/or tunnel valleys trend to the northwest off the flank of the Packerton Moraine where they intersect a broad outwash plain.

This broad valley is currently occupied by the Tippecanoe River which trends west to southwest across the center of Kosciusko County. This outwash plain broadens to more than five miles wide, where it is intersected by a north-south trending outwash plain in the north-central part of the county (around Leesburg). Due to the area's complex glacial history, the boundaries between the systems are gradational and individual aquifers may extend across aquifer system boundaries. The thickness of unconsolidated sediments in Kosciusko County is quite variable, ranging from around 150 feet in small areas along the north-central border, western border and southeastern border of the county, to in excess of 350 feet in the central part of the county. Elsewhere in Kosciusko County, unconsolidated deposits are commonly 200 to 300 feet thick. Almost all the domestic wells are completed in unconsolidated deposits in the county.

Source: [http://www.in.gov/dnr/water/files/46\\_Kosciusko\\_County\\_UNC\\_AQSYS\\_text.pdf](http://www.in.gov/dnr/water/files/46_Kosciusko_County_UNC_AQSYS_text.pdf)  
Division of Water, Resource Assessment Section

**Figure 4-3: Kosciusko County Aquifer Recharge Rate**



[http://maps.indiana.edu/previewMaps/Hydrology/Aquifer\\_Recharge\\_Near\\_Surface.html](http://maps.indiana.edu/previewMaps/Hydrology/Aquifer_Recharge_Near_Surface.html)

### **4.13 Water Pollution**

Water pollution contaminates lakes, rivers wetlands, aquifers, and groundwater, and leaches into the surrounding soil. Consisting of any contamination of water with chemicals or other foreign substances that are detrimental to human, plant, or animal health, water pollution places risks on downstream water quality and water supply. Impaired waters containing pollutants can create a hazard affecting wildlife and plant species and can potentially poison underground streams and the wells of people living in the surrounding area, depriving communities of a reliable source of life giving water and injuring opportunities for economic development and recreation.

Sewage, wastewater, marine dumping, industrial waste, radioactive waste, oil pollution and underground storage leaks are some of the most common forms of water pollution. Inadequately engineered hillside construction can endanger downslope development, and erosive soils have been known to generate stream siltation and compromise water quality.

The Federal Clean Water Act encourages communities to reduce discharges of storm water pollutants and ensure that waters are safe for fishing, swimming, and drinking. Agricultural runoff is estimated to have resulted in the erosion of 2.25 billion tons of soil and the deposit of large amounts of phosphorus and nitrogen into many waters.

*(Source: National Aeronautics and Space Administration's abstract on the Clean Water Act).*

The Federal Clean Water Act provides funding to states and local communities to assist them with meeting their clean water infrastructure needs and protects valuable wetlands and other aquatic habitats through a permitting process that ensures development and other activities are conducted in an environmentally sound manner.

The Indiana Department of Environmental Management (IDEM) is required to assess the quality of the waters in the state of Indiana.

<b>5</b>	<b>Section 5 - Hazard Identification and Risk Assessment</b>
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The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation must be based on sound risk assessment. A risk assessment involves quantifying the potential loss resulting from a disaster by assessing the vulnerability of buildings, infrastructure, and people. This assessment identifies the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of three components—hazard identification, vulnerability analysis, and risk analysis.

## **5.1 Hazard Identification/Profile**

### **5.1.1 Existing Plans**

To facilitate the planning process, pre-existing plans were used for this risk assessment section. These existing plans included Kosciusko County Comprehensive Emergency Management Plan October 2015 (CEMP) and Indiana digital flood maps.

Previous planning efforts associated with the development of the 2009 Kosciusko County Hazard Analysis identified the principal natural hazards to Kosciusko County (in order of likelihood): (1) tornadoes, which have touched down in the county as recently as 2017; (2) urban flooding, which has affected residents most recently in 2015; (3) earthquake; (4) thunderstorm hazards, which included hail, lightning and severe winds and occur annually; (5) winter weather hazards; (6) drought/extreme heat;

Kosciusko County's principal technological hazards (in order of likelihood) include (1) hazardous materials events (fixed-sites and transportation-related); (2) levee failure (3) dam failure; (4) structural failures; and (5) fires.

## 5.2 National Hazard Records

### 5.2.1 National Climatic Data Center (NCDC) Records

To assist the planning team, historical storm event data was compiled from the National Climatic Data Center (NCDC). NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather events.

The NCDC data included 425 reported events in Kosciusko County between January 1, 1965 and August 31, 2017. A summary table of events related to each hazard type is included in the hazard profile sections that follow. A full table listing all events, including additional details, is included as Appendix D. In addition to NCDC data, Storm Prediction Center (SPC) data associated with tornadoes, strong winds, and hail were plotted using SPC recorded latitude and longitude. These events are plotted and included as Appendix E. The list of NCDC hazards is included in Table 5-1.

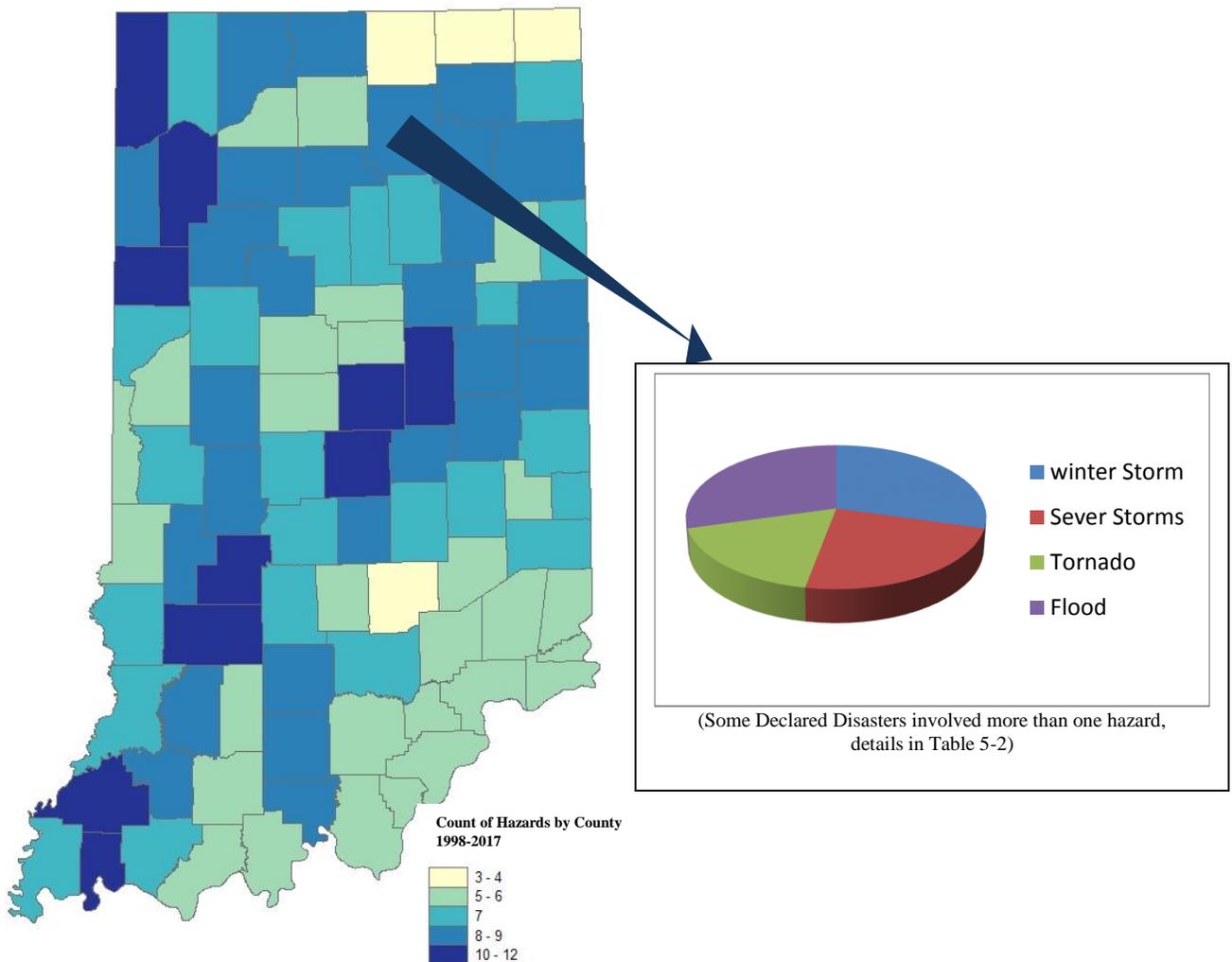
**Table 5-1: Climatic Data Center Historical Hazards**

Hazard
Tornadoes
Severe Thunderstorms
Drought/Extreme Heat
Winter Storms
Flood/Flash flood

## 5.2.2 FEMA Disaster Information

In the past decade, FEMA has declared a number of emergencies and disasters for the state of Indiana. Emergency declarations allow states access to FEMA funds for Public Assistance (PA); disaster declarations allow for even more PA funding including Individual Assistance (IA) and the Hazard Mitigation Grant Program (HMGP). Kosciusko County has received federal aid for both PA and IA funding for nine declared disasters since 1998. Figure 5-1 depicts the disasters and emergencies that have been declared for Kosciusko County within the past decade. Table 5-2 lists more specific information for each declaration.

**Figure 5-1: FEMA-Declared Emergencies and Disasters in Kosciusko County (1998-2017)**



**Table 5-2: FEMA-Declared Emergencies in Kosciusko County (1998-2017)**

Date of Incident	Date of Declaration	Disaster Description	Type of Assistance
1/01/99 – 1/31/99	1/15/99	Severe Winter Storms	Public
12/11/00 – 12/31/00	1/24/01	Severe Winter Storms	Public
7/04/03 – 8/06/03	7/11/03	Severe Storms, Tornadoes, and Flooding	Individual and Public
5/25/04 – 6/25/04	6/3/04	Severe Storms, Tornadoes, and Flooding	Individual
1/01/05 – 2/11/05	1/21/05	Severe Winter Storms and Flooding	Individual
2/12/07 – 2/14/07	3/12/07	Severe Winter Storms	Public
1/7/08 – 1/31/08	1/30/08	Severe Storms and Flooding	Individual and Public
3/08/09 – 03/14/09	4/22/09	Severe Storms, Tornadoes, and Flooding	Individual
1/5/14 – 1/9/14	4/22/14	Winter Storm and Snowstorm	Public

### 5.3 Hazard Ranking Methodology

During Meeting #2, held on September 27, 2017, the planning team reviewed historical hazards information and participated in a risk analysis using a projector and spreadsheet. The spreadsheet listed the compiled NCDC data for each community.

The spreadsheet calculated the probability rating (Low, Medium, High) of each hazard based on the number of events that have occurred in the county within the past 50 years. Throughout the planning process, the MHMP team had the opportunity to update the NCDC data with more accurate local information. For example, the NCDC records often list the locations of hazards such as floods under the county, not accounting for how the individual communities were affected. In such situations, the probability rating assigned to the county was applied to all jurisdictions within the county.

Team consensus was also important in determining the probability of hazards not recorded by NCDC, e.g. dam and levee failure and hazardous materials spills. The probabilities for these hazardous events were determined by the planning team’s estimation, derived from local experience and records, of the number of historical events that have occurred within the past 50 years. The probability ratings are based on the following guidelines:

- Low = 0-5 events
- Medium = 6-15 events
- High = 16+ events

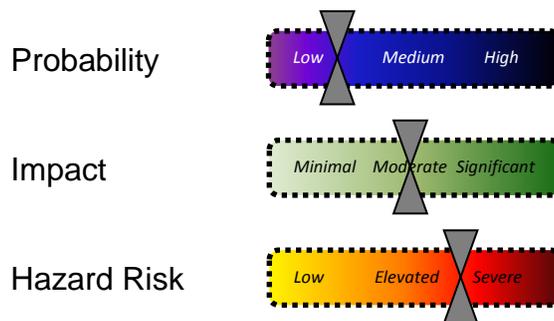
After improving the NCDC data with additional local data, the team determined each hazard’s potential impact on the communities. The impact rating (Minimal, Moderate, Significant) was based on the following guidelines.

- Minimal =
  - Few injuries
  - Critical facilities shut down for 24 hours
  - Less than 15% of property damage
- Moderate =
  - Multiple injuries
  - Critical facilities shut down for 1-2 weeks
  - At least 30% of property damaged

- Significant = Multiple deaths  
Critical facilities shut down for more than 1 month  
More than 50% of property damaged

Finally, the overall hazard risk was determined by multiplying probability and impact. It is important to consider both probability and impact when determining risk. For example, if an asteroid were to collide with Earth, the impact would be extreme; but the probability of an asteroid strike (has not happened in billions of years) is so negligibly small that the overall risk is extremely low. There has never been a situation in human history in which a person was killed by a meteor. In contrast, other potentially damaging events like thunderstorms and floods are relatively less severe, but have occurred regularly in many places.

Each hazard addressed within the plan will use sliding scales to represent the probability, impact, and overall risk ratings. The scales will be depicted as follows:



The planning team identified tornadoes, thunderstorms, and winter storms as the three most significant hazards affecting Kosciusko County. The hazard rankings are listed in Table 5-3.

**Table 5-3: Updated Kosciusko County Hazards 2017**

HAZARD CATEGORIES	HAZARD PROBABILITY	HAZARD IMPACT	HAZARD RISK
	<i>(Low, Medium, High)</i>	<i>(Minimal, Moderate, Significant)</i>	<i>(Low, Elevated, Severe)</i>
<b>KOSCIUSKO COUNTY (ALL)</b>			
Hazardous Materials Release	High	Significant	Severe
Dam Failure	High	Significant	Severe
Levee Failure	High	Significant	Severe
Winter Storms	High	Significant	Severe
Tornadoes	High	Significant	Severe
Flood	High	Significant	Severe
Flash Flood	Medium	Moderate	Severe
Thunderstorms	High	Minimal	Severe
Infectious Disease	Medium	Moderate	Low
Drought	Medium	Moderate	Low

<b>Earthquake</b>	<b>Medium</b>	<b>Moderate</b>	<b>Low</b>
<b>Ground Failure</b>	<b>Medium</b>	<b>Minimal</b>	<b>Low</b>
<b>BURKET</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>CLAYPOOL</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>ETNA GREEN</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>LEESBURG</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low

<b>MENTONE</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>MILFORD</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>NORTH WEBSTER</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>PIERCETON</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Medium	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>SIDNEY</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe

Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Medium	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>SILVER LAKE</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>SYRACUSE</b>			
Tornado	High	Moderate	Severe
Flood	Low	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>WARSAW</b>			
Tornado	High	Moderate	Severe
Flood	Medium	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low
<b>WINONA LAKE</b>			
Tornado	High	Moderate	Severe
Flood	Medium	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Low	Moderate	Low
Severe Thunderstorm/Hail/ Lightning/High Wind	High	Moderate	Severe
Winter Weather (snow & ice)	High	Moderate	Severe
Drought/Extreme Heat	Low	Minimal	Low
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Low	Minimal	Low

## 5.4 GIS and HAZUS-MH

The third step in this assessment is the risk analysis which quantifies the risk to the population, infrastructure, and economy of the community. Where possible, the hazards were quantified using GIS analyses and HAZUS-MH. This process reflects a level two approach to analyzing hazards as defined for HAZUS-MH. The approach includes substitution of selected default data with local data. This process improved the accuracy of the model predictions.

HAZUS-MH generates a combination of site-specific and aggregated loss estimates depending upon the analysis options that are selected and upon the input that is provided by the user. Aggregate inventory loss estimates, which include building stock analysis, are based upon the assumption that building stock is evenly distributed across census blocks/tracts. Therefore, it is possible that overestimates of damage will occur in some areas while underestimates will occur in other areas. With this in mind, total losses tend to be more reliable over larger geographic areas than for individual census blocks/tracts. It is important to note that HAZUS-MH is not intended to be a substitute for detailed engineering studies. Rather, it is intended to serve as a planning aid for communities interested in assessing their risk to flood-, earthquake-, and hurricane-related hazards. This documentation does not provide full details on the processes and procedures completed in the development of this project. It is only intended to highlight the major steps that were followed during the project.

Site-specific analysis is based upon loss estimations for individual structures. For flooding, analysis of site-specific structures takes into account the depth of water in relation to the structure. HAZUS-MH also takes into account the actual dollar exposure to the structure for the costs of building reconstruction, content, and inventory. However, damages are based upon the assumption that each structure will fall into a structural class, and structures in each class will respond in a similar fashion to a specific depth of flooding or ground shaking. Site-specific analysis is also based upon a point location rather than a polygon, therefore the model does not account for the percentage of a building that is inundated. These assumptions suggest that the loss estimates for site-specific structures as well as for aggregate structural losses need to be viewed as approximations of losses that are subject to considerable variability rather than as exact engineering estimates of losses to individual structures. For the purpose of the 2017 revise of the plan values of damaged or destroyed properties were increased based on 2016 Assessed Value per the Indiana Department of Local Government Finance reports

The following events were analyzed. The parameters for these scenarios were created though GIS, HAZUS-MH, and historical information to predict which communities would be at risk.

### Using HAZUS-MH

1. 100-year overbank flooding
2. Earthquake scenarios

### Using GIS

1. Tornado
2. Hazardous material release

## 5.5 Vulnerability Assessment

### 5.5.1 Asset Inventory

#### 5.5.1.1 Processes and Sources for Identifying Assets

The HAZUS-MH data is based on best available national data sources. The initial step involved updating the default HAZUS-MH data using State of Indiana data sources.

The default HAZUS-MH data has been updated as follows:

- The HAZUS-MH defaults, critical facilities, and essential facilities have been updated based on the most recent available data sources. Critical and essential point facilities have been reviewed, revised, and approved by local subject matter experts at each county.
- The essential facility updates (schools, medical care facilities, fire stations, police stations, and EOCs) have been applied to the HAZUS-MH model data. HAZUS-MH reports of essential facility losses reflect updated data.

The default aggregate building inventory tables have been replaced with the most recent Assessor records. Each remaining Assessor record was geocoded to an address point location based upon a matching street address. The generated building inventory points represent the approximate locations (within a parcel) of building exposure. Address-matching results for Kosciusko County are provided in Table 5-4.

**Table 5-4: Address-Matching For Kosciusko County**

<b>Data Source</b>	<b>Count</b>
Total Parcels	51,709
Assessor Records	51,978
County Provided Addresses	45,402
Assessor Records with Improvements	40,035

The following assumptions were made during the analysis:

- The building exposure is determined from the Assessor records. It is assumed that the population and the buildings are located at the centroid of the parcel.
- The algorithm used to match county-provided address and parcel point locations with the Assessor records is not perfect. The results in this analysis reflect matched address records only.
- Population counts are based upon 2.5 persons per household. Only residential occupancy classes are used to determine the impact on the local population. If the event were to occur at night, it would be assumed that people are at home (not school, work, or church).
- The analysis is restricted to the county boundaries. Events that occur near the county boundaries do not contain damage assessments from adjacent counties.

### 5.5.1.2 Essential Facilities List

Table 5-5 identifies the essential facilities that were added or updated for the analysis. Essential facilities are a subset of critical facilities. A complete list of critical facilities is included as Appendix F. A map of all critical facilities is included as Appendix G.

**Table 5-5: Essential Facilities List**

Facility	Number of Facilities
Care Facilities	9
Emergency Operations Centers	1
Fire Stations	16
Police Stations	10
Schools	41

### 5.5.1.3 Facility Replacement Costs

Facility replacement costs and total building exposure are identified in Table 5-6. The replacement costs have been updated by local data. Table 5-6 also includes the estimated number of buildings within each occupancy class.

The Assessor records often do not distinguish parcels by occupancy class when the parcels are not taxable; therefore, the total number of buildings and the building replacement costs for government, religious/non-profit, and education may be underestimated.

**Table 5-6: Building Exposure**

General Occupancy	Estimated Total Buildings	Total Building Exposure (X 1000)
Agricultural	3,194	\$525,557
Commercial	1,935	\$525,064
Education	81	\$51,589
Government	241	\$51,446
Industrial	505	\$831,622
Religious/Non-Profit	417	\$139,212
Residential	31,603	\$3,106,506
<b>Total</b>	<b>37,976</b>	<b>\$5,230,998</b>

### 5.5.1.4 Future Development

As the county’s population continues to grow, the residential and urban areas will extend further into the county, placing more pressure on existing transportation and utility infrastructure while increasing the rate of farmland conversion; Kosciusko County will address specific mitigation strategies in Section 6 to alleviate such issues.

Because Kosciusko County is vulnerable to a variety of natural and technological threats, the county government—in partnership with state government—must make a commitment to prepare for the management of these types of events. Kosciusko County is committed to ensuring that county elected and appointed officials become informed leaders regarding community hazards so

that they are better prepared to set and direct policies for emergency management and county response.

## 5.6 Hazard Profiles

### 5.6.1 Tornado Hazard

#### 5.6.1.1 Hazard Definition for Tornado Hazard

Tornadoes pose a great risk to the state of Indiana and its citizens. Tornadoes can occur at any time during the day or night. They can also happen during any month of the year. The unpredictability of tornadoes makes them one of Indiana’s most dangerous hazards. Their extreme winds are violently destructive when they touch down in the region’s developed and populated areas. Current estimates place the maximum velocity at about 300 mph, but higher and lower values can occur. A wind velocity of 200 mph will result in a wind pressure of 102.4 pounds per square foot of surface area—a load that exceeds the tolerance limits of most buildings. Considering these factors, it is easy to understand why tornadoes can be so devastating for the communities they hit.

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 can reach the ground very quickly and become a tornado. If the funnel cloud picks up and blows debris, it has reached the ground and is a tornado.

Tornadoes are classified according to the Fujita tornado intensity scale. The tornado scale ranges from low intensity F0 with effective wind speeds of 40 to 70 mph to F5 tornadoes with effective wind speeds of over 260 mph. The Fujita intensity scale is included in Table 5-7.

**Table 5-7: Fujita Tornado Rating**

Fujita Number	Estimated Wind Speed	Path Width	Path Length	Description of Destruction
<b>0</b> <i>Gale</i>	40-72 mph	6-17 yards	0.3-0.9 miles	Light damage, some damage to chimneys, branches broken, sign boards damaged, shallow-rooted trees blown over.
<b>1</b> <i>Moderate</i>	73-112 mph	18-55 yards	1.0-3.1 miles	Moderate damage, roof surfaces peeled off, mobile homes pushed off foundations, attached garages damaged.
<b>2</b> <i>Significant</i>	113-157 mph	56-175 yards	3.2-9.9 miles	Considerable damage, entire roofs torn from frame houses, mobile homes demolished, boxcars pushed over, large trees snapped or uprooted.
<b>3</b> <i>Severe</i>	158-206 mph	176-566 yards	10-31 miles	Severe damage, walls torn from well-constructed houses, trains overturned, most trees in forests uprooted, heavy cars thrown about.
<b>4</b> <i>Devastating</i>	207-260 mph	0.3-0.9 miles	32-99 miles	Complete damage, well-constructed houses leveled, structures with weak foundations blown off for some distance, large missiles generated.
<b>5</b> <i>Incredible</i>	261-318 mph	1.0-3.1 miles	100-315 miles	Foundations swept clean, automobiles become missiles and thrown for 100 yards or more, steel-reinforced concrete structures badly damaged.

*Source: NOAA Storm Prediction Center*

### 5.6.1.2 Previous Occurrences for Tornado Hazard

There have been several occurrences of tornadoes within Kosciusko County during the past few decades. The NCDC database reported 26 tornadoes/funnel clouds in Kosciusko County since 1965.

One event occurred in October 2007. A tornado traveled from Marshall County northeast into extreme northwestern Kosciusko County. Damage included 116 structures total and was estimated at \$3 million. A combination of strong dynamics, wind shear, and rapid low level moisture return all combined to produce severe weather across much of northern Indiana.

The Kosciusko County NCDC recorded tornadoes are identified in Table 5-8. Additional details for NCDC events are included in Appendix D.

**Table 5-8: Kosciusko County Tornadoes\***

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Kosciusko	6/28/1965	Tornado	F1	0	0	0K	0
Kosciusko	9/14/1965	Tornado	F1	0	0	3K	0
Kosciusko	10/24/1967	Tornado	F2	0	5	250K	0
Kosciusko	8/9/1969	Tornado	F	0	0	0K	0
Kosciusko	4/3/1974	Tornado	F4	1	39	0K	0
Kosciusko	5/29/1977	Tornado	F0	0	0	0K	0
Kosciusko	6/2/1980	Tornado	F1	0	1	25K	0
Kosciusko	6/15/1991	Tornado	F0	0	0	0K	0
Kosciusko	8/3/1992	Tornado	F0	0	0	3K	0
Kosciusko	9/9/1992	Tornado	F0	0	0	0K	0
Milford	4/19/1996	Tornado	F0	0	0	0	0
Etna Green	6/11/1998	Tornado	F1	0	4	800K	0
Sidney	6/14/2000	Tornado	F2	0	0	200K	10K
Mentone	10/24/2001	Tornado	F1	0	14	2.5M	0
Pierceton	5/9/2003	Tornado	F1	0	0	5K	0
Atwood	7/6/2005	Tornado	F0	0	0	0	0
Nappanee	10/18/2007	Tornado	F2	0	0	3.0M	0K
Monoquet	6/23/2010	Tornado	F1	0	0	300K	0
Warsaw	10/26/2010	Tornado	F0	0	0	0	0
Burket	11/17/2013	Tornado	F1	0	0	0	0
Silver Lake	11/17/2013	Tornado	F2	0	0	0	0
Oswego	11/17/2013	Tornado	F1	0	0	0	0
Palestine	7/1/2014	Tornado	F1	0	0	0	0
Gravelton	7/1/2014	Tornado	F0	0	0	0	0
Silver Lake	7/1/2014	Tornado	F0	0	0	0	0
Hastings	8/20/2016	Tornado	F0	0	0	0	0

\* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

### 5.6.1.3 Geographic Location for Tornado Hazard

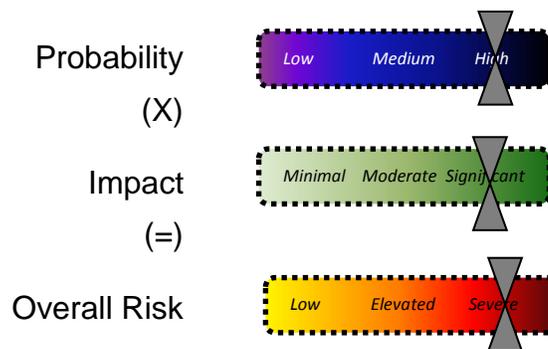
The entire county has the same risk for occurrence of tornadoes. They can occur at any location within the county.

### 5.6.1.4 Hazard Extent for Tornado Hazard

The historical tornadoes generally move from southwest to northeast across the county. The extent of the hazard varies both in terms of the extent of the path and the wind speed.

### 5.6.1.5 Risk Identification for Tornado Hazard

Based on historical information, the probability of a tornado is high. Tornadoes with varying magnitudes are expected to happen. In Meeting #2, the planning team determined that the potential impact of a tornado is significant; therefore, the overall risk of a tornado hazard for Kosciusko County is severe.



### 5.6.1.6 Vulnerability Analysis for Tornado Hazard

Tornadoes can occur within any area in the county; therefore, the entire county population and all buildings are vulnerable to tornadoes. To accommodate this risk, this plan will consider all buildings located within the county as vulnerable. The existing buildings and infrastructure in Kosciusko County are discussed in Table 5-6.

### 5.6.1.7 Critical Facilities

All critical facilities are vulnerable to tornadoes. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary based on the magnitude of the tornado, but can include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). Table 5-5 lists the types and numbers of all of the essential facilities in the area. Critical facility

information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

### 5.6.1.8 Building Inventory

The building exposure in terms of types and numbers of buildings for the entire county is listed in Table 5-6. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, and loss of building function (e.g. damaged home will no longer be habitable causing residents to seek shelter).

### 5.6.1.9 Infrastructure

During a tornado the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county’s entire infrastructure is equally vulnerable, it is important to emphasize that any number of these items could become damaged during a tornado. The impacts to these items include broken, failed, or impassable roadways, broken or failed utility lines (e.g. loss of power or gas to community), and railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

An example scenario is described as follows to gauge the anticipated impacts of tornadoes in the county, in terms of numbers and types of buildings and infrastructure.

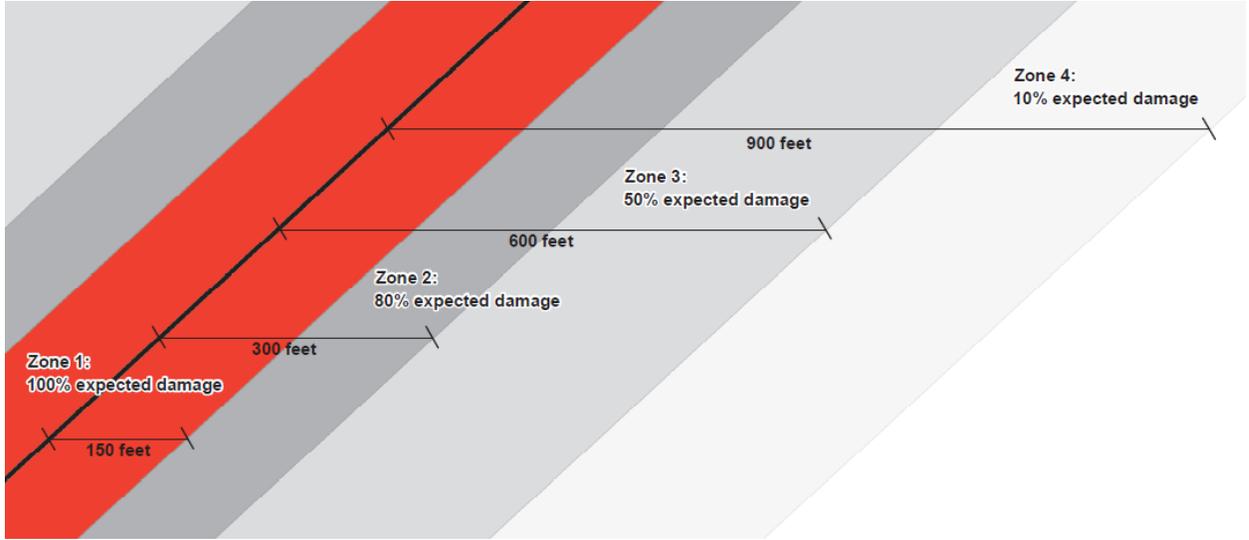
GIS overlay modeling was used to determine the potential impacts of an F4 tornado. The analysis used a hypothetical path, modeling an F4 tornado event running for 24 miles through the communities of Mentone, Warsaw, and North Webster. The selected widths were modeled after a recreation of the Fujita-Scale guidelines based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these six categories. Table 5-9 depicts tornado damage curves as well as path widths.

**Table 5-9: Tornado Path Widths and Damage Curves**

Fujita Scale	Path Width (feet)	Maximum Expected Damage
5	2,400	100%
4	1,800	100%
3	1,200	80%
2	600	50%
1	300	10%
0	150	0%

Within any given tornado path there are degrees of damage. The most intense damage occurs within the center of the damage path with decreasing amounts of damage away from the center. After the hypothetical path is digitized on a map the process is modeled in GIS by adding buffers (damage zones) around the tornado path. Figure 5-2 and Table 5-10 describe the zone analysis. The selected hypothetical tornado path is depicted in Figure 5-3, and the damage curve buffers are shown in Figure 5-4.

**Figure 5-2: Tornado Analysis Using GIS Buffers**



An F4 tornado has four damage zones, depicted in Table 5-10. Total devastation is estimated within 150 feet of the tornado path. The outer buffer is 900 feet from the tornado path, within which buildings will experience 10% damage.

**Table 5-10: F4 Tornado Zones and Damage Curves**

Zone	Buffer (feet)	Damage Curve
1	0-150	100%
2	150-300	80%
3	300-600	50%
4	600-900	10%

Figure 5-3: Hypothetical F4 Tornado Path in Kosciusko County

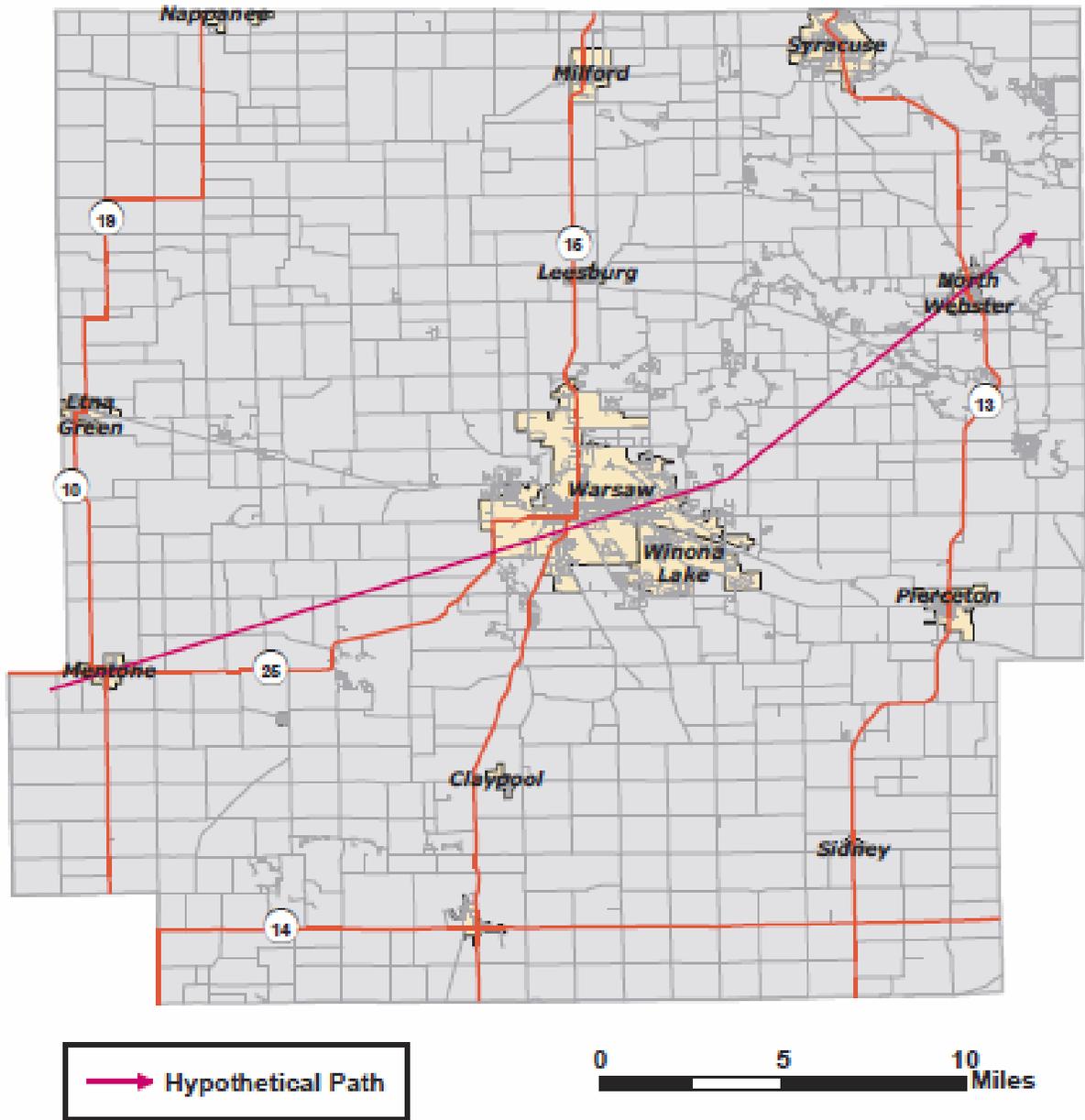
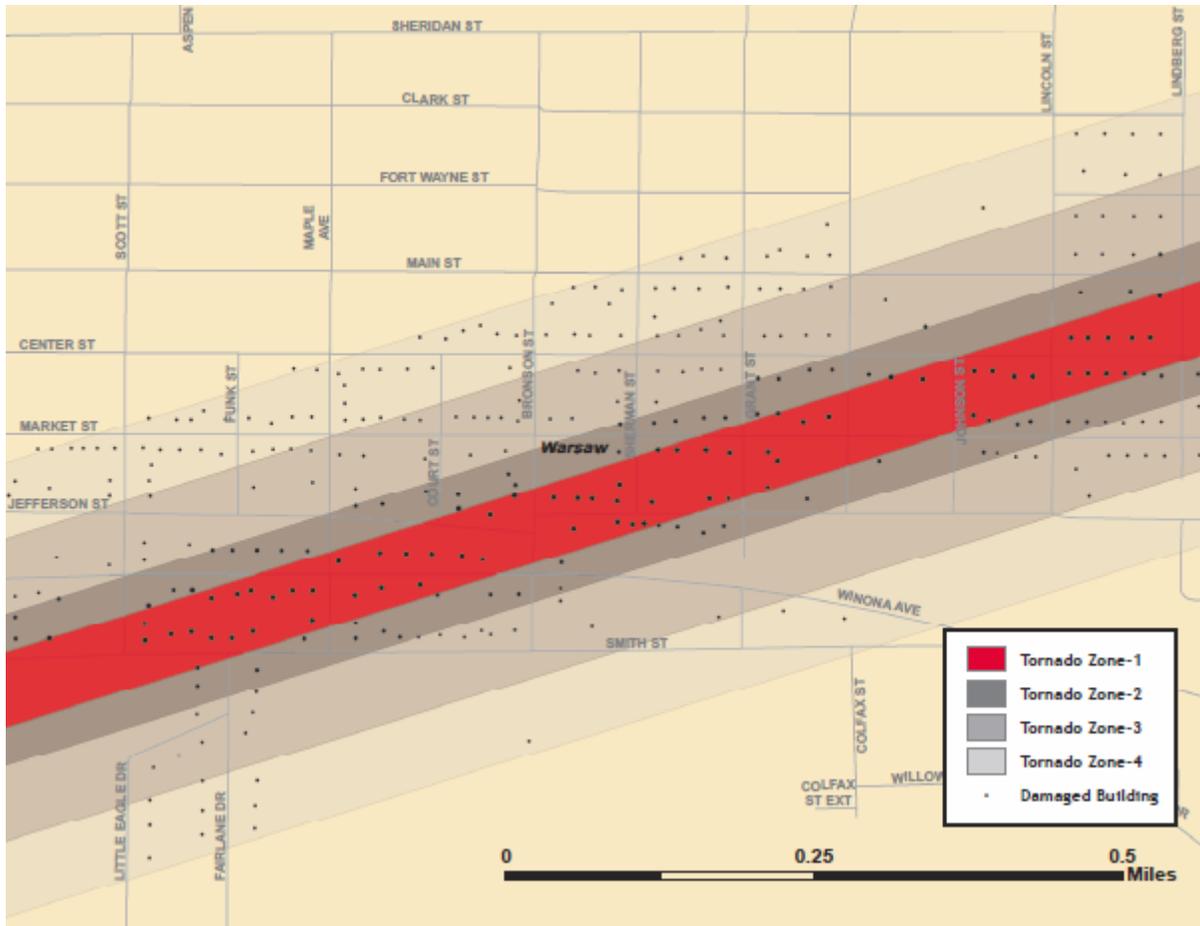


Figure 5-4: Modeled F4 Tornado Damage Buffers in Kosciusko County



In 2017 the Kosciusko County GIS Department used the criteria outlined in the original MHMP to conduct a new analysis of the damage along the path of the tornado. The results of the analysis are depicted in Tables 5-11 and 5-12. The GIS analysis estimates that 2,123 buildings will be damaged. The estimated building losses were \$131 million. The building losses are the assessed value of the property multiplied by the percentages of damage. The overlay was performed against parcels provided by Kosciusko County that were joined with Assessor records showing property improvement.

The Assessor records often do not distinguish parcels by occupancy class when the parcels are not taxable; therefore, the total number of buildings and the building replacement costs for government, religious/non-profit, and education may be underestimated.

**Table 5-11: Estimated Numbers of Buildings Damaged by Occupancy Type**

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	290	309	596	508
Commercial	51	40	78	60
Industrial	2	1	17	9
Agriculture	6	20	40	31
Religious	5	6	11	15
Government	3	1	10	4
Education	3	2	1	4
<b>Total</b>	<b>360</b>	<b>379</b>	<b>753</b>	<b>631</b>

**Table 5-12: Estimated Building Losses by Occupancy Type (X 1000)**

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	\$29,006	\$24,087	\$32,513	\$4,697
Commercial	\$13,325	\$2,888	\$4,649	\$1,085
Industrial	\$233	\$16	\$1,961	\$97
Agriculture	\$139	\$247	\$227	\$23
Religious	\$507	\$1,680	\$3,422	\$177
Government	\$369	\$56	\$1,171	127
Education	\$6,343	\$0	\$1,260	\$1,863
<b>Total</b>	<b>\$48,922</b>	<b>\$28,974</b>	<b>\$45,203</b>	<b>\$8,069</b>

### 5.6.1.10 Critical Facility Damage

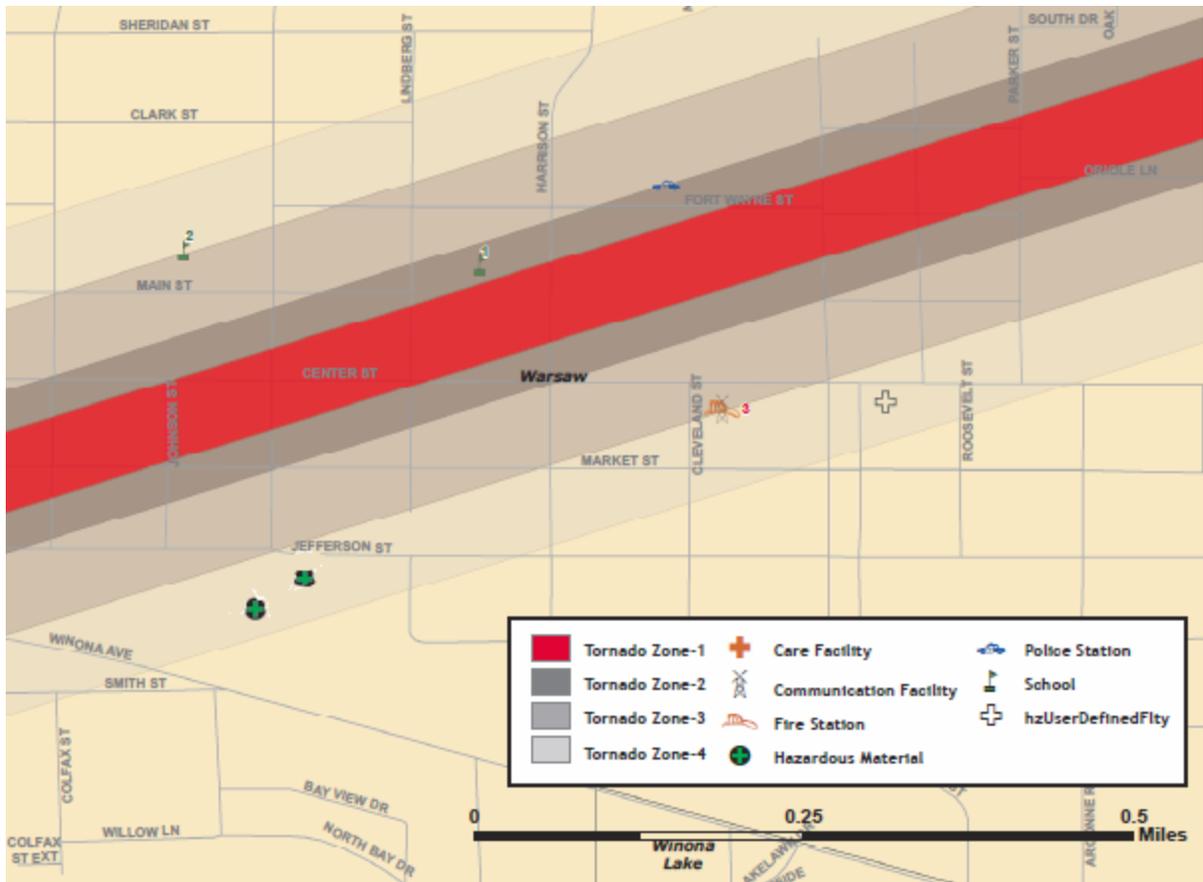
There are 24 critical facilities located within 900 feet of the hypothetical tornado path. The model predicts that two medical care facilities, four communication facilities, three fire departments, two hazardous materials facilities, three police departments, seven schools, and three Medical Transport facilities would experience damage. The affected facilities are identified in Table 5-13, and Figure 5-5 shows the geographic location of some of the facilities.

**Table 5-13: Estimated Critical Facilities Affected**

Classification	Name
Medical Care	Warsaw Meadows
Medical Care	Chapman House
Communication	Cell Tower (S 900 W Mentone)
Communication	Cell Tower (E 300 N, Warsaw)
Communication	Mentone Fire Department Siren
Communication	Warsaw-Wayne Fire Station 2 (West Center St, Warsaw) Siren
Fire Department	North Webster Fire Department
Fire Department	Mentone Fire Department
Fire Department	Warsaw Fire Station 2 (West Center St., Warsaw)
Hazardous Materials	Dalton Corporation.
Hazardous Materials	Warsaw Plating Works
Police Department	North Webster Police Department
Police Department	Mentone Town Police Department

Classification	Name
Police Department	Warsaw Police Department
School	Sacred Heart Elementary School
School	Lincoln Elementary School
School	Edgewood Middle School
School	Lakeview Middle School
School	Mentone Elementary School
School	North Webster Elementary
School	Washington Elementary
Medical Response	Mentone EMS
Medical Response	Lutheran EMS- Kosciusko (Warsaw)
Medical Response	North Webster EMS

**Figure 5-5: Critical Facilities within Tornado Path**



#### **5.6.1.11 Vulnerability to Future Assets/Infrastructure for Tornado Hazard**

The entire population and buildings have been identified as at risk because tornadoes can occur anywhere within the state of Indiana, at any time of the day, and during any month of the year. Furthermore, any future development in terms of new construction within the county will be at risk. The building exposure for Kosciusko County is included in Table 5-6.

All critical facilities in the county and communities within the county are at risk. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

#### **5.6.1.12 Analysis of Community Development Trends**

Preparing for severe storms will be enhanced if officials sponsor a wide range of programs and initiatives to address the overall safety of county residents. New structures need to be built with more sturdy construction and those structures already in place need to be hardened to lessen the potential impacts of severe weather. Community warning sirens to provide warnings of approaching storms are also vital to ensuring the safety of Kosciusko County residents.

## **5.6.2 Flood Hazard**

### **5.6.2.1 Hazard Definition for Flooding**

Flooding is a significant natural hazard throughout the United States. The type, magnitude, and severity of flooding are functions of the amount and distribution of precipitation over a given area, the rate at which precipitation infiltrates into the ground, the geometry and hydrology of the catchment, and flow dynamics and conditions in and along the river channel. Floods can be classified as one of two types: upstream floods or downstream floods. Both types of floods are common in Indiana. Upstream floods, also called flash floods, occur in the upper parts of drainage basins and are generally characterized by periods of intense rainfall over a short duration. These floods arise with very little warning and often result in locally intense damage, and sometimes loss of life, due to the high energy of the flowing water. Flood waters can snap trees, topple buildings, and easily move large boulders or other structures. Six inches of rushing water can upend a person; another 18 inches might carry off a car. Generally, upstream floods cause damage over relatively localized areas, but they can be quite severe in the local areas where they occur. Urban flooding is a type of upstream flood. Urban flooding involves the overflow of storm drain systems and can be the result of inadequate drainage combined with heavy rainfall or rapid snowmelt. Upstream or flash floods can occur at any time of the year in Indiana, but they are most common in the spring and summer months.

Downstream floods, sometimes called riverine floods, refer to floods on large rivers at locations with large upstream catchments. Downstream floods are typically associated with precipitation events that are of relatively long duration and occur over large areas. Flooding on small tributary streams may be limited, but the contribution of increased runoff may result in a large flood downstream. The lag time between precipitation and time of the flood peak is much longer for downstream floods than for upstream floods, generally providing ample warning for people to move to safe locations and, to some extent, secure some property against damage. Riverine flooding on the large rivers of Indiana generally occurs during either the spring or summer.

### **5.6.2.2 Hazard Definition for Dam and Levee Failure**

Dams are structures that retain or detain water behind a large barrier. When full or partially full, the difference in elevation between the water above the dam and below creates large amounts of potential energy, creating the potential for failure. The same potential exists for levees when they serve their purpose, which is to confine flood waters within the channel area of a river and exclude that water from land or communities land-ward of the levee. Dams and levees can fail due to either: 1) water heights or flows above the capacity for which the structure was designed; or 2) deficiencies in the structure such that it can not hold back the potential energy of the water. If a dam or levee fails, issues of primary concern include loss of human life/injury, downstream property damage, lifeline disruption (of concern would be transportation routes and utility lines required to maintain or protect life), and environmental damage.

Many communities view both dams and levees as permanent and infinitely safe structures. This sense of security may well be false, leading to significantly increased risks. Both downstream of dams and on floodplains protected by levees, security leads to new construction, added infrastructure, and increased population over time. Levees in particular are built to hold back flood waters only up to some maximum level, often the 100-year (1% annual probability) flood event. When that maximum is exceeded by more than the design safety margin, then the levee

will be overtopped or otherwise fail, inundating communities in the land previously protected by that levee. It has been suggested that climate change, land-use shifts, and some forms of river engineering may be increasing the magnitude of large floods and the frequency of levee-failure situations.

In addition to failure that results from extreme floods above the design capacity, levees and dams can fail due to structural deficiencies. Both dams and levees require constant monitoring and regular maintenance to assure their integrity. Many structures across the U.S. have been underfunded or otherwise neglected, leading to an eventual day of reckoning in the form either of realization that the structure is unsafe or, sometimes, an actual failure. The threat of dam or levee failure may require substantial commitment of time, personnel, and resources. Since dams and levees deteriorate with age, minor issues become larger compounding problems, and the risk of failure increases.

### 5.6.2.3 Previous Occurrences for Flooding

The NCDC database reported twelve flood events in Kosciusko County between 2000 and 2017, which caused an estimated \$725,000 in damages to property but does not identify any crop losses. The most recent event occurred in July 7, 2017. Thunderstorms over much of southwestern Kosciusko County dropped between 4 and 6 inches of rain in the span of a few hours, causing widespread flooding and areas of flash flooding. At least a dozen roads were closed at one point due to water flowing over them. South Bruner Road, just northeast of Palestine, was washed away over Magee Robbins Ditch when the water flow exceeded the drainage pipe limits. This resulted in residents on the other side being stranded for several hours until the water receded and temporary repairs could be made.

The Kosciusko County NCDC recorded floods are identified in Table 5-14. Additional details for NCDC events are included in Appendix D.

**Table 5-14: Kosciusko County Previous Occurrences of Flooding\***

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Warsaw	7/18/2007	Flash Flood	N/A	0	0	10K	0K
SYRACUSE	5/16/2009	Flash Flood		0	0	100.00K	0.00K
ATWOOD	8/17/2009	Flash Flood		0	0	0.00K	0.00K
BARBEE	6/1/2013	Flash Flood		0	0	0.00K	0.00K
NORTH WEBSTER	8/2/2013	Flash Flood		0	0	0.00K	0.00K
VAWTER PARK	7/13/2015	Flash Flood		0	0	0.00K	0.00K
ETNA GREEN	7/7/2017	Flash Flood		0	0	0.00K	0.00K
Kosciusko	9/11/2000	Flood	N/A	0	0	400K	0
Mentone	1/8/2008	Flood	N/A	0	0	200K	0K
Milford	2/5/2008	Flood	N/A	0	0	15K	0K
MONOQUET	4/18/2013	Flood		0	0	0.00K	0.00K
OSWEGO	7/18/2015	Flood		0	0	0.00K	0.00K

\* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

#### **5.6.2.4 Previous Occurrences for Dam and Levee Failure**

According to the Kosciusko County CEMP, there are no records or local knowledge of any dam or certified levee failure in the county.

### 5.6.2.5 Repetitive Loss Properties

FEMA defines a repetitive loss structure as a structure covered by a contract of flood insurance issued under the NFIP, which has suffered flood loss damage on two occasions during a 10-year period that ends on the date of the second loss, in which the cost to repair the flood damage is 25% of the market value of the structure at the time of each flood loss.

Indiana Department of Natural Resources (IDNR) and the Indiana Department of Homeland Security (IDHS) were contacted to determine the location of repetitive loss structures. According to the 2016 supplied data, Kosciusko County has 24 repetitive loss structures. The total amount paid for building replacement and building contents for damages to these repetitive loss structures is \$919,025.72. Table 5-15 describes the loss structures in terms of occupancy and jurisdiction.

**Table 5-15: Kosciusko County Repetitive Loss Structures**

Jurisdiction	Occupancy Type	Number of Structures	Number of Losses	Total Paid
Kosciusko County	Single-Family	24	58	\$919,025.72

### 5.6.2.6 Geographic Location for Flooding

Most river flooding occurs in early spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Severe thunderstorms may cause flooding during the summer or fall, but tend to be localized. According to the Kosciusko County Hazard Analysis, the primary source of river flooding is the Tippecanoe River. Although the EEL River in the southwest corner of the county is prone to flooding, it impacts only a small portion of land that is primarily farmland, wetlands and wildland.

Flash floods, brief heavy flows in small streams or normally dry creek beds, also occur within the county. Flash flooding is typically characterized by high-velocity water, often carrying large amounts of debris. Urban flooding involves the overflow of storm drain systems and is typically the result of inadequate drainage following heavy rainfall or rapid snowmelt.

The IDNR recently digitized the paper FEMA Flood Insurance Rate Maps (FIRM). These digital files, although not official FIRMs, provided the boundary which was the basis for this analysis. The overbank flooding areas are depicted on the map in Appendix E. Flash flooding may occur countywide.

The National Oceanic and Atmospheric Administration (NOAA) Advanced Hydrologic Prediction Service provides information from gauge locations at points along various rivers across the United States. For Kosciusko County, there are gauges located at Tippecanoe River at North Webster and on the Shatto Ditch near Mentone. Additional gauges have been requested to assist with monitoring stream and river levels.

(Source: [https://waterdata.usgs.gov/in/nwis/current/?type=flow&group\\_key=county\\_cd](https://waterdata.usgs.gov/in/nwis/current/?type=flow&group_key=county_cd))

### 5.6.2.7 Geographic Location for Dam and Levee Failure

The National Inventory of Dams identified 11 dams in Kosciusko County. The map in Appendix G illustrates the location of Kosciusko County dams. Table 5-16 summarizes the National Inventory of Dams information.

**Table 5-16: National Inventory of Dams**

Dam Name	River	Hazard	EAP
PAPAKEECHIE LAKE	Unnamed Tributary Lake Wawasee	H	N
WEIMER-BLACK DAM	Unnamed Tributary Tippecanoe River	S	N
PALESTINE LAKE DAM	Trimble Creek	S	N
WEBSTER LAKE DAM – EAST	Tippecanoe River	S	N
FLATBELLY LAKE DAM	Unnamed Tributary Papakeeche Lake	H	N
WEBSTER LAKE DAM – WEST	Tippecanoe River	S	Y
CENTER LAKE (SOUTH STRUCTURE) CONTROL STRUCTURE	Unnamed Tributary Walnut Creek	L	N
RIDINGER LAKE CONTROL STRUCTURE	Unnamed Tributary Tippecanoe River	L	N
PRICE LAKE	Unnamed Tributary Spear Lake	L	N
SHOCK LAKE DAM	Unnamed Tributary Papakeeche Lake	L	N
SYRACUSE LAKE CONTROL STRUCTURE	Turkey Creek	L	N

A review of the Indiana Department of Natural Resource’s files identified one levee in Kosciusko County—Center Lake Levee in Warsaw, Indiana. The levee is documented from historical IDNR data; its physical presence was not confirmed and it may no longer exist.

\* The dams and levees listed in this multi-hazard mitigation plan are recorded from historical IDNR data. Their physical presences were not confirmed; therefore, new or unrecorded structures may exist.

### **5.6.2.8 Hazard Extent for Flooding**

The HAZUS-MH flood model is designed to generate a flood depth grid and flood boundary polygon by deriving hydrologic and hydraulic information based on user-provided elevation data or by incorporating selected output from other flood models. HAZUS-MH also has the ability to clip a Digital Elevation Model (DEM) with a user-provided flood boundary, thus creating a flood depth grid. For Kosciusko County HAZUS-MH was used to extract flood depth by clipping the DEM with the IDNR FIRMs Base Flood Elevation (BFE) boundary. The BFE is defined as the area that has a 1% chance of flooding in any given year.

Flood hazard scenarios were modeled using GIS analysis and HAZUS-MH. The flood hazard modeling was based on historical occurrences and current threats. Existing IDNR flood maps were used to identify the areas of study. These digital files, although not official FIRMs, provided the boundary which was the basis for this analysis. Planning team input and a review of historical information provided additional information on specific flood events.

### **5.6.2.9 Hazard Extent for Dam and Levee Failure**

When dams are assigned the low (L) hazard potential classification, it means that failure or incorrect operation of the dam will result in zero human life losses and no low economic and/or environmental losses. Losses are principally limited to the owner’s property. Dams assigned the significant (S) hazard classification are those dams in which failure or incorrect operation results in no probable loss of human life; however it can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Dams classified as significant hazard potential dams are often located in predominantly rural or agricultural areas, but could be located in populated areas with a significant amount of infrastructure. Dams assigned the high (H) hazard

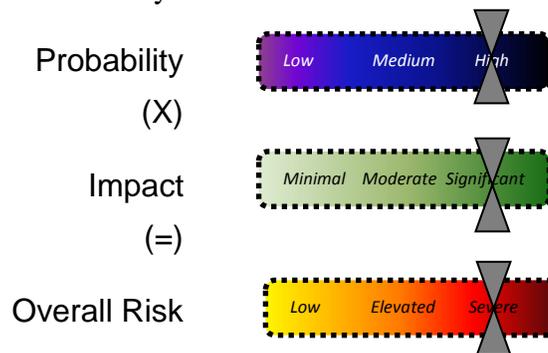
potential classification are those dams in which failure or incorrect operation has the highest risk to cause loss of human life and significant damage to buildings and infrastructure.

According to the IDNR and the National Inventory of Dams, two dams are classified as high hazard dams. Only Webster Dam has an Emergency Action Plan (EAP). An EAP is not required by the State of Indiana but is recommended in the 2003 Indiana Dam Safety & Inspection Manual.

Accurate mapping of the risks of flooding behind levees depends on knowing the condition and level of protection the levees actually provide. FEMA and the U.S. Army Corps of Engineers are working together to make sure that flood hazard maps clearly reflect the flood protection capabilities of levees, and that the maps accurately represent the flood risks posed to areas situated behind them. Levee owners—usually states, communities, or in some cases private individuals or organizations—are responsible for ensuring that the levees they own are maintained according to their design. To be considered creditable flood protection structures on FEMA's flood maps, levee owners must provide documentation to prove the levee meets design, operation, and maintenance standards for protection against the one-percent-annual chance flood.

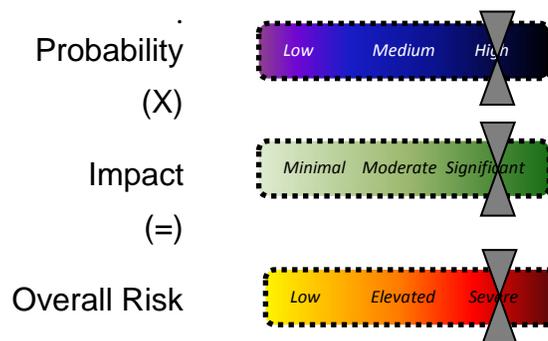
### 5.6.2.10 Risk Identification for Flood Hazard

Based on historical information, the probability of a flood is high. In Meeting #2, the planning team determined that the potential impact of a flood is significant; therefore, the overall risk of a flood hazard for Kosciusko County is severe.



### 5.6.2.11 Risk Identification for Dam/Levee Failure

Based on historical information, the probability of dam/levee failure is high. In Meeting #2, the planning team determined that the potential impact of dam/levee failure is significant; therefore, the overall risk of dam/levee failure for Kosciusko County is severe.



### 5.6.2.12 HAZUS-MH Analysis Using 100-Year Flood Boundary and County Parcels

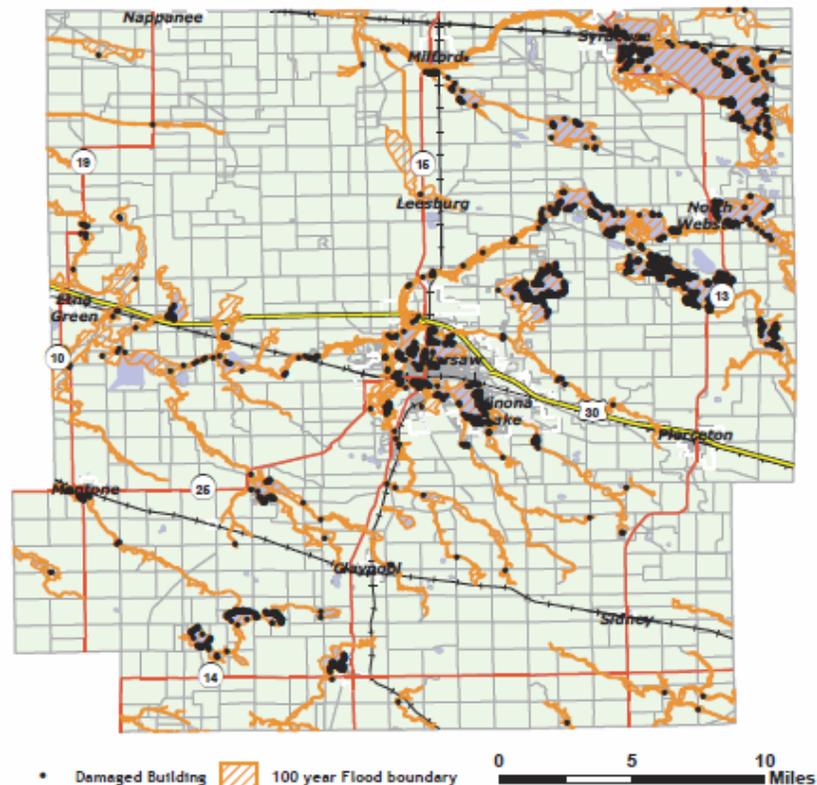
HAZUS-MH generated the flood depth grid for a 100-year return period by clipping the IGS 1/3 ArcSecond (approximately 10 meters) Digital Elevation Model (DEM) to the Kosciusko County flood boundary. Next, HAZUS-MH utilized a user-defined analysis of Kosciusko County with site-specific parcel data provided by the county.

HAZUS-MH estimates the 100-year flood would damage 3,148 buildings at a replacement cost of \$68.6 million after increasing estimates based on 2016 Assessed Value per the Indiana Department of Local Government Finance reports. The total estimated numbers of damaged buildings are given in Table 5-17. Figure 5-6 depicts the Kosciusko County parcel points that fall within the 100-year floodplain. Figures 5-7 highlights damaged buildings within the floodplain areas in Warsaw.

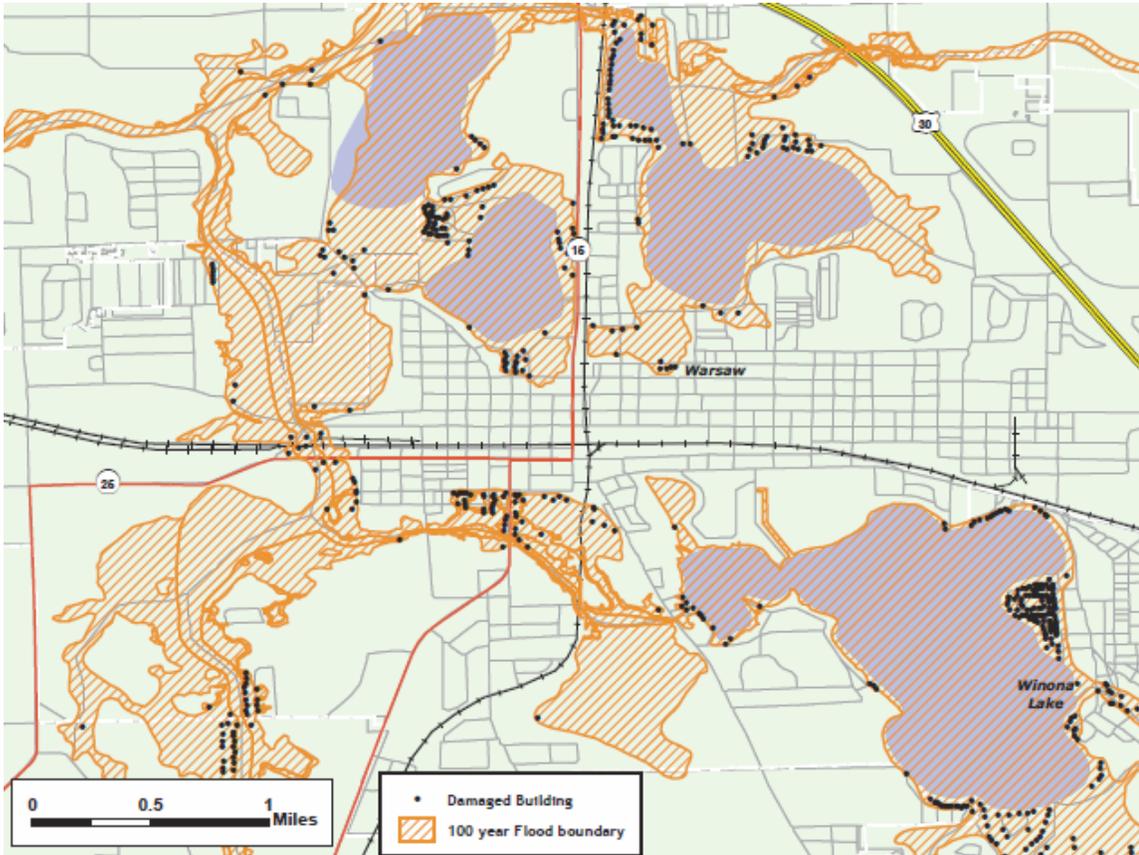
**Table 5-17: Kosciusko County HAZUS-MH Building Damage**

General Occupancy	Number of Buildings Damaged	Total Building Damage (x1000)
Residential	2,989	\$64,640
Commercial	75	\$2,478
Industrial	15	\$922
Agricultural	46	\$337
Religious/Non-Profit	14	\$262
Government	9	\$0
Education	0	\$0
<b>Total</b>	<b>3,148</b>	<b>\$68,620</b>

**Figure 5-6: Kosciusko County Buildings in Floodplain (100 year Flood)**



**Figure 5-7: Kosciusko County Urban Areas (Warsaw) Flood-Prone Areas (100 Year Flood)**



**5.6.2.13 Critical Facilities**

A critical facility will encounter many of the same impacts as other buildings within the flood boundary. These impacts can include structural failure, extensive water damage to the facility and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). A complete list of all the critical facilities, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

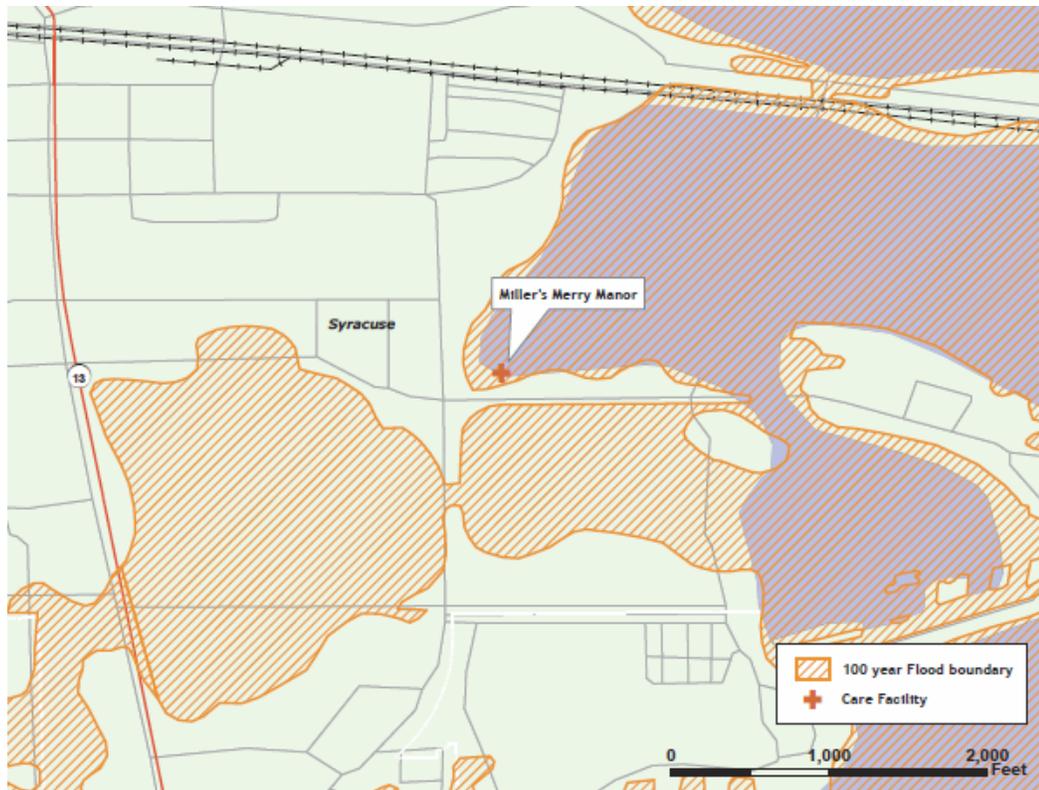
The analysis identified one care facility (Millers Merry Manor Syracuse) that may be subject to flooding. The facility itself is not in the floodplain but the grounds drainage and septic could be affected. The critical facility potentially at risk to flooding within Kosciusko County is given in Table 5-18. A map of the critical facility potentially at risk to flooding is shown in Figures 5-8.

**Table 5-18: Kosciusko County Damaged Critical Facilities**

Classification	Facility Name
Care Facility	Millers Merry Manor (Syracuse)
*Waste Water	Warsaw Wastewater Plant

\*Warsaw’s wastewater treatment facility had been located in a floodplain but in 2011 was relocated to 2056 N 150 W to reduce/remove the risk of flooding.

**Figure 5-8: Boundary of 100 - Year Flood Overlaid with Critical Facilities**



#### **5.6.2.14 Infrastructure**

The types of infrastructure that could be impacted by a flood include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available for this plan, it is important to emphasize that any number of these items could become damaged in the event of a flood. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); or railway failure from broken or impassable railways. Bridges could fail or become impassable, causing a traffic risk.

#### **5.6.2.15 Vulnerability Analysis for Flash Flooding**

Flash flooding could affect any location within this jurisdiction; therefore, the entire county's population and buildings are vulnerable to a flash flood. These structures can expect the same impacts as discussed in a riverine flood.

Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

#### **5.6.2.16 Vulnerability Analysis for Dam and Levee Failure**

An EAP is required to assess the effect of dam failure on these communities. In order to be considered creditable flood protection structures on FEMA's flood maps, levee owners must provide documentation to prove the levee meets design, operation and maintenance standards for protection against the "one-percent-annual chance" flood.

### **5.6.2.17 Vulnerability to Future Assets/Infrastructure for Flooding**

Flash flooding may affect nearly every location within the county; therefore all buildings and infrastructure are vulnerable to flash flooding. Currently, the Kosciusko County planning commission reviews new development for compliance with the local zoning ordinance. At this time no construction is planned within the area of the 100-year floodplain. Therefore, there is no new construction which will be vulnerable to a 100-year flood.

### **5.6.2.18 Vulnerability to Future Assets/Infrastructure for Dam and Levee Failure**

The Kosciusko County planning commission reviews new development for compliance with the local zoning ordinance.

### **5.6.2.19 Analysis of Community Development Trends**

Controlling floodplain development is the key to reducing flood-related damages. Areas with recent development within the county may be more vulnerable to drainage issues. Storm drains and sewer systems are usually most susceptible. Damage to these can cause the back up of water, sewage, and debris into homes and basements, causing structural and mechanical damage as well as creating public health hazards and unsanitary conditions.

See Table 2-4 for planning documents that are used to guide our Community Development.

## **5.6.3 Earthquake Hazard**

### **5.6.3.1 Hazard Definition for Earthquake Hazard**

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, as is the case for seismic zones in the Midwestern United States. The most seismically active area is referred to as the New Madrid Seismic Zone. Scientists have learned that the New Madrid fault system may not be the only fault system in the Central U.S. capable of producing damaging earthquakes. The Wabash Valley fault system in Illinois and Indiana shows evidence of large earthquakes in its geologic history, and there may be other, as yet unidentified, faults that could produce strong earthquakes.

Ground shaking from strong 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 be shaken off their mountings during an earthquake. When an earthquake occurs in a populated area it may cause deaths, injuries, and extensive property damage.

The possibility of the occurrence of a catastrophic earthquake in the central and eastern United States is real as evidenced by history and described throughout this section. The impacts of significant earthquakes affect large areas, terminating public services and systems needed to aid the suffering and displaced. These impaired systems are interrelated in the hardest struck zones. Power lines, water and sanitary lines, and public communication may be lost; and highways, railways, rivers, and ports may not allow transportation to the affected region. Furthermore, essential facilities, such as fire and police departments and hospitals, may be disrupted if not previously improved to resist earthquakes.

As with hurricanes, mass relocation may be necessary, but the residents who are suffering from the earthquake can neither leave the heavily impacted areas nor receive aid or even communication in the aftermath of a significant event.

Magnitude, which is determined from measurements on seismographs, measures the energy released at the source of the earthquake. Intensity measures the strength of shaking produced by the earthquake at a certain location and is determined from effects on people, human structures, and the natural environment. Tables 5-19 and 5-20 list earthquake magnitudes and their corresponding intensities.

*[http://earthquake.usgs.gov/learning/topics/mag\\_vs\\_int.php](http://earthquake.usgs.gov/learning/topics/mag_vs_int.php)*

**Table 5-19: Abbreviated Modified Mercalli Intensity Scale**

<b>Mercalli Intensity</b>	<b>Description</b>
I	Not felt except by a very few under especially favorable conditions.
II	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

**Table 5-20: Earthquake Magnitude vs. Modified Mercalli Intensity Scale**

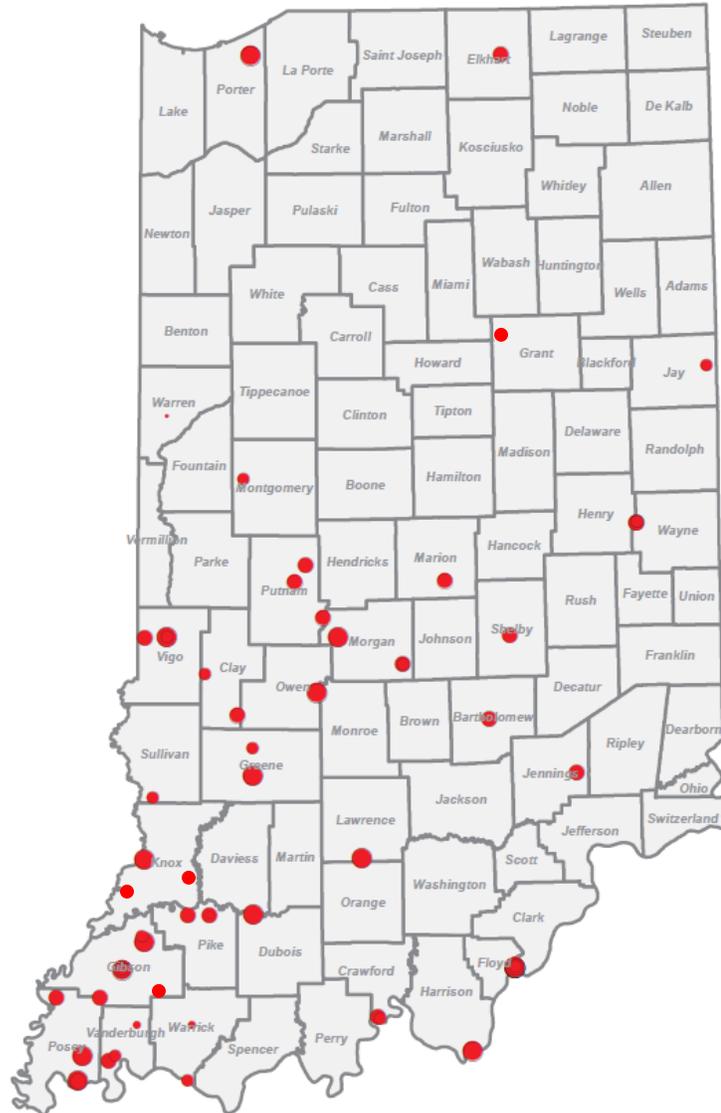
<b>Earthquake Magnitude</b>	<b>Typical Maximum Modified Mercalli Intensity</b>
1.0 - 3.0	I
3.0 - 3.9	II - III
4.0 - 4.9	IV - V
5.0 - 5.9	VI - VII
6.0 - 6.9	VII - IX
7.0 and higher	VIII or higher

### 5.6.3.2 Previous Occurrences for Earthquake Hazard

Approximately 40 earthquakes have occurred in Indiana for which reasonably accurate records exist. They vary in Moment Magnitude from a low of approximately M=2.0 to a high of M=5.2. The consensus of opinion among seismologists working in the Midwest is that a magnitude 5.0 to 5.5 event could occur virtually anywhere at any time throughout the region. The last earthquake to occur in Indiana—as of the date of this report—occurred on September 12, 2004 just north of Shelbyville and measured 3.6 in magnitude. The largest prehistoric earthquake documented in the state occurred at Vincennes over 6,100 years ago. The size and physical character of sandblows formed during the quake show it to have had a Moment Magnitude of 7.4.

According to the Indiana Geological Survey (IGS), no earthquakes have been recorded with epicenters in Kosciusko County. Statewide historical epicenters outside of Kosciusko County are included in Figure 5-9, although information related to the impacts to Kosciusko County from these events is limited.

**Figure 5-9: Historical Earthquake Epicenters**



The most damaging Indiana earthquake originating within the state occurred on September 27, 1909 near the Indiana border between Vincennes and Terre Haute. Some chimneys fell, several building walls cracked, light connections severed, and pictures shook from the walls. It was felt throughout Indiana and parts of Iowa, Kentucky, Missouri, Arkansas, and probably in parts of Kansas, covering an area of 30,000 square miles.

Another damaging earthquake originating in Indiana occurred on April 29, 1899; it rated intensity VI to VII on the Modified Mercalli Scale. It was strongest in Jeffersonville and Shelbyville, and in Vincennes, chimneys crumbled and walls cracked. It was felt over an area of 40,000 square miles.

In 1876, twin shocks 15 minutes apart were felt over an area of 60,000 square miles. A shock in 1887 centered near Vincennes was felt over 75,000 square miles; an 1891 shock damaged property and frightened people in a church in Evansville.

Indiana has also suffered from damage caused by earthquakes originating in neighboring states. The worst occurred on November 9, 1968, and centered near Dale in southern Illinois. The shock, a magnitude of 5.3, was felt over 580,000 square miles and 23 states including all of Indiana. Intensity VII was reported from Cynthiana, where chimneys cracked, twisted, and toppled; at Fort Branch, where groceries fell from shelves and a loud roaring noise was heard; and in Mount Vernon, New Harmony, Petersburg, Princeton, and Stewartsville, all of which had similar effects. At Poseyville, "Fish jumped out of the rivers, ponds, and lakes."

Earthquake activity that has occurred since the development of the MHMP in 2009. One occurred in 2010 (3.8 between Kokomo and Marion) four in 2012 (3.0 in NW Indiana on 1/26/12; 3.1 & 2.7 near Bicknell, IN on 5/10/12; 2.2 around Washington IN on 4/11/12) and 2015 (2.3 Haubstadt IN on 5/28/15)

On April 18, 2008, an earthquake originating in Illinois within the Wabash Valley Seismic Zone caused minor structural damage to buildings in East Alton, Mount Carmel, and West Salem, Illinois, and a cornice fell from one building at Louisville, Kentucky. The earthquake, a magnitude 5.4, was felt widely throughout the central United States from Green Bay, Wisconsin south to Atlanta, Georgia and Tuscaloosa, Alabama and from Sioux City, Iowa and Omaha, Nebraska east to Akron, Ohio and Parkersburg, West Virginia, including all or parts of Alabama, Arkansas, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, Nebraska, North Carolina, Ohio, Tennessee, West Virginia, and Wisconsin. It was also felt in southern Ontario, Canada.

On November 7, 1958, an earthquake originating near Mt. Carmel, Illinois caused plaster to fall at Fort Branch. Roaring and whistling noises were heard at Central City, and the residents of Evansville thought there had been in an explosion or plane crash. It was felt over 33,000 square miles of Illinois, Indiana, Missouri, and Kentucky.

On March 2, 1937, a shock centering near Anna, Ohio threw objects from shelves at Fort Wayne and some plaster fell. Six days later, another shock originating at Anna brought pictures crashing down and cracked plaster in Fort Wayne and was strongly felt in Lafayette.

The great New Madrid earthquakes of 1811 and 1812 must have strongly affected the state, particularly the southwestern part, but there is little information available from these frontier times.

[The above history was abridged from Earthquake Information Bulletin, Volume 4, Number 4, July-August 1972 and from <http://earthquake.usgs.gov/eqcenter/equinthenews/2008/us2008qza6/#summary>.]

### **1827 Jul 5 11:30 4.8M Intensity VI**

Near New Harmony, Indiana (38.0N 87.5W)

The earthquake cracked a brick store at New Harmony, Indiana, and greatly alarmed some people. It was described as violent at New Madrid, Missouri, and severe in St. Louis. It also alarmed many in Cincinnati, Ohio and Frankfort, Kentucky.

### **1827 Aug 7 04:30 4.8M Intensity V**

Southern Illinois (38.0N 88.0W)

**1827 Aug 7 07:00 4.7M Intensity V**

Southern Illinois (38.0N 88.0W)

**1887 Feb 6 22:15 4.6M Intensity VI**

Near Vincennes, Indiana (38.7N 87.5W)

This shock was strongest in southwest Indiana and southeast Illinois. Plaster was shaken from walls in Vincennes, west of Terre Haute, and in Martinsville; a cornice reportedly fell from a building in Huntington, Indiana. It was felt distinctly in Evansville, Indiana, but only slightly in the outskirts of St. Louis, Missouri. The shockwave was also reported in Louisville, Kentucky.

**1891 Jul 27 02:28 4.1M Intensity VI**

Evansville, Indiana (37.9N 87.5W)

A strong local earthquake damaged a wall on a hotel, broke dishes, and overturned furniture in Evansville. The shock also was strong near Evansville in Mount Vernon, and Newburgh Indiana; and at Hawesville, Henderson, and Owensboro, Kentucky.

**1921 Mar 14 12:15 4.4M Intensity VI**

Near Terre Haute, Indiana (39.5N 87.5W)

This earthquake broke windows in many buildings and sent residents rushing into the streets in Terre Haute. Small articles were overturned in Paris, Illinois, about 35 km northwest of Terre Haute.

**1925 Apr 27 04:05 4.8M Intensity VI**

Wabash River valley, near Princeton, Indiana (38.2N 87.8W)

Chimneys were downed in Princeton and in Carmi, Indiana; 100 km southwest chimneys were broken in Louisville, Kentucky. Crowds fled from the theaters in Evansville, Indiana. The affected area included parts of Indiana, Illinois, Kentucky, Missouri, and Ohio.

*The above text was taken from <http://earthquake.usgs.gov/regional/states/indiana/history.php>*

### **5.6.3.3 Geographic Location for Earthquake Hazard**

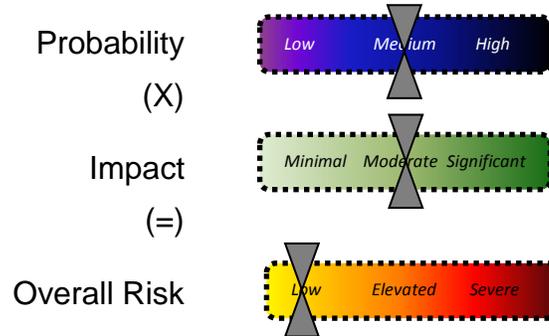
Kosciusko County occupies a region susceptible to two earthquake threats: the threat of an earthquake along the Wabash Valley Fault System and the threat of an event near Anna in Shelby County Ohio. Return periods for large earthquakes within the New Madrid System are estimated to be 500 years; moderate quakes between magnitude 5.5 and 6.0 can recur within approximately 150 years or less. The Wabash Valley Fault System is a sleeper that threatens the southwest quadrant of the state and may generate an earthquake large enough to cause damage as far north and east as Kosciusko County.

### **5.6.3.4 Hazard Extent for Earthquake Hazard**

The extent of the earthquake is countywide. One of the most critical sources of information that is required for accurate assessment of earthquake risk is soils data. A National Earthquake Hazards Reduction Program (NEHRP) compliant soils map was used for the analysis which was provided by IGS. The map identifies the soils most susceptible to failure.

### 5.6.3.5 Risk Identification for Earthquake Hazard

Based on historical information, the probability of an earthquake is medium; however, USGS and IGS research and studies attest that future earthquakes in Kosciusko County are possible. In Meeting #2, the planning team determined that the potential impact of an earthquake is moderate; therefore, the overall risk of an earthquake hazard for Kosciusko County is low.



### 5.6.3.6 Vulnerability Analysis for Earthquake Hazard

This hazard could impact the entire jurisdiction equally; therefore, the entire county's population and all buildings are vulnerable to an earthquake and can expect the same impacts within the affected area. To accommodate this risk this plan will consider all buildings located within the county as vulnerable.

### 5.6.3.7 Critical Facilities

All critical facilities are vulnerable to earthquakes. A critical facility would encounter many of the same impacts as any other building within the county. These impacts include structural failure and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). A complete list of all of the critical facilities, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

### 5.6.3.8 Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 5-6. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure and loss of building function which could result in indirect impacts (e.g. damaged homes will no longer be habitable causing residents to seek shelter).

### 5.6.3.9 Infrastructure

During an earthquake the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available to this plan it is important to emphasize that any number of these items could become damaged in the event of an earthquake. The impacts to these items include broken, failed or impassable roadways, broken or failed utility lines (e.g. loss of power or gas to community), and railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic. Typical scenarios are described to gauge the anticipated impacts of earthquakes in the county in terms of numbers and types of buildings and infrastructure.

Five earthquake scenarios—three based on deterministic scenarios and two based on probabilistic scenarios—were developed to provide a reasonable basis for earthquake planning in Kosciusko County. Note that a deterministic scenario, in this context, refers to hazard or risk models based on specific scenarios without explicit consideration of the probability of their occurrences.

The first deterministic scenario was a 7.1 magnitude epicenter along the Wabash Valley fault zone. Shake maps provided by FEMA were used in HAZUS-MH to estimate losses for Kosciusko County based on this event. The second deterministic scenario was the Anna, Ohio scenario. In the development of the previous plan, the Polis team contacted the Ohio Geological Survey to obtain existing geological information and recommendations for earthquake scenarios. The Ohio Geological Survey suggested an epicenter near Anna, Ohio with a moment magnitude of 6.5. Because there is a statistical possibility for this event to occur, it is relevant to consider for planning purposes. The third deterministic scenario was a moment magnitude of 5.5 with the epicenter located in Kosciusko County, selected because of the opinion of the IGS that an earthquake could occur in the selected location and would therefore represent a realistic scenario for planning purposes.

Additionally, the analysis included two different types of probabilistic scenarios. These types of scenarios are based on ground shaking parameters derived from U.S. Geological Survey probabilistic seismic hazard curves. The first probabilistic scenario was a 500-year return period scenario. This scenario evaluates the average impacts of a multitude of possible earthquake epicenters with a magnitude that would be typical of that expected for a 500-year return period. The second probabilistic scenario allowed calculation of annualized loss. The annualized loss analysis in HAZUS-MH provides a means for averaging potential losses from future scenarios while considering their probabilities of occurrence. The HAZUS-MH earthquake model evaluates eight different return period scenarios including those for the 100-, 250-, 500-, 750-, 1000-, 1500-, 2000-, and 2500-year return period earthquake events. HAZUS-MH then calculates the probabilities of these events as well as the interim events, calculates their associated losses, and sums these losses to calculate an annualized loss. These analysis options were chosen because they are useful for prioritization of seismic reduction measures and for simulating mitigation strategies.

The following earthquake hazard modeling scenarios were performed:

- 7.1 magnitude earthquake on the Wabash Valley Fault System
- 6.5 magnitude earthquake epicenter near Anna, Ohio
- 5.5 magnitude earthquake local epicenter
- 500-year return period event
- Annualized earthquake loss

Modeling a deterministic scenario requires user input for a variety of parameters. One of the most critical sources of information that is required for accurate assessment of earthquake risk is soils data. Fortunately, a National Earthquake Hazards Reduction Program (NEHRP) soil classification map exists for Indiana. NEHRP soil classifications portray the degree of shear-wave amplification that can occur during ground shaking. The IGS supplied soils map was used for the analysis. FEMA provided a map for liquefaction potential that was used by HAZUS-MH.

An earthquake depth of 10.0 kilometers was selected based on input from IGS. HAZUS-MH also requires the user to define an attenuation function unless ground motion maps are supplied. Because Kosciusko County has experienced smaller earthquakes, the decision was made to use the Central Eastern United States (CEUS) attenuation function. The probabilistic return period analysis and the annualized loss analysis do not require user input.

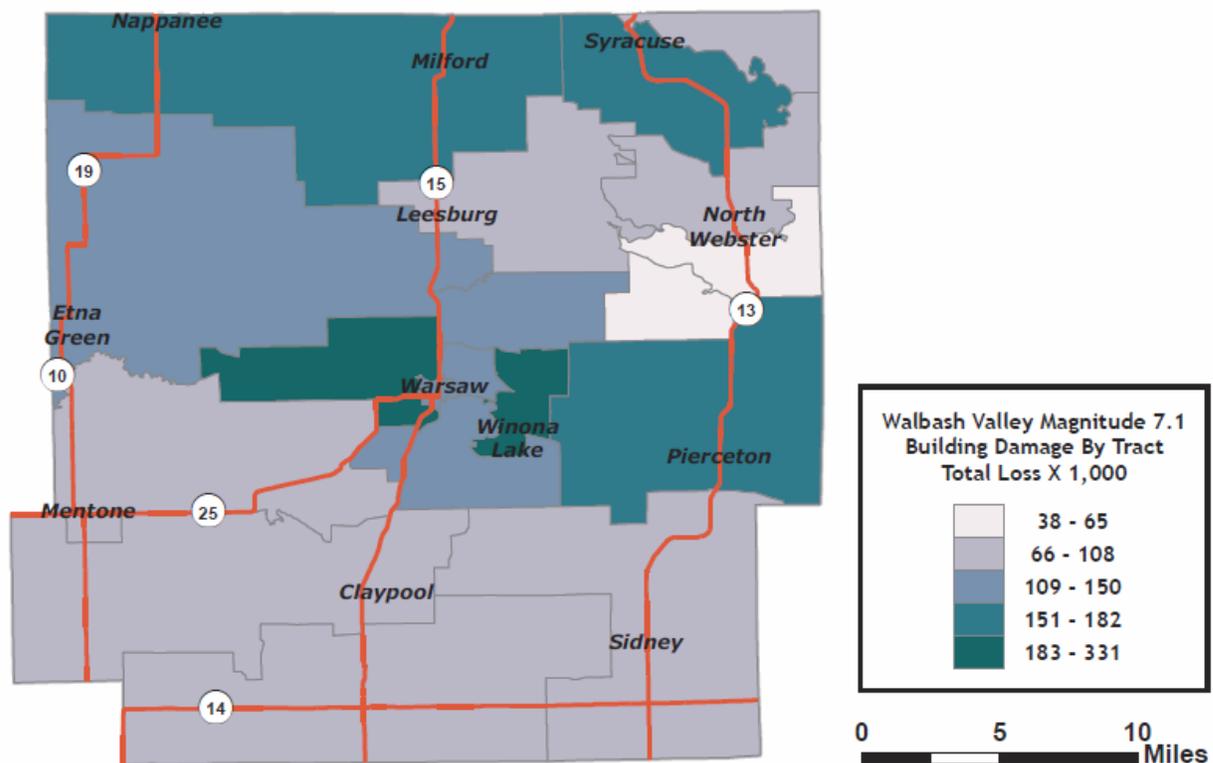
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

### 5.6.3.10 Results for 7.1 Magnitude Earthquake Wabash Valley Scenario

The results of the 7.1 Wabash Valley Earthquake HAZUS-MH estimates that approximately 18 buildings will be at least moderately damaged. It is estimated that no buildings will be damaged beyond repair.

The total building related losses totaled \$3.5 million after increasing estimates based on 2016 Assessed Value per the Indiana Department of Local Government Finance reports; 5% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up more than 41% of the total loss.

**Figure 5-90: Wabash Valley Scenario-Building Economic Losses in Thousands of Dollars**



### 5.6.3.11 Wabash Valley Scenario—Essential Facility Losses

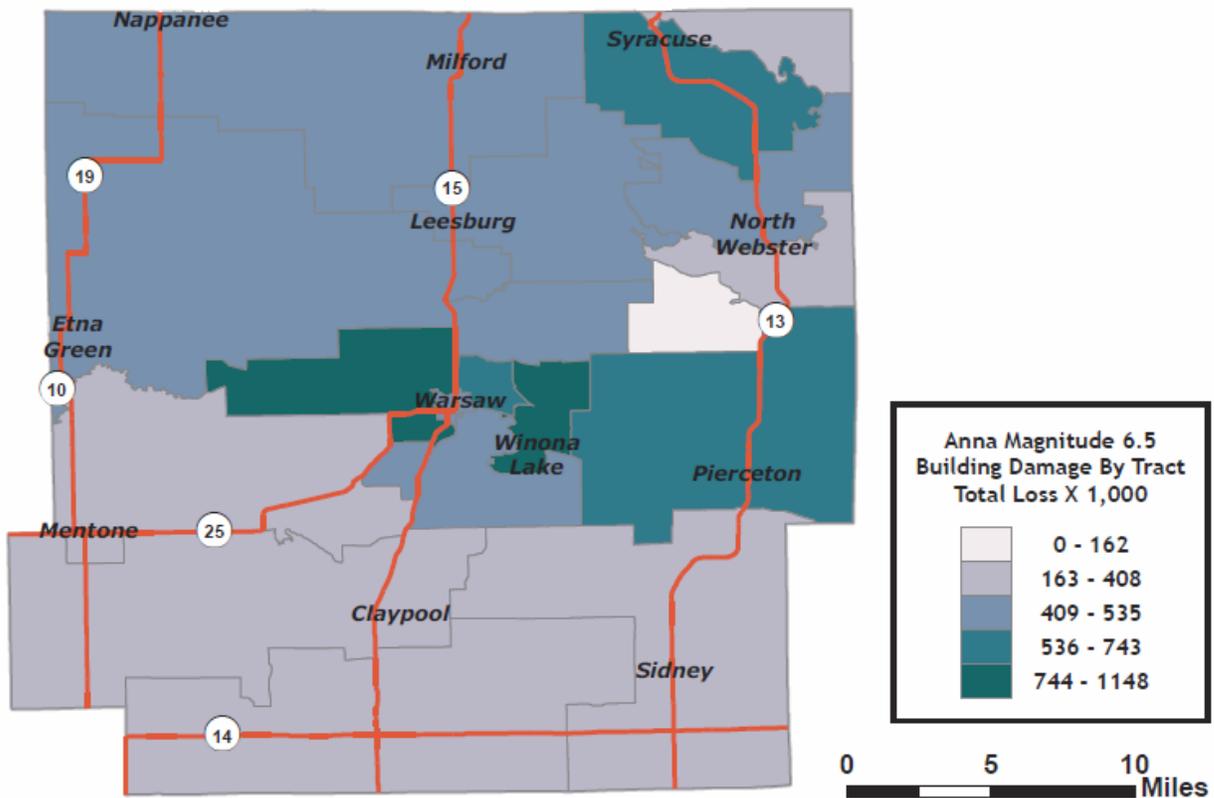
Before the earthquake, the region had 810 care beds available for use. On the day of the earthquake, the model estimates that only 405 care beds (50%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 97% of the beds will be back in service. By day 30, 100% will be operational.

### 5.6.3.12 Results for 6.5 Magnitude Earthquake Anna Ohio Scenario

The results of the initial analysis, the 6.5 Anna Ohio, HAZUS-MH estimates that approximately 350 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. It is estimated that three buildings will be damaged beyond repair.

The total building related losses totaled \$27.1 million after increasing estimates based on 2016 Assessed Value per the Indiana Department of Local Government Finance reports; 23% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up more than 43% of the total loss.

Figure 5-101: Anna Ohio Scenario-Building Economic Losses in thousands of Dollars



### 5.6.3.13 Anna Ohio Scenario—Essential Facility Losses

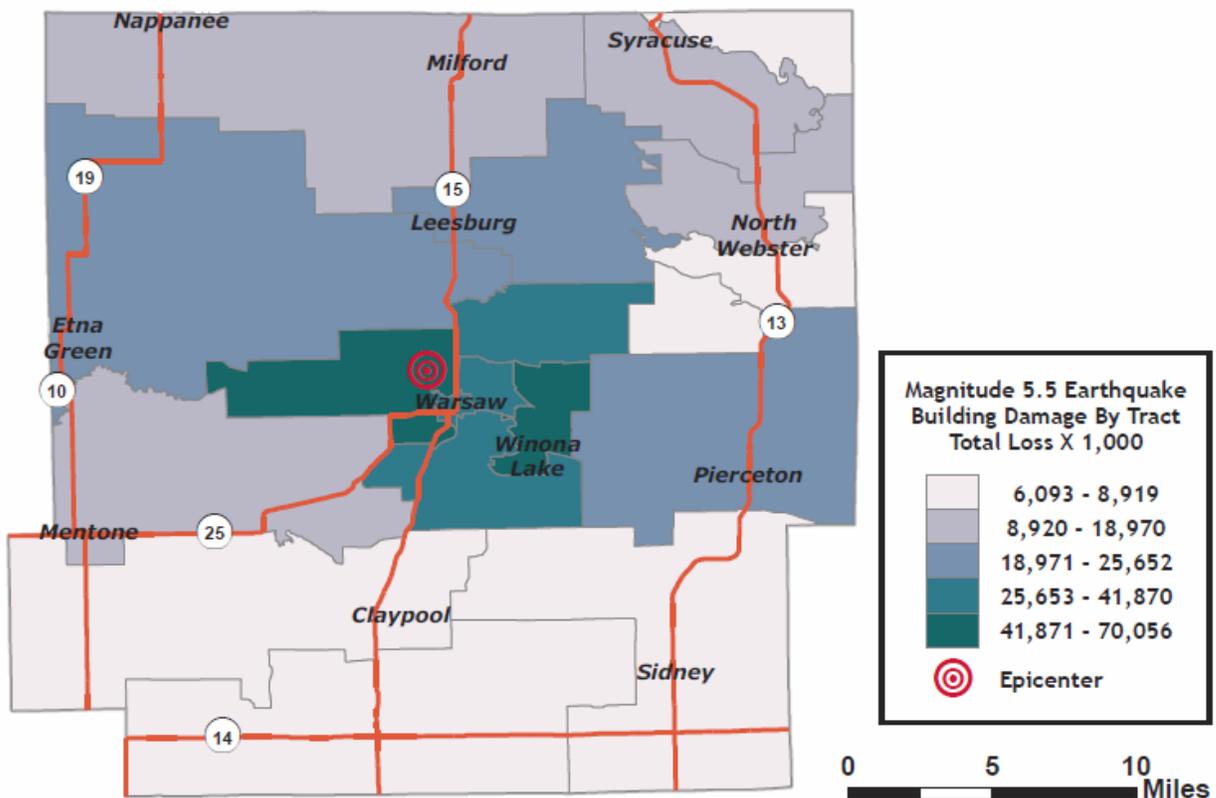
Before the earthquake, the region had 810 care beds available for use. On the day of the earthquake, the model estimates that only 485 care beds (60%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 98% of the beds will be back in service. By day 30, 100% will be operational.

### 5.6.3.14 Results for 5.5 Magnitude Earthquake in Kosciusko County

The results of the initial analysis, the 5.5 magnitude earthquake with an epicenter in the center of Kosciusko County, are depicted in Figure 5-12. HAZUS-MH estimates that approximately 5,855 buildings will be at least moderately damaged. This is more than 17% of the total number of buildings in the region. It is estimated that 206 buildings will be damaged beyond repair.

The total building related losses totaled \$624.69 million after increasing estimates based on 2016 Assessed Value per the Indiana Department of Local Government Finance reports; 11% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which comprised more than 50% of the total loss.

**Figure 5-112: Kosciusko County 5.5M Scenario-Building Economic Losses in Thousands of Dollars**



### 5.6.3.15 Kosciusko County 5.5M Scenario—Essential Facility Losses

Before the earthquake, the region had 810 care beds available for use. On the day of the earthquake, the model estimates that only 17 care beds (2%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 42% of the beds will be back in service. By day 30, 72% will be operational.

### **5.6.3.16 Results 5.0 Magnitude 500-Year Probabilistic Scenario**

The results of the 500-year probabilistic analysis HAZUS-MH estimates that approximately 347 buildings will be at least moderately damaged. This is more than 1% of the total number of buildings in the region. It is estimated that three buildings will be damaged beyond repair. The total building-related losses totaled \$13.56 million after increasing estimates based on 2016 Assessed Value per the Indiana Department of Local Government Finance reports; 23% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up more than 42% of the total loss.

### **5.6.3.17 500-Year Probabilistic Scenario—Essential Facility Losses**

Before the earthquake, the region had 810 care beds available for use. On the day of the earthquake, the model estimates that only 401 care beds (50%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 96% of the beds will be back in service. By day 30, 100% will be operational.

### **5.6.3.18 Results Annualized Risk Scenario**

HAZUS-MH estimates that approximately 186 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. It is estimated that no buildings will be damaged beyond repair.

### **5.6.3.19 Vulnerability to Future Assets/Infrastructure for Earthquake Hazard**

New construction, especially critical facilities, will accommodate earthquake mitigation design standards.

### **5.6.3.20 Analysis of Community Development Trends**

Community development will occur outside of the low lying areas in flood plains with a water table within five feet of grade which are susceptible to liquefaction.

In Meeting #2, the MHMP team discussed specific mitigation strategies for potential earthquake hazards. The discussion included strategies to harden and protect future, as well as existing, structures against the possible termination of public services and systems including power lines, water and sanitary lines, and public communication.

## **5.6.4 Thunderstorm Hazard**

### **5.6.4.1 Hazard Definition for Thunderstorm Hazard**

Severe thunderstorms are defined as thunderstorms with one or more of the following characteristics: strong winds, large damaging hail, or frequent lightning. Severe thunderstorms most frequently occur in Indiana during the spring and summer months, but can occur any month of the year at any time of day. A severe thunderstorm's impacts can be localized or can be widespread in nature. A thunderstorm is classified as severe when it meets one or more of the following criteria.

- Hail of diameter 0.75 inches or higher
- Frequent and dangerous lightning
- Wind speeds equal to or greater than 58 mph

### **5.6.4.2 Hail**

Hail is a product of a strong thunderstorm. Hail usually falls near the center of a storm, however strong winds occurring at high altitudes in the thunderstorm can blow the hailstones away from the storm center, resulting in damage in other areas near the storm. Hailstones range from pea-sized to baseball-sized, but hailstones larger than softballs have been reported on rare occasion.

### **5.6.4.3 Lightning**

Lightning is a discharge of electricity from a thunderstorm. Lightning is often perceived as a minor hazard, but in reality lightning causes damage to many structures and kills or severely injures numerous people in the United States each year.

### **5.6.4.4 Severe Winds (Straight-Line Winds)**

Straight-line winds from thunderstorms are a fairly common occurrence across Indiana. Straight-line winds can cause damage to homes, businesses, power lines, and agricultural areas, and may require temporary sheltering of individuals who are without power for extended periods of time.

### **5.6.4.5 Previous Occurrences for Thunderstorm Hazard**

The NCDC database reported 65 hailstorms in Kosciusko County since 1950. Hailstorms occur nearly every year in the late spring and early summer months. The most recent significant occurrence was on May 26, 2017 when a cold front produced a number of storms across northern Indiana.

The Kosciusko County hailstorms are identified in Table 5-21. Additional details for NCDC events are included in Appendix D.

**Table 5-21: Kosciusko County Hailstorms\***

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Kosciusko	5/5/1971	Hail	1.50 in.	0	0	0	0
Kosciusko	6/20/1979	Hail	1.00 in.	0	0	0	0
Kosciusko	6/2/1980	Hail	1.75 in.	0	0	0	0
Kosciusko	6/2/1980	Hail	2.75 in.	0	0	0	0
Kosciusko	3/28/1985	Hail	0.75 in.	0	0	0	0
Kosciusko	3/28/1985	Hail	0.75 in.	0	0	0	0
Kosciusko	4/25/1986	Hail	1.50 in.	0	0	0	0
Kosciusko	4/25/1986	Hail	0.75 in.	0	0	0	0
Kosciusko	4/25/1986	Hail	0.75 in.	0	0	0	0
Kosciusko	4/25/1986	Hail	1.50 in.	0	0	0	0
Kosciusko	7/29/1987	Hail	1.50 in.	0	0	0	0
Kosciusko	7/29/1987	Hail	1.50 in.	0	0	0	0
Kosciusko	7/11/1989	Hail	0.75 in.	0	0	0	0
Kosciusko	6/2/1990	Hail	0.75 in.	0	0	0	0
Kosciusko	6/2/1990	Hail	1.00 in.	0	0	0	0
Kosciusko	3/27/1991	Hail	1.00 in.	0	0	0	0
Kosciusko	7/7/1991	Hail	1.75 in.	0	0	0	0
Warsaw	5/25/1994	Hail	2.00 in.	0	0	0	0
Syracuse	7/2/1997	Hail	1.00 in.	0	0	0	0
North Webster	6/12/1998	Hail	1.00 in.	0	0	0	0
Mentone	6/12/1998	Hail	1.00 in.	0	0	0	0
Syracuse	4/10/1999	Hail	1.00 in.	0	0	0	0
North Webster	5/17/1999	Hail	0.75 in.	0	0	0	0
Silver Lake	4/20/2000	Hail	0.88 in.	0	0	0	0
Winona Lake	4/20/2000	Hail	0.88 in.	0	0	0	0
North Webster	4/20/2000	Hail	0.88 in.	0	0	0	0
Warsaw	5/9/2000	Hail	0.75 in.	0	0	0	0
Atwood	5/12/2000	Hail	1.75 in.	0	0	0	0
Pierceton	5/12/2000	Hail	0.88 in.	0	0	0	0
North Webster	8/2/2000	Hail	0.75 in.	0	0	0	0
Syracuse	8/2/2000	Hail	0.75 in.	0	0	0	0
Milford	9/11/2000	Hail	0.75 in.	0	0	0	0
Warsaw	9/11/2000	Hail	0.75 in.	0	0	0	0
North Webster	4/10/2001	Hail	0.75 in.	0	0	0	0
Pierceton	6/19/2001	Hail	0.75 in.	0	0	0	0
Pierceton	6/19/2001	Hail	0.75 in.	0	0	0	0
North Webster	10/24/2001	Hail	0.75 in.	0	0	0	0
Leesburg	3/20/2003	Hail	0.88 in.	0	0	0	0
Leesburg	4/30/2003	Hail	0.75 in.	0	0	0	0
North Webster	4/30/2003	Hail	1.00 in.	0	0	0	0
Warsaw	5/9/2003	Hail	0.75 in.	0	0	0	0
Leesburg	5/9/2003	Hail	1.00 in.	0	0	0	0
North Webster	5/9/2003	Hail	1.00 in.	0	0	0	0
Pierceton	5/9/2003	Hail	2.50 in.	0	0	0	0
North Webster	7/4/2003	Hail	1.00 in.	0	0	0	0
North Webster	7/4/2003	Hail	1.50 in.	0	0	0	0
Warsaw	7/4/2003	Hail	0.75 in.	0	0	0	0
Palestine	7/6/2003	Hail	0.75 in.	0	0	0	0
Warsaw	5/6/2004	Hail	0.75 in.	0	0	0	0
Silver Lake	5/7/2004	Hail	1.00 in.	0	0	0	0
Leesburg	5/21/2004	Hail	0.75 in.	0	0	0	0
Sidney	5/23/2004	Hail	0.88 in.	0	0	0	0
Warsaw	7/13/2004	Hail	1.00 in.	0	0	0	0

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
North Webster	5/17/2006	Hail	0.75 in.	0	0	0	0
Warsaw	6/21/2006	Hail	0.75 in.	0	0	0	0
North Webster	6/21/2006	Hail	0.75 in.	0	0	0	0
Warsaw	9/5/2006	Hail	1.00 in.	0	0	0	0
Barbee	5/1/2007	Hail	0.75 in.	0	0	OK	OK
Silver Lake	6/13/2008	Hail	0.75 in.	0	0	OK	OK
North Webster	6/15/2008	Hail	0.88 in.	0	0	OK	OK
Oswego	6/15/2008	Hail	0.75 in.	0	0	OK	OK
Oswego	6/22/2008	Hail	0.75 in.	0	0	OK	OK
Barbee	6/22/2008	Hail	1.00 in.	0	0	OK	OK
North Webster	6/22/2008	Hail	0.88 in.	0	0	OK	OK
Mentone	6/19/2009	Hail	1.00 in.	0	0	OK	OK
Silver Lake	6/19/2009	Hail	1.00 in.	0	0	OK	OK
Palestine	6/25/2009	Hail	.75 in.	0	0	OK	OK
Oswego	6/18/2010	Hail	1.00 in.	0	0	OK	OK
Warsaw	5/11/2011	Hail	.88 in.	0	0	OK	OK
Mentone	6/10/2011	Hail	.88 in.	0	0	OK	OK
Claypool	11/14/2011	Hail	.75 in.	0	0	OK	OK
Winona Lake	3/15/2012	Hail	.75 in.	0	0	OK	OK
Warsaw	3/15/2012	Hail	.88 in.	0	0	OK	OK
Oswego	6/29/2012	Hail	.75 in.	0	0	OK	OK
Oswego	9/22/2012	Hail	.75 in.	0	0	OK	OK
North Webster	5/9/2014	Hail	.75 in.	0	0	OK	OK
Warsaw	7/26/2014	Hail	.75 in.	0	0	OK	OK
Pierceton	7/26/2014	Hail	1.00 in.	0	0	OK	OK
Pierceton	7/26/2014	Hail	1.00 in.	0	0	OK	OK
North Webster	7/24/2017	Hail	1.00 in.	0	0	OK	OK
North Webster	7/24/2017	Hail	1.00 in.	0	0	OK	OK
Etna Green	9/5/2014	Hail	1.00 in.	0	0	OK	OK
Etna Green	9/5/2014	Hail	1.00 in.	0	0	OK	OK
North Webster	9/5/2015	Hail	.75 in.	0	0	OK	OK
Warsaw	10/6/2014	Hail	.88 in.	0	0	OK	OK
Claypool	5/30/2015	Hail	1.00 in.	0	0	OK	OK
Oswego	7/13/2015	Hail	1.00 in.	0	0	OK	OK
Leesburg	6/29/2017	Hail	.75 in.	0	0	OK	OK
Warsaw Arpt.	6/10/2017	Hail	.75 in.	0	0	OK	OK

\* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

The NCDC database reported eleven occurrences of significant lightning strikes in Kosciusko County since 1950. The most recent event occurred in Enchanted Hills in September of 2017 and caused an estimated Seventy-five thousand dollars in damage.

The Kosciusko County lightning strikes are identified in Table 5-22. Additional details for NCDC events are included in Appendix D. Lightning occurs in Kosciusko County every year. The following list only represents those events which were recorded by the NCDC.

**Table 5-22: Kosciusko County Lightning Strikes\***

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Wawasee	9/2/1993	Lightning	N/A	0	2	5K	0
Kosciusko	7/5/1994	Lightning	N/A	0	1	0	0
Packerton	7/21/1998	Lightning	N/A	0	0	250K	0
Warsaw	9/11/2000	Lightning	N/A	0	0	150K	0
Burket	8/22/2001	Lightning	N/A	0	0	50K	0
Warsaw	8/22/2001	Lightning	N/A	0	0	20K	0
Sidney	4/12/2006	Lightning	N/A	0	0	100K	0
Warsaw	5/15/2007	Lightning	N/A	0	0	40K	0K
Winona Lake	6/22/2007	Lightning	N/A	0	0	0K	0K
Atwood	7/26/2009	Lightning	N/A	0	0	20K	0K
Enchanted Hills	9/19/2017	Lightning	N/A	0	0	75K	0K

\* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

The NCDC database identified 251 wind storms reported since 1975. The most recent event occurred in June of 2017 when unseasonable warm and moist air interacted with a powerful cold front to bring several small lines of thunderstorms. While the majority of the stronger winds were not able to reach the ground, some wind gusts in the 60 to 80 mph range were noted across parts of northern Indiana.

As shown in Table 5-23, wind storms have historically occurred year-round with the greatest frequency and damage between May and July. The following table includes available top wind speeds for Kosciusko County.

**Table 5-23: Kosciusko County Wind Storms\***

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Kosciusko	11/21/1994	High Wind	0 kts.	0	0	50K	0
Kosciusko	11/27/1994	High Wind	0 kts.	0	0	120K	0
Kosciusko	3/25/1996	High Wind	46 kts.	0	0	0	0
Kosciusko	3/9/2002	High Wind	55 kts.	0	0	0	0
Kosciusko	11/12/2003	High Wind	56 kts.	0	0	50K	0
Kosciusko	3/5/2004	High Wind	52 kts.	0	0	0	0
Kosciusko	10/30/2004	Strong Wind	48 kts.	0	0	9K	0
Kosciusko	4/1/2007	Strong Wind	45 kts.	0	0	25K	0K
Kosciusko	4/1/2007	Strong Wind	45 kts.	0	0	25K	0K
Kosciusko	1/10/1975	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	4/19/1975	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	11/10/1975	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	6/30/1977	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	6/20/1979	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	6/29/1979	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	10/1/1979	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	4/8/1980	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	7/5/1980	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	7/5/1980	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	8/10/1980	Tstm Wind	0 kts.	0	0	0	0

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Kosciusko	4/13/1981	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	4/28/1981	Tstm Wind	50 kts.	0	0	0	0
Kosciusko	9/19/1981	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	10/17/1981	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	6/27/1983	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	7/1/1983	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	7/1/1983	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	9/9/1985	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	7/15/1986	Tstm Wind	52 kts.	0	0	0	0
Kosciusko	7/15/1986	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	6/12/1987	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	7/29/1987	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	7/14/1988	Tstm Wind	0 kts.	0	6	0	0
Kosciusko	7/15/1988	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	8/18/1988	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	9/19/1988	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	5/31/1989	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	9/7/1989	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	8/28/1990	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	3/27/1991	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	5/30/1991	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	5/30/1991	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	6/15/1991	Tstm Wind	0 kts.	0	3	0	0
Kosciusko	6/15/1991	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	7/2/1992	Tstm Wind	0 kts.	0	0	0	0
Warsaw	8/26/1993	Tstm Winds	0 kts.	0	0	50K	0
Kosciusko	4/26/1994	Tstm Winds	0 kts.	0	0	50K	0
Leesburg	6/13/1994	Tstm Winds	0 kts.	0	0	5K	0
Leesburg	6/13/1994	Tstm Winds	0 kts.	0	0	0	0
Leesburg	6/13/1994	Tstm Winds	0 kts.	0	0	50K	0
Kosciusko	4/26/1994	Tstm Winds	0 kts.	0	0	50K	0
Atwood	6/7/1995	Tstm Winds	0 kts.	0	0	5K	0
Warsaw	6/7/1995	Tstm Winds	0 kts.	0	0	0	0
Kosciusko	10/29/1996	Tstm Wind	0 kts.	0	0	0	0
Warsaw	5/18/1997	Tstm Wind	0 kts.	0	0	0	0
Kosciusko	7/14/1997	Tstm Wind	50 kts.	0	0	0	0
Kosciusko	7/18/1997	Tstm Wind	50 kts.	0	0	0	0
Oswego	3/28/1998	Tstm Wind	0 kts.	0	0	1K	0
Mentone	6/12/1998	Tstm Wind	0 kts.	0	0	250K	0
Barbee	6/18/1998	Tstm Wind	0 kts.	0	0	0K	0
Warsaw	6/29/1998	Tstm Wind	0 kts.	0	0	0K	0
Warsaw	7/3/1998	Tstm Wind	50 kts.	0	0	0	0
Beaver Dam	7/3/1998	Tstm Wind	50 kts.	0	0	0	0
Warsaw	7/19/1998	Tstm Wind	52 kts.	0	0	0	0
Syracuse	7/21/1998	Tstm Wind	50 kts.	0	0	0	0
Warsaw	7/21/1998	Tstm Wind	50 kts.	0	0	500K	0
Pierceton	7/21/1998	Tstm Wind	0 kts.	0	0	200K	0
Warsaw	7/21/1998	Tstm Wind	64 kts.	0	0	0	0
Pierceton	7/21/1998	Tstm Wind	50 kts.	0	0	10K	0
Milford	8/24/1998	Tstm Wind	0 kts.	0	0	50K	0
Syracuse	8/24/1998	Tstm Wind	0 kts.	0	0	50K	0
North Webster	11/10/1998	Tstm Wind	52 kts.	0	0	0	0
Etna Green	4/22/1999	Tstm Wind	0 kts.	0	0	5K	0
Warsaw	4/22/1999	Tstm Wind	60 kts.	0	0	0	0

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Milford	6/1/1999	Tstm Wind	0 kts.	0	0	50K	0
Etna Green	7/28/1999	Tstm Wind	0 kts.	0	0	25K	0
Silver Lake	5/9/2000	Tstm Wind	0 kts.	0	0	0	0
Winona Lake	5/9/2000	Tstm Wind	0 kts.	0	0	0	0
North Webster	5/9/2000	Tstm Wind	0 kts.	0	0	0	0
Claypool	5/18/2000	Tstm Wind	0 kts.	0	0	0	0
Etna Green	5/18/2000	Tstm Wind	0 kts.	0	0	0	0
Silver Lake	5/18/2000	Tstm Wind	0 kts.	0	0	0	0
Syracuse	8/2/2000	Tstm Wind	0 kts.	0	0	0	0
Warsaw	8/6/2000	Tstm Wind	0 kts.	0	0	0	0
Syracuse	9/11/2000	Tstm Wind	0 kts.	0	0	0K	0
North Webster	4/23/2001	Tstm Wind	0 kts.	0	0	0K	0
North Webster	6/12/2001	Tstm Wind	60 kts.	0	0	0	0
North Webster	6/12/2001	Tstm Wind	0 kts.	0	0	0	0
North Webster	6/12/2001	Tstm Wind	0 kts.	0	0	5K	0
North Webster	6/12/2001	Tstm Wind	0 kts.	0	0	3K	0
North Webster	6/12/2001	Tstm Wind	0 kts.	0	0	20K	0
North Webster	6/19/2001	Tstm Wind	0 kts.	0	0	0	0
Warsaw	8/22/2001	Tstm Wind	0 kts.	0	0	0	0
North Webster	8/22/2001	Tstm Wind	0 kts.	0	0	0	0
Syracuse	8/22/2001	Tstm Wind	0 kts.	0	0	0	0
Warsaw	8/22/2001	Tstm Wind	0 kts.	0	0	0	0
Warsaw	8/22/2001	Tstm Wind	0 kts.	0	0	0	0
Oswego	8/22/2001	Tstm Wind	0 kts.	0	0	0	0
Warsaw	8/22/2001	Tstm Wind	0 kts.	0	0	0	0
Syracuse	9/7/2001	Tstm Wind	0 kts.	0	0	0K	0
Pierceton	7/29/2002	Tstm Wind	0 kts.	0	0	0	0
Warsaw	9/19/2002	Tstm Wind	0 kts.	0	0	0	0
Leesburg	4/30/2003	Tstm Wind	55 kts.	0	0	2K	0
Pierceton	5/9/2003	Tstm Wind	52 kts.	0	0	0	0
Warsaw	7/4/2003	Tstm Wind	50 kts.	0	0	0	0
North Webster	7/7/2003	Tstm Wind	50 kts.	0	0	0	0
Leesburg	7/8/2003	Tstm Wind	50 kts.	0	0	0	0
North Webster	7/8/2003	Tstm Wind	58 kts.	0	0	0	0
Warsaw Arpt	7/8/2003	Tstm Wind	53 kts.	0	0	0	0
North Webster	8/21/2003	Tstm Wind	50 kts.	0	0	0	0
Kosciusko	8/26/2003	Tstm Wind	50 kts.	0	0	0	0
North Webster	8/26/2003	Tstm Wind	52 kts.	0	0	0	0
North Webster	8/26/2003	Tstm Wind	50 kts.	0	0	0	0
Milford	5/21/2004	Tstm Wind	50 kts.	0	0	0	0
Warsaw	5/22/2004	Tstm Wind	51 kts.	0	0	0	0
North Webster	6/14/2004	Tstm Wind	50 kts.	0	0	0	0
Syracuse	7/21/2004	Tstm Wind	50 kts.	0	0	0	0
Warsaw	7/21/2004	Tstm Wind	50 kts.	0	0	0	0
Winona Lake	5/13/2005	Tstm Wind	52 kts.	0	0	0	0
Syracuse	6/5/2005	Tstm Wind	51 kts.	0	0	0	0
atwood	7/6/2005	Tstm Wind	55 kts.	0	0	0	0
Milford	7/18/2005	Tstm Wind	55 kts.	0	0	0	0
Syracuse	7/21/2005	Tstm Wind	55 kts.	0	0	1K	0
Syracuse	7/25/2005	Tstm Wind	55 kts.	0	0	2K	0
Syracuse	11/6/2005	Tstm Wind	55 kts.	0	0	10K	0
Silver Lake	11/6/2005	Tstm Wind	50 kts.	0	0	1K	0
Leesburg	3/13/2006	Tstm Wind	55 kts.	0	0	0	0
Milford	3/13/2006	Tstm Wind	60 kts.	0	0	265K	0
Warsaw	5/25/2006	Tstm Wind	55 kts.	0	0	0	0
Warsaw	6/21/2006	Tstm Wind	65 kts.	0	0	0	0

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Milford	7/2/2006	Tstm Wind	60 kts.	0	0	5K	0
Syracuse	7/18/2006	Tstm Wind	50 kts.	0	0	0	0
Syracuse	5/15/2007	Tstm Wind	53 kts.	0	0	0K	0K
Milford	5/15/2007	Tstm Wind	60 kts.	0	0	50K	0K
Oswego	5/15/2007	Tstm Wind	55 kts.	0	0	10K	0K
Oswego	5/15/2007	Tstm Wind	55 kts.	0	0	10K	0K
Warsaw	5/15/2007	Tstm Wind	55 kts.	0	0	15K	0K
Nappanee	8/15/2007	Tstm Wind	55 kts.	0	0	0K	0K
Barbee	8/24/2007	Tstm Wind	70 kts.	0	0	150K	0K
Clunette	10/18/2007	Tstm Wind	55 kts.	0	0	0K	0K
Leesburg	10/18/2007	Tstm Wind	55 kts.	0	0	0K	0K
Barbee	12/23/2007	Tstm Wind	53 kts.	0	0	0K	0K
Warsaw	12/23/2007	Tstm Wind	56 kts.	0	0	0K	0K
North Webster	6/15/2008	Tstm Wind	50 kts.	0	0	0K	0K
Oswego	6/21/2008	Tstm Wind	55 kts.	0	0	0K	0K
Warsaw	8/4/2008	Tstm Wind	60 kts.	0	0	0K	0K
Nappanee	12/27/2008	Tstm Wind	60 kts.	0	0	15K	0K
Mentone	5/14/2009	Tstm Wind	55 kts.	0	0	5.000M	0.00K
Winona Lake	5/14/2009	Tstm Wind	50 kts.	0	0	0	0K
Redmon Park	6/19/2009	Tstm Wind	60 kts.	0	0	0	0K
Syracuse	6/19/2009	Tstm Wind	60 kts.	0	0	0	0K
Vawter Park	6/19/2009	Tstm Wind	65 kts.	0	0	0	0k
Redmon Park	7/16/2009	Tstm Wind	55 kts.	0	0	.50K	0K
Barbee	7/16/2009	Tstm Wind	55 kts.	0	0	0	0K
Claypool	5/21-2010	Tstm Wind	55 kts.	0	0	0	0K
Warsaw	5/32/2010	Tstm Wind	50 kts.	0	0	0	0K
Oswego	6/12/2010	Tstm Wind	55 kts.	0	0	0	0K
Oswego	6/12/2010	Tstm Wind	55 kts.	0	0	0	0K
Warsaw	6/12/2010	Tstm Wind	55 kts.	0	0	0	0K
Milford	6/18/2010	Tstm Wind	65 kts.	0	0	0	0K
North Webster	6/23/2010	Tstm Wind	56 kts.	0	0	0	0K
Leesburg	6/23/2010	Tstm Wind	55 kts.	0	0	0	0K
Syracuse	6/23/2010	Tstm Wind	70 kts.	0	0	0	0K
Packerton	7/15/2010	Tstm Wind	50 kts.	0	0	0	0K
Packerton	7/15/2010	Tstm Wind	55 kts.	0	0	0	0K
Mentone	7/28/2010	Tstm Wind	60 kts.	0	0	0	0K
Vawter Park	10/26/2010	Tstm Wind	60 kts.	0	0	0	0K
Leesburg	4/4/2011	Tstm Wind	65 kts.	0	0	0	0K
Barabee	4/4/2011	Tstm Wind	53 kts.	0	0	0	0K
Warsaw	4/4/2011	Tstm Wind	50 kts.	0	0	6.00K	0K
Milford	5/29/2011	Tstm Wind	50 kts.	0	0	0	0K
Warsaw	6/21/2011	Tstm Wind	70 kts.	0	0	0	0K
Oswego	7/2/2011	Tstm Wind	50 kts.	0	0	0	0K
Syracuse	7/22/2011	Tstm Wind	60 kts.	0	0	0	0K
Winona Lake	7/22/2011	Tstm Wind	78 kts.	0	0	500.00K	0K
North Webster	7/22/2011	Tstm Wind	52 kts.	0	0	0	0K
Pierceton	7/23/2011	Tstm Wind	50 kts.	0	0	0	0K
Claypool	8/3/2011	Tstm Wind	50 kts.	0	0	0	0K
North Webster	8/7/2011	Tstm Wind	55 kts.	0	0	0	0K
Warsaw	6/29/2012	Tstm Wind	61 kts.	0	0	0	0K
Warsaw	6/29/2012	Tstm Wind	60 kts.	0	0	0	0K
Warsaw Arpt	6/29/2012	Tstm Wind	60 kts.	0	0	0	0K
Syracuse	6/29/2012	Tstm Wind	60 kts.	0	0	0	0K
Winona Lake	7/1/2012	Tstm Wind	60 kts.	0	0	0	0K
Winona Lake	7/1/2012	Tstm Wind	60 kts.	0	0	0	0K
Claypool	7/1/2012	Tstm Wind	60 kts.	0	0	0	0K

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Warsaw	8/4/2012	Tstm Wind	55 kts.	0	0	0	OK
North Webster	8/4/2012	Tstm Wind	56 kts.	0	0	0	OK
Pierceton	5/31/2013	Tstm Wind	50 kts.	0	0	0	OK
Warsaw	6/24/2013	Tstm Wind	52 kts.	0	0	0	OK
Warsaw	6/24/2013	Tstm Wind	52 kts.	0	0	0	OK
Warsaw Arpt	6/24/2013	Tstm Wind	55 kts.	0	0	0	OK
Vawter Park	6/24/2013	Tstm Wind	60 kts.	0	0	0	OK
Warsaw	6/25/2013	Tstm Wind	52 kts.	0	0	0	OK
North Webster	6/25/2013	Tstm Wind	56 kts.	0	0	0	OK
North Webster	6/25/2013	Tstm Wind	56 kts.	0	0	0	OK
Atwood	6/27/2013	Tstm Wind	55 kts.	0	0	0	OK
Warsaw	7/10/2013	Tstm Wind	55 kts.	0	0	0	OK
Leesburg	7/10/2013	Tstm Wind	55 kts.	0	0	0	OK
Syracuse	7/10/2013	Tstm Wind	58 kts.	0	0	0	OK
Silver Lake	8/2/2013	Tstm Wind	50 kts.	0	0	0	OK
Barbee	11/17/2013	Tstm Wind	50 kts.	0	0	0	OK
Pierceton	11/17/2013	Tstm Wind	55 kts.	0	0	0	OK
Oswego	11/17/2013	Tstm Wind	55 kts.	0	0	0	OK
Oswego	11/17/2013	Tstm Wind	60 kts.	0	0	0	OK
Oswego	11/17/2013	Tstm Wind	60 kts.	0	0	0	OK
Warsaw	11/18/2013	Tstm Wind	60 kts.	0	0	0	OK
Milford	6/18/2014	Tstm Wind	50 kts.	0	0	0	OK
Redmon Park	6/28/2014	Tstm Wind	60 kts.	0	0	0	OK
Oswego	7/1/2014	Tstm Wind	56 kts.	0	0	0	OK
Syracuse	7/1/2014	Tstm Wind	60 kts.	0	0	0	OK
Enchanted Hills	7/1/2014	Tstm Wind	55 kts.	0	0	0	OK
Warsaw	7/1/2014	Tstm Wind	65 kts.	0	0	0	OK
Warsaw	7/2/2014	Tstm Wind	60 kts.	0	0	0	OK
North Webster	7/1/2014	Tstm Wind	61 kts.	0	0	0	OK
North Webster	7/27/2014	Tstm Wind	58 kts.	0	0	0	OK
Milford	8/19/2014	Tstm Wind	55 kts.	0	0	0	OK
Redmond Park	9/5/2014	Tstm Wind	55 kts.	0	0	0	OK
Redmond Park	9/5/2014	Tstm Wind	50 kts.	0	0	0	OK
Atwood	9/5/2014	Tstm Wind	55 kts.	0	0	0	OK
North Webster	9/20/2014	Tstm Wind	52 kts.	0	0	0	OK
Oswego	5/8/2015	Tstm Wind	56 kts.	0	0	0	OK
Warsaw	5/30/2015	Tstm Wind	55 kts.	0	0	0	OK
Oswego	5/30/2015	Tstm Wind	50 kts.	0	0	0	OK
Oswego	6/10/2015	Tstm Wind	61 kts.	0	0	0	OK
Oswego	6/10/2015	Tstm Wind	52 kts.	0	0	0	OK
Vawter Park	8/17/2015	Tstm Wind	52 kts.	0	0	0	OK
Redmond Park	8/17/2015	Tstm Wind	50 kts.	0	0	0	OK
Milford	6/20/2016	Tstm Wind	55 kts.	0	0	0	OK
Syracuse	6/20/2016	Tstm Wind	55 kts.	0	0	0	OK
Vawter Park	6/20/2016	Tstm Wind	55 kts.	0	0	0	OK
Warsaw	6/22/2016	Tstm Wind	55 kts.	0	0	0	OK
Claypool	6/22/2016	Tstm Wind	61 kts.	0	0	0	OK
Milford	7/12/2016	Tstm Wind	61 kts.	0	0	0	OK
Barabee	8/17/2016	Tstm Wind	55 kts.	0	0	0	OK
Etna Green	11/18/2016	Tstm Wind	55 kts.	0	0	0	OK
Warsaw Arpt	11/18/2016	Tstm Wind	55 kts.	0	0	0	OK
Beaver Dam	11/18/2016	Tstm Wind	55 kts.	0	0	0	OK
Leesburg	11/18/2016	Tstm Wind	60 kts.	0	0	0	OK
Redmond Park	11/18/2016	Tstm Wind	50 kts.	0	0	0	OK
Syracuse	3/1/2017	Tstm Wind	50 kts.	0	0	0	OK
Winona Lake	3/1/2017	Tstm Wind	50 kts.	0	0	0	OK

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Oswego	3/1/2017	Tstm Wind	56 kts.	0	0	0	OK
Warsaw	3/1/2017	Tstm Wind	61 kts.	0	0	0	OK
Warsaw	3/1/2017	Tstm Wind	51 kts.	0	0	0	OK
North Webster	3/1/2017	Tstm Wind	55 kts.	0	0	0	OK
North Webster	3/1/2017	Tstm Wind	56 kts.	0	0	0	OK
Beaver Dam	5/18/2017	Tstm Wind	55 kts.	0	0	0	OK
Silver Lake	5/26/2017	Tstm Wind	70 kts.	0	0	0	OK
Warsaw	6/4/2017	Tstm Wind	50 kts.	0	0	0	OK
Sidney	6/13/2017	Tstm Wind	55 kts.	0	0	0	OK

\* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

#### 5.6.4.6 Geographic Location for Thunderstorm Hazard

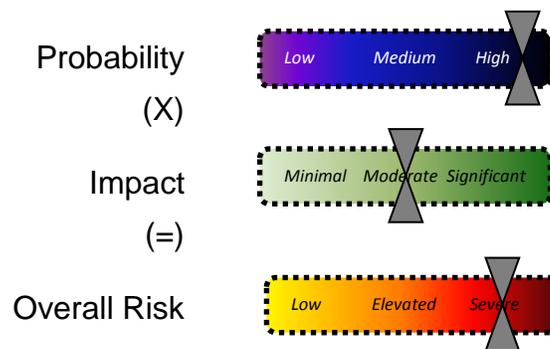
The entire county has the same risk for occurrence of thunderstorms. They can occur at any location within the county.

#### 5.6.4.7 Hazard Extent for Thunderstorm Hazard

The extent of the historical thunderstorms varies in terms of the extent of the storm, the wind speed, and the size of hail stones. Thunderstorms can occur at any location within the county.

#### 5.6.4.8 Risk Identification for Thunderstorm Hazard

Based on historical information, the probability of a thunderstorm is high. In Meeting #2, the planning team determined that the potential impact of a thunderstorm is moderate; therefore, the overall risk of a thunderstorm hazard for Kosciusko County is severe.



#### 5.6.4.9 Vulnerability Analysis for Thunderstorm Hazard

Severe thunderstorms are an equally distributed threat across the entire jurisdiction; therefore, the entire county's population and all buildings are vulnerable to a severe thunderstorm and can expect the same impacts within the affected area. This plan will therefore consider all buildings located within the county as vulnerable. The existing buildings and infrastructure in Kosciusko County are discussed in Table 5-6.

#### **5.6.4.10 Critical Facilities**

All critical facilities are vulnerable to severe thunderstorms. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, fires caused by lightning and loss of function of the facility (e.g. a damaged police station will no longer be able to serve the community). Table 5-5 lists the types and numbers of all of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

#### **5.6.4.11 Building Inventory**

A table of the building exposure in terms of types and numbers of buildings for the entire county is provided in Table 5-6. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of building functionality (e.g. a damaged home will no longer be habitable causing residents to seek shelter).

#### **5.6.4.12 Infrastructure**

During a severe thunderstorm the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable it is important to emphasize that any number of these items could become damaged during a severe thunderstorm. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); or railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

#### **5.6.4.13 Potential Dollar Losses for Thunderstorm Hazard**

A HAZUS-MH analysis was not completed for thunderstorms because the widespread extent of such a hazard makes it difficult to accurately model outcomes.

To determine dollar losses for a thunderstorm hazard, the available NCDC hazard information was condensed to include only thunderstorm hazards that occurred within the past ten years. Kosciusko County's MHMP team then reviewed the property damages reported to NCDC and made any applicable updates.

It was determined that since 2008, Kosciusko County has incurred \$ 5.6 million in damages relating to thunderstorms, including hail, lightning, and high winds. The resulting information is listed in Table 5-24.

**Table 5-24: Kosciusko County Property Damage (2008-2017)**

Location or County	Date	Type	Magnitude	Property Damage
Silver Lake	6/13/2008	Hail	0.75 in.	\$
North Webster	6/15/2008	Hail	0.88 in.	\$
Oswego	6/15/2008	Hail	0.75 in.	\$
North Webster	6/15/2008	Tstm Wind	50 kts.	\$
Oswego	6/21/2008	Tstm Wind	55 kts.	\$
Oswego	6/22/2008	Hail	0.75 in.	\$
Barbee	6/22/2008	Hail	1.00 in.	\$
North Webster	6/22/2008	Hail	0.88 in.	\$
Warsaw	8/4/2008	Tstm Wind	60 kts.	\$
Nappanee	12/27/2008	Tstm Wind	60 kts.	\$15,000
			<b>2008 Subtotal</b>	<b>\$15,000</b>
Mentone	5/14/2009	Tstm Wind	55 kts.	\$ 5,000,000
Redmon Park	7/16/2016	Tstm Wind	55 kts.	\$50,000
Atwood	7/16/2009	Lightning		\$20,000
			<b>2009 Subtotal</b>	<b>\$5,070,000</b>
No reported damages in 2010				
			<b>2010 Subtotal</b>	<b>00</b>
Warsaw	4/4/2011	Tst Wind	50 kts.	\$15,000
Winona Lake	7/22/2011	Tst Wind	78 kts.	\$500,000
			<b>2011 Subtotal</b>	<b>\$515,000</b>
No reported damage in 2012				
			<b>2012 Subtotal</b>	<b>00</b>
No reported damage in 2013				
			<b>2013 Subtotal</b>	<b>00</b>
No reported damage in 2014				
			<b>2014 Subtotal</b>	<b>00</b>
No reported damage in 2015				
			<b>2015 Subtotal</b>	<b>00</b>
No reported damage in 2016				
			<b>2016 Subtotal</b>	<b>00</b>
No reported damage in 2017				
			<b>2017 Subtotal</b>	<b>00</b>
			<b>Total</b>	<b>\$5,600,000</b>

The historical data is erratic and not wholly documented or confirmed. As a result, potential dollar losses for a future event cannot be precisely calculated; however, based on averages in the last decade, it can be determined that Kosciusko County incurs annual risk of approximately \$622,222 per year.

#### **5.6.4.14 Vulnerability to Future Assets/Infrastructure for Thunderstorm Hazard**

All future development within the county and all communities will remain vulnerable to these events.

#### **5.6.4.15 Analysis of Community Development Trends**

Preparing for severe storms will be enhanced if officials sponsor a wide range of programs and initiatives to address the overall safety of county residents. New structures need to be built with more sturdy construction, and those structures already in place need to be hardened to lessen the potential impacts of severe weather. Community warning sirens to provide warning of approaching storms are also vital to preventing the loss of property and ensuring the safety of Kosciusko County residents.

## **5.6.5 Drought and Extreme Heat Hazard**

### **5.6.5.1 Hazard Definition for Drought Hazard**

Drought is a climatic phenomenon that occurs in Kosciusko County. The meteorological condition that creates a drought is below normal rainfall. However, excessive heat can lead to increased evaporation, which will enhance drought conditions. Droughts can occur in any month. Drought differs from normal arid conditions found in low rainfall areas. Drought is the consequence of a reduction in the amount of precipitation over an undetermined length of time (usually a growing season or more).

The severity of a drought depends on location, duration, and geographical extent. Additionally, drought severity depends on the water supply, usage demands made by human activities, vegetation, and agricultural operations. Drought brings several different problems that must be addressed. The quality and quantity of crops, livestock, and other agricultural assets will be affected during a drought. Drought can adversely impact forested areas leading to an increased potential for extremely destructive forest and woodland fires that could threaten residential, commercial, and recreational structures.

### **5.6.5.2 Hazard Definition for Extreme Heat Hazard**

Drought conditions are often accompanied by extreme heat, which is defined as temperatures that hover 10 degrees or more above the average high for the area and last for several weeks. Extreme heat can occur in humid conditions when high atmospheric pressure traps the damp air near the ground or in dry conditions, which often provoke dust storms.

### **5.6.5.3 Common Terms Associated with Extreme Heat**

**Heat Wave:** Prolonged period of excessive heat, often combined with excessive humidity

**Heat Index:** A number in degrees Fahrenheit that tells how hot it feels when relative humidity is added to air temperature. Exposure to full sunshine can increase the heat index by 15 degrees.

**Heat Cramps:** Muscular pains and spasms due to heavy exertion. Although heat cramps are the least severe, they are often the first signal that the body is having trouble with heat.

**Heat Exhaustion:** Typically occurs when people exercise heavily or work in a hot, humid place where body fluids are lost through heavy sweating. Blood flow to the skin increases, causing blood flow to decrease to the vital organs, resulting in a form of mild shock. If left untreated, the victim's condition will worsen. Body temperature will continue to rise and the victim may suffer heat stroke.

**Heat Stroke/Sun Stroke:** A life-threatening condition. The victim's temperature control system, which produces sweat to cool the body, stops working. The body's temperature can rise so high that brain damage and death may result if the body is not cooled quickly.

*Source: FEMA*

#### 5.6.5.4 Previous Occurrences for Drought and Extreme Heat Hazard

The NCDC database reported two drought/heat wave events in Kosciusko County since 1950. In 1995, heat wave conditions developed across all of Indiana. High temperatures reached between 95 and 105 degrees with heat indices between 100 and 120 degrees. Nearly all heat-related deaths occurred in the sick or elderly populations and most occurred in northwest Indiana.

NCDC records of droughts/heat waves are identified in Table 5-25. Additional details for NCDC events are included in Appendix D.

**Table 5-25: Kosciusko County Drought/Heat Wave Events\***

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Kosciusko	7/13/1995	Heat Wave	N/A	14	0	1.0M	0
Kosciusko	8/21/1995	Heat Wave	N/A	1	0	0	0

\* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

#### 5.6.5.5 Geographic Location for Drought and Extreme Heat Hazard

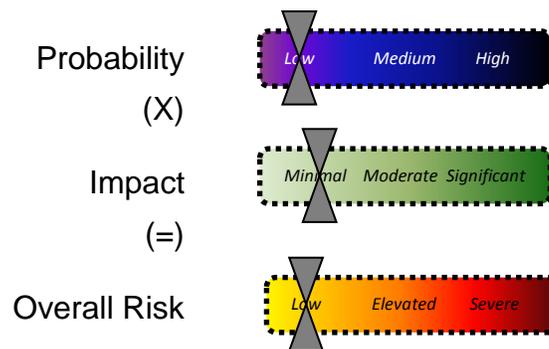
Droughts are regional in nature. All areas of the United States are vulnerable to the risk of drought and extreme heat.

#### 5.6.5.6 Hazard Extent for Drought and Extreme Heat Hazard

Droughts and extreme heat can be widespread or localized events. The extent of the droughts varies both in terms of the extent of the heat and the range of precipitation.

#### 5.6.5.7 Risk Identification for Drought/Extreme Heat Hazard

Based on historical information, the probability of a drought is low. In Meeting #2, the planning team determined that the potential impact of a drought or an extended period of extreme heat is minimal; therefore, the overall risk of a drought/extreme heat hazard for the county is low.



#### **5.6.5.8 Vulnerability Analysis for Drought and Extreme Heat Hazard**

Drought and extreme heat impacts are an equally distributed threat across the entire jurisdiction; therefore, the county is vulnerable to this hazard and can expect the same impacts within the affected area. According to FEMA, approximately 175 Americans die each year from extreme heat. Young children, elderly, and infirmed populations have the greatest risk.

The entire population and all buildings have been identified as at risk. The building exposure for Kosciusko County, as determined from the building inventory is included in Table 5-6.

#### **5.6.5.9 Critical Facilities**

All critical facilities are vulnerable to drought. A critical facility will encounter many of the same impacts as any other building within the jurisdiction, which should involve only minor damage. These impacts include water shortages, fires as a result of drought conditions, and residents in need of medical care from the heat and dry weather. Table 5-5 lists the types and numbers of all of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

#### **5.6.5.10 Building Inventory**

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 5-6. The buildings within the county can all expect the same impacts similar to those discussed for critical facilities. These impacts include water shortages, fires as a result of drought conditions, and residents in need of medical care from the heat and dry weather.

#### **5.6.5.11 Infrastructure**

During a drought the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. The risk to these structures is primarily associated with a fire that could result from the hot, dry conditions. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these items could become damaged during a heat wave. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); or railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

#### **5.6.5.12 Vulnerability to Future Assets/Infrastructure for Drought/Extreme Heat Hazard**

Future development will remain vulnerable to these events. Typically, some urban and rural areas are more susceptible than others. For example, urban areas are subject to water shortages during periods of drought. Excessive demands of the populated area place a limit on water resources. In rural areas, crops and livestock may suffer from extended periods of heat and drought. Dry conditions can lead to the ignition of wildfires that could threaten residential, commercial, and recreational areas.

### **5.6.5.13 Analysis of Community Development Trends**

Because the droughts and extreme heat are regional in nature future development will be impacted across the county. Although urban and rural areas are equally vulnerable to this hazard, those living in urban areas may have a greater risk from the effects of a prolonged heat wave. The atmospheric conditions that create extreme heat tend to trap pollutants in urban areas, adding contaminated air to the excessively hot temperatures and creating increased health problems. Furthermore, asphalt and concrete store heat longer, gradually releasing it at night and producing high nighttime temperatures. This phenomenon is known as the “urban heat island effect” (*Source: FEMA*).

Local officials should address the drought and extreme heat hazard by educating the public on steps to take before and during the event—for example, temporary window reflectors to direct heat back outside, staying indoors as much as possible, and avoiding strenuous work during the warmest part of the day.

## **5.6.6 Winter Storm Hazard**

### **5.6.6.1 Hazard Definition for Winter Storm Hazard**

Severe winter weather consists of various forms of precipitation and strong weather conditions. This may include one or more of the following: freezing rain, sleet, heavy snow, blizzards, icy roadways, extreme low temperatures, and strong winds. These conditions can cause human health risks such as frostbite, hypothermia, and death.

### **5.6.6.2 Ice (glazing) and Sleet Storms**

Ice or sleet, even in the smallest quantities, can result in hazardous driving conditions and can be a significant cause of property damage. Sleet can be easily identified as frozen raindrops. Sleet does not stick to trees and wires. The most damaging winter storms in Indiana have been ice storms. Ice storms are the result of cold rain that freezes on contact with objects having a temperature below freezing. Ice storms occur when moisture-laden gulf air converges with the northern jet stream causing strong winds and heavy precipitation. This precipitation takes the form of freezing rain coating power lines, communication lines, and trees with heavy ice. The winds will then cause the overburdened limbs and cables to snap; leaving large sectors of the population without power, heat, or communication. Falling trees and limbs can also cause building damage during an ice storm. In the past few decades numerous ice storm events have occurred in Indiana.

### **5.6.6.3 Snowstorms**

Significant snowstorms are characterized by the rapid accumulation of snow, often accompanied by high winds, cold temperatures, and low visibility. A blizzard is categorized as a snowstorm with winds of 35 miles per hour or greater and/or visibility of less than ¼ mile for three or more hours. The strong winds during a blizzard blow falling and already existing snow, create poor visibility and impassable roadways. Blizzards have the potential to result in property damage.

Indiana has repeatedly been struck by blizzards. Blizzard conditions can not only cause power outages and loss of communication, but also make transportation difficult. The blowing of snow can make visibility less than ¼ mile, but the resulting disorientation makes even travel by foot dangerous if not deadly.

### **5.6.6.4 Severe Cold**

Severe cold is characterized by the ambient air temperature dropping to around 0°F or below. These extreme temperatures can increase the likelihood of frostbite and hypothermia. High winds during severe cold events can enhance the air temperature's effects. Fast winds during cold weather events can lower the wind chill factor (how cold the air feels on your skin). As a result, the time it takes for frostbite and hypothermia to affect a person's body will decrease.

### 5.6.6.5 Previous Occurrences for Winter Storm Hazard

The NCDC database identified 23 winter storm and extreme cold events for Kosciusko County since 1965. The most recent event was recorded in January 2014. Blizzards occurred as recently as February of 2011, which resulted in road closures and a local emergency declaration.

The NCDC winter storms are listed in Table 5-26. Additional details for NCDC events are included in Appendix D.

**Table 5-26: Winter Storm Events\***

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Kosciusko	1/14/1994	Extreme Cold	N/A	3	0	5.0M	0
Kosciusko	2/25/1994	Heavy Snow/blowing Snow	N/A	0	0	0	0
Kosciusko	2/27/1995	Glaze	N/A	0	0	0	0
Kosciusko	4/10/1995	Ice Storm	N/A	0	0	0	0
Kosciusko	12/8/1995	Winter Storm	N/A	0	0	0	0
Kosciusko	12/18/1995	Winter Storm	N/A	0	0	0	0
Kosciusko	2/2/1996	Extreme Cold	N/A	0	0	0	0
Kosciusko	1/9/1997	Winter Storm	N/A	0	0	0	0
Kosciusko	1/15/1997	Winter Storm	N/A	0	0	0	0
Kosciusko	1/2/1999	Heavy Snow	N/A	0	0	0	0
Kosciusko	12/11/2000	Heavy Snow	N/A	0	0	0K	0
Kosciusko	12/16/2000	Heavy Snow	N/A	0	0	0K	0
Kosciusko	1/31/2002	Ice Storm	N/A	0	1	10K	0
Kosciusko	2/26/2002	Winter Storm	N/A	0	0	0	0
Kosciusko	12/24/2002	Heavy Snow	N/A	0	0	0	0
Kosciusko	1/5/2005	Winter Storm	N/A	0	0	0	0
Kosciusko	1/8/2005	Heavy Snow	N/A	0	0	0	0
Kosciusko	1/22/2005	Winter Storm	N/A	0	0	0	0
Kosciusko	3/1/2005	Winter Storm	N/A	0	0	0	0
Kosciusko	12/1/2005	Winter Weather/mix	N/A	0	0	0	0
Kosciusko	12/8/2005	Heavy Snow	N/A	0	0	0	0
Kosciusko	2/13/2007	Blizzard	N/A	0	0	0K	0K
Kosciusko	2/13/2007	Blizzard	N/A	0	0	0K	0K
Kosciusko	2/13/2007	Winter Storm	N/A	0	0	0K	0K
Kosciusko	2/13/2007	Winter Storm	N/A	0	0	0K	0K
Kosciusko	2/24/2007	Ice Storm	N/A	0	0	25K	0K
Kosciusko	2/24/2007	Ice Storm	N/A	0	0	25K	0K
Kosciusko	12/1/2007	Winter Storm	N/A	0	0	0K	0K
Kosciusko	12/1/2007	Winter Storm	N/A	0	0	0K	0K
Kosciusko	12/4/2007	Heavy Snow	N/A	0	0	0K	0K
Kosciusko	12/4/2007	Heavy Snow	N/A	0	0	0K	0K
Kosciusko	12/9/2007	Ice Storm	N/A	0	0	0K	0K
Kosciusko	12/15/2007	Winter Storm	N/A	0	0	0K	0K
Kosciusko	2/1/2008	Winter Storm	N/A	0	0	0K	0K
Kosciusko	3/4/2008	Winter Storm	N/A	0	0	0K	0K
Northern Indiana	12/18/2008	Ice Storm	N/A	0	0	0K	0K
Northern Indiana	12/18/2008	Ice Storm	N/A	0	0	0K	0K
Kosciusko	1/12/2009	Heavy Snow	N/A	0	0	0K	0K

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Kosciusko	1/12/2009	Heavy Snow	N/A	0	0	OK	OK
Kosciusko	1/2/2010	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/9/2010	Winter Storm	N/A	0	0	OK	OK
Kosciusko	12/12/2010	Winter Storm	N/A	0	0	OK	OK
Kosciusko	1/11/2011	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/1/2011	Blizzard	N/A	0	0	OK	OK
Kosciusko	2/5/2011	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/20/2011	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/24/2011	Winter Weather	N/A	0	0	OK	OK
Kosciusko	1/1/2012	Winter Weather	N/A	0	0	OK	OK
Kosciusko	1/12/2012	Winter Weather	N/A	0	0	OK	OK
Kosciusko	1/19/2012	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/4/2012	Winter Weather	N/A	0	0	OK	OK
Kosciusko	12/26/2012	Winter Weather	N/A	0	0	OK	OK
Kosciusko	1/27/2013	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/4/2013	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/26/2013	Winter Weather	N/A	0	0	OK	OK
Kosciusko	3/24/2013	Winter Weather	N/A	0	0	OK	OK
Kosciusko	12/13/2013	Winter Storm	N/A	0	0	OK	OK
Kosciusko	1/1/2014	Winter Weather	N/A	0	0	OK	OK
Kosciusko	1/5/2014	Winter Storm	N/A	0	0	OK	OK
Kosciusko	2/2/2014	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/4/2014	Winter Storm	N/A	0	0	OK	OK
Kosciusko	2/17/2014	Winter Weather	N/A	0	0	OK	OK
Kosciusko	1/5/2015	Winter Weather	N/A	0	0	OK	OK
Kosciusko	1/8/2015	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/14/2015	Winter Storm	N/A	0	0	OK	OK
Kosciusko	3/3/2015	Winter Weather	N/A	0	0	OK	OK
Kosciusko	12/28/2015	Winter Weather	N/A	0	0	OK	OK
Kosciusko	1/3/2016	Winter Weather	N/A	0	0	OK	OK
Kosciusko	1/12/2016	Winter Weather	N/A	0	0	OK	OK
Kosciusko	2/24/2016	Winter Storm	N/A	0	0	OK	OK
Kosciusko	12/17/2016	Winter Weather	N/A	0	0	OK	OK
Kosciusko	3/17/2017	Winter Weather	N/A	0	0	OK	OK

\* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

### 5.6.6.6 Geographic Location for Winter Storm Hazard

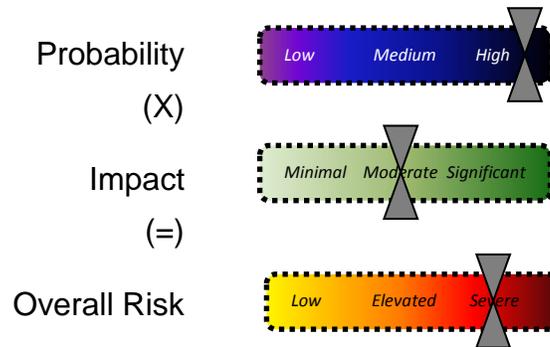
Severe winter storms are regional in nature. Most of the NCDC data is calculated regionally or in some cases statewide.

### 5.6.6.7 Hazard Extent for Winter Storm Hazard

The extent of the historical winter storms varies in terms of storm location, temperature, and ice or snowfall. A severe winter storm can occur anywhere in the jurisdiction.

### 5.6.6.8 Risk Identification for Winter Storm Hazard

Based on historical information, the probability of a winter storm is high. In Meeting #2, the planning team determined that the potential impact of a winter storm is moderate; therefore, the overall risk of a winter storm hazard for Kosciusko County is severe.



### 5.6.6.9 Vulnerability Analysis for Winter Storm Hazard

Winter storm impacts are equally distributed across the entire jurisdiction; therefore, the entire county is vulnerable to a winter storm and can expect the same impacts within the affected area. The building exposure for Kosciusko County, as determined from the building inventory, is included in Table 5-6.

### 5.6.6.10 Critical Facilities

All critical facilities are vulnerable to a winter storm. A critical facility will encounter many of the same impacts as other buildings within the jurisdiction. These impacts include loss of gas or electricity from broken or damaged utility lines, damaged or impassable roads and railways, broken water pipes, and roof collapse from heavy snow. Table 5-5 lists the types and numbers of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

### 5.6.6.11 Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 5-6. The impacts to the general buildings within the county are similar to the damages expected to the critical facilities. These include loss of gas or electricity from broken or damaged utility lines, damaged or impassable roads and railways, broken water pipes, and roof collapse from heavy snow.

### 5.6.6.12 Infrastructure

During a winter storm the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable it is important to emphasize that any number of these items could become damaged during a winter storm. Potential impacts include broken gas and/or electricity lines or damaged utility lines, damaged or impassable roads and railways, and broken water pipes.

### 5.6.6.13 Potential Dollar Losses for Winter Storm Hazard

A HAZUS-MH analysis was not completed for winter storms because the widespread extent of such a hazard makes it difficult to accurately model outcomes.

To determine dollar losses for a winter storm hazard, the available NCDC hazard information was condensed to include only winter storm hazards that occurred within the past ten years. Kosciusko County’s MHMP team then reviewed the property damages reported to NCDC and made any applicable updates.

It was determined that since 1998, Kosciusko County has incurred \$60,000 in damages relating to winter storms, including sleet/ice and heavy snow. The resulting data is listed in Table 5-27.

**Table 5-27: Kosciusko County Property Damage (1998-2017)**

Location or County	Date	Type	Magnitude	Property Damage
Kosciusko	1/2/1999	Heavy Snow	N/A	\$ -
<b>1999 Subtotal</b>				<b>\$ -</b>
Kosciusko	12/11/2000	Heavy Snow	N/A	\$ -
Kosciusko	12/16/2000	Heavy Snow	N/A	\$ -
<b>2000 Subtotal</b>				<b>\$ -</b>
Kosciusko	1/31/2002	Ice Storm	N/A	\$ 10,000
Kosciusko	2/26/2002	Winter Storm	N/A	\$ -
Kosciusko	12/24/2002	Heavy Snow	N/A	\$ -
<b>2002 Subtotal</b>				<b>\$ 10,000</b>
Kosciusko	1/5/2005	Winter Storm	N/A	\$ -
Kosciusko	1/8/2005	Heavy Snow	N/A	\$ -
Kosciusko	1/22/2005	Winter Storm	N/A	\$ -
Kosciusko	3/1/2005	Winter Storm	N/A	\$ -
Kosciusko	12/1/2005	Winter Weather/mix	N/A	\$ -
Kosciusko	12/8/2005	Heavy Snow	N/A	\$ -
<b>2005 Subtotal</b>				<b>\$ -</b>
Kosciusko	2/13/2007	Blizzard	N/A	\$ -
Kosciusko	2/13/2007	Blizzard	N/A	\$ -
Kosciusko	2/13/2007	Winter Storm	N/A	\$ -
Kosciusko	2/13/2007	Winter Storm	N/A	\$ -
Kosciusko	2/24/2007	Ice Storm	N/A	\$ 25,000
Kosciusko	2/24/2007	Ice Storm	N/A	\$ 25,000
Kosciusko	12/1/2007	Winter Storm	N/A	\$ -
Kosciusko	12/1/2007	Winter Storm	N/A	\$ -
Kosciusko	12/4/2007	Heavy Snow	N/A	\$ -
Kosciusko	12/4/2007	Heavy Snow	N/A	\$ -
Kosciusko	12/9/2007	Ice Storm	N/A	\$ -
Kosciusko	12/15/2007	Winter Storm	N/A	\$ -
<b>2007 Subtotal</b>				<b>\$ 50,000</b>
Kosciusko	2/1/2008	Winter Storm	N/A	\$ -

Location or County	Date	Type	Magnitude	Property Damage
Kosciusko	3/4/2008	Winter Storm	N/A	\$ -
Northern Indiana	12/18/2008	Ice Storm	N/A	\$ -
Northern Indiana	12/18/2008	Ice Storm	N/A	\$ -
<b>2008 Subtotal</b>				<b>\$ -</b>
<b>Total Property Damage</b>				<b>\$ 60,000</b>

The historical data is erratic and not wholly documented or confirmed. As a result, potential dollar losses for a future event cannot be precisely calculated; however, based on averages in the last decade, it can be determined that Kosciusko County incurs annual risk of approximately \$6,000 per year.

**5.6.6.14 Vulnerability to Future Assets/Infrastructure for Winter Storm Hazard**

Any new development within the county will remain vulnerable to these events.

**5.6.6.15 Analysis of Community Development Trends**

Because the winter storm events are regional in nature future development will be equally impacted across the county.

## 5.6.7 Hazardous Materials Storage and Transport Hazard

### 5.6.7.1 Hazard Definition for Hazardous Materials Storage and Transport Hazard

Indiana has numerous active transportation lines that run through many of the counties in the state. Active railways transport harmful and volatile substances between our borders every day. The transportation of chemicals and substances along interstate routes is commonplace in Indiana. The rural areas of Indiana have considerable agricultural commerce creating a demand for fertilizers, herbicides, and pesticides to be transported along rural roads. Finally, Indiana is bordered by two major rivers and Lake Michigan. Barges transport chemicals and substances along these waterways daily. These factors increase the chance of hazardous material releases and spills throughout the state of Indiana.

The release or spill of certain substances can cause an explosion. Explosions result from the ignition of volatile products such as petroleum products, natural and other flammable gases, hazardous materials/chemicals, dust, and bombs. An explosion can potentially cause death, injury, and property damage. In addition, a fire routinely follows an explosion which may cause further damage and inhibit emergency response. Emergency response may require fire, safety/law enforcement, search and rescue, and hazardous materials units.

### 5.6.7.2 Previous Occurrences for Hazardous Materials Storage and Transport Hazard

Kosciusko County has experienced a few significantly large-scale hazardous material incident at fixed sites or during transport that have resulted in multiple deaths or serious injuries; there have also been many minor releases that have put local firefighters, hazardous materials teams, emergency management, and local law enforcement into action to try to stabilize these incidents and prevent or lessen harm to Kosciusko County residents. Table 5-28 lists the major releases within the county from 1993 to 2017.

**Table 5-28: Kosciusko County Historical HAZMAT Releases**

Date	Location	Characteristics of the Event
1997	Claypool	Water treatment plant experienced a chlorine leak, which resulted in an evacuation of Claypool businesses and residents. No injuries occurred.
1995	US-30	A tanker truck transporting anhydrous gas drove off the highway and tipped. No leak occurred; traffic was rerouted as a precaution. A backup of one mile occurred.
1993	Burkett Elevator	Farm fertilizer supply company experienced a fire on an elevator containing pesticides. An evacuation area was established of one mile, some inhalation injuries occurred, no fatalities
2009	US 30 & 500 W	Anhydrous tank struck and leaking
2009	Claypool	A soybean processing facility experienced a leak of the biodiesel which sprayed onto the boiler this resulted in an explosion that blew all of the doors in the boiler room building off the hinges or tracks.
2009	Warsaw	Orthopedics employee attempting to dispose of excess bone cement mixture miscalculated which resulted in the evacuation of the building and later an explosion.
2009	Leesburg	Farmer dumped 5,000 pounds of Nitrogen
2010	Wawasee	Pipe at base of gas pump broke releasing 100 gallon of fuel into Lake Wawasee
2010	Atwood	Company that researches alternative fuel created numerous calls (12) for air contamination

2010	Fulton County	Assist with air monitoring during a metal recycling fire
2010	Mentone	Chemical spill at local spring maker
2010	Pierceton	Wreck involving 3 semis causing death and release of fuel and fluids into side ditch
2010	Warsaw	Chemical spill at local factory
2010	Winona Lake	Numerous calls for unknown substance at outfall into lake
2010	Burket	Gas smell at Bever Dam Lake
2011	Pierceton	Semi wreck US 30 & SR 13 X3
2011	Warsaw	Company releases Nitrogen
2011	Leesburg	Construction crew spills chemical
2011	Warsaw	Car drives over fill line from tanker filling tanks at gas station
2011	Warsaw	Company spills Sulfuric acid
2012	Warsaw	Semi hauling eggs rear-ended. The now liquid eggs closed US 30
2012	Warsaw	Semi tanker of Anhydrous rollover released and had to be offloaded
2013	Fulton County	Assist with air monitoring during a metal recycling fire
2013	Pierceton	Fuel spill
2013	Syracuse	Boat sunk and released fuel and fluids into channel
2013	Winona Lake	Deployed booms to catch product
2013	North Webster	Boat sunk and released fuel and fluids into lake
2013	Claypool	LP gas leak
2014	Claypool	Provided supplies for Meth lab
2014	North Webster	Double fatal accident with fuel and fluids in ditch
2014	Leesburg	Unknown amount of fuel spilled from unknown semi which flowed into wetland
2014	Claypool	Choline alarm at town water supply
2015	Warsaw	Fire at chemical facility creates large spill and runoff into Winona Lake
2015	Winona Lake	Release from outfall
2015	Syracuse	Semi losses fuel tank
2015	Warsaw	Gas spill
2015	Silver Lake	Truck hauling Aluminum powder rolls over
2016	Warsaw	Runoff from Warsaw Bus Garage fire
2016	Pierceton	Chemical spill
2016	North Webster	Anhydrous leak at Ice factory
2016	Warsaw	Orthopedic company has acid leak and evacuates building
2016	Syracuse	Semi backing into dock rips fuel tank off
2016	North Webster	Road Rage leads to wreck that causes release of fuel
2017	Silver Lake	Barn fire results in release of farm chemicals
2017	Silver Lake	Heavy rainfall causes wastewater overflow
2017	Burket	Accident with grain truck creates fuel spill

### 5.6.7.3 Geographic Location for Hazardous Materials Storage and Transport Hazard

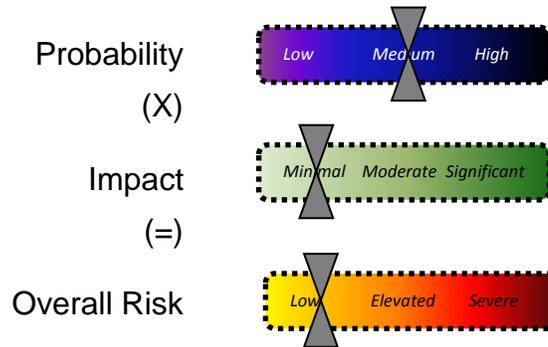
The hazardous material hazards are countywide and are primarily associated with the transport of materials via highway and railroad.

#### 5.6.7.4 Hazard Extent for Hazardous Materials Storage and Transport Hazard

The extent of the hazardous material hazard varies both in terms of the quantity of material being transported as well as the specific content of the container.

#### 5.6.7.5 Risk Identification for Hazardous Materials Release

Based on historical information, the probability of a hazmat hazard is medium. In Meeting #2, the planning team determined that the potential impact of a hazmat release is minimal; therefore, the overall risk of a hazmat hazard for Kosciusko County is low.



#### 5.6.7.6 Vulnerability Analysis for Hazardous Materials Storage and Transport Hazard

Hazardous material impacts are an equally distributed threat across the entire jurisdiction; therefore, the entire county is vulnerable to a hazardous material release and can expect the same impacts within the affected area. The main concern during a release or spill is the populations affected. The building exposure for Kosciusko County, as determined from building inventory, is included in Table 5-6. This plan will therefore consider all buildings located within the county as vulnerable.

#### 5.6.7.7 Critical Facilities

All critical facilities and communities within the county are at risk. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural failure due to fire or explosion and loss of function of the facility (e.g. a damaged police station will no longer be able to serve the community). Table 5-5 lists the types and numbers of all essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

#### 5.6.7.8 Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 5-6. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure due to fire or explosion or debris and loss of function of the building (e.g. a damaged home will no longer be habitable causing residents to seek shelter).

### 5.6.7.9 Infrastructure

During a hazardous material release the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available to this plan it is important to emphasize that any number of these items could become damaged in the event of a hazardous material release. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); and railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

In terms of numbers and types of buildings and infrastructure, typical scenarios are described to gauge the anticipated impacts of hazardous material release events in the county.

The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) model was utilized to assess the area of impact for a chlorine release at the intersection of Anchorage Road and the Norfolk Southern railroad tracks on the northeast side of Warsaw.

Chlorine is a greenish yellow gas with a pungent suffocating odor. The gas liquefies at  $-35^{\circ}\text{C}$  and room pressure or will liquefy from pressure applied at room temperature. Contact with unconfined liquid chlorine can cause frostbite from evaporative cooling. Chlorine does not burn, but, like oxygen, supports combustion. The toxic gas can have adverse health effects from either long-term inhalation of low concentrations of vapors or short-term inhalation of high concentrations. Chlorine vapors are much heavier than air and tend to settle in low areas. Chlorine is commonly used to purify water, bleach wood pulp, and make other chemicals.

*Source: CAMEO*

ALOHA is a computer program designed especially for use by people responding to chemical accidents, as well as for emergency planning and training. Chlorine is a common chemical used in industrial operations and can be found in either liquid or gas form. Rail and truck tankers commonly haul chlorine to and from facilities.

For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area was chosen due to its proximity to commercial, residential and environmental concerns in the area. The geographic area covered in this analysis is depicted in Figure 5-13.

Figure 5-123: Location of Chemical Release



### 5.6.7.10 Analysis

The ALOHA atmospheric modeling parameters, depicted in Figure 5-15, were based upon a westerly wind speed of five miles per hour. The temperature was 68°F with 75% humidity and partly cloudy skies.

The source of the chemical spill is a horizontal, cylindrical-shaped tank. The diameter of the tank was set to 6.94 feet and the length set to 53 feet (15,000 gallons). At the time of its release, it was estimated that the tank was 100% full. The chlorine in this tank is in its liquid state.

This release was based on a leak from a 2.5-inch-diameter hole, 12 inches above the bottom of the tank. According to the ALOHA parameters, approximately 10,400 pounds of material would be released per minute. The image in Figure 5-16 depicts the plume footprint generated by ALOHA.

Figure 5-134: ALOHA Plume Modeling Parameters

**SITE DATA:**

Location: WARSAW, INDIANA  
Building Air Exchanges Per Hour: 0.40 (unsheltered single storied)  
Time: August 20, 2009 0951 hours EST (using computer's clock)

**CHEMICAL DATA:**

Chemical Name: CHLORINE Molecular Weight: 70.91 g/mol  
AEGL-1(60 min): 0.5 ppm AEGL-2(60 min): 2 ppm AEGL-3(60 min): 20 ppm  
IDLH: 10 ppm  
Ambient Boiling Point: -30.4° F  
Vapor Pressure at Ambient Temperature: greater than 1 atm  
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

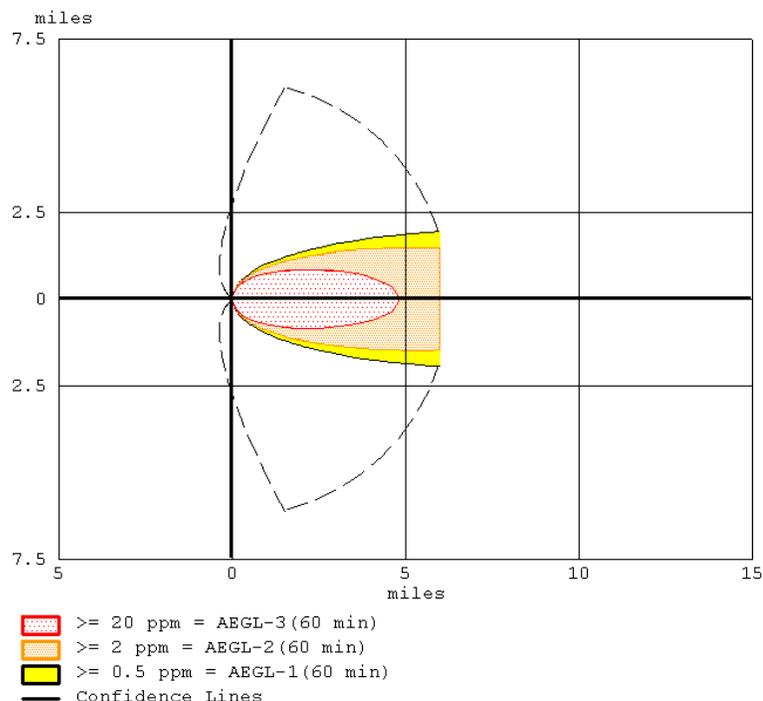
**ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)**

Wind: 5 miles/hour from W at 10 meters  
Ground Roughness: open country Cloud Cover: 5 tenths  
Air Temperature: 68° F Stability Class: B  
No Inversion Height Relative Humidity: 75%

**SOURCE STRENGTH:**

Leak from hole in horizontal cylindrical tank  
Non-flammable chemical is escaping from tank  
Tank Diameter: 6.94 feet Tank Length: 53 feet  
Tank Volume: 15000 gallons  
Tank contains liquid Internal Temperature: 68° F  
Chemical Mass in Tank: 88.2 tons Tank is 100% full  
Circular Opening Diameter: 2.5 inches  
Opening is 12 inches from tank bottom  
Release Duration: 24 minutes  
Max Average Sustained Release Rate: 10,400 pounds/min  
(averaged over a minute or more)  
Total Amount Released: 163,464 pounds  
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

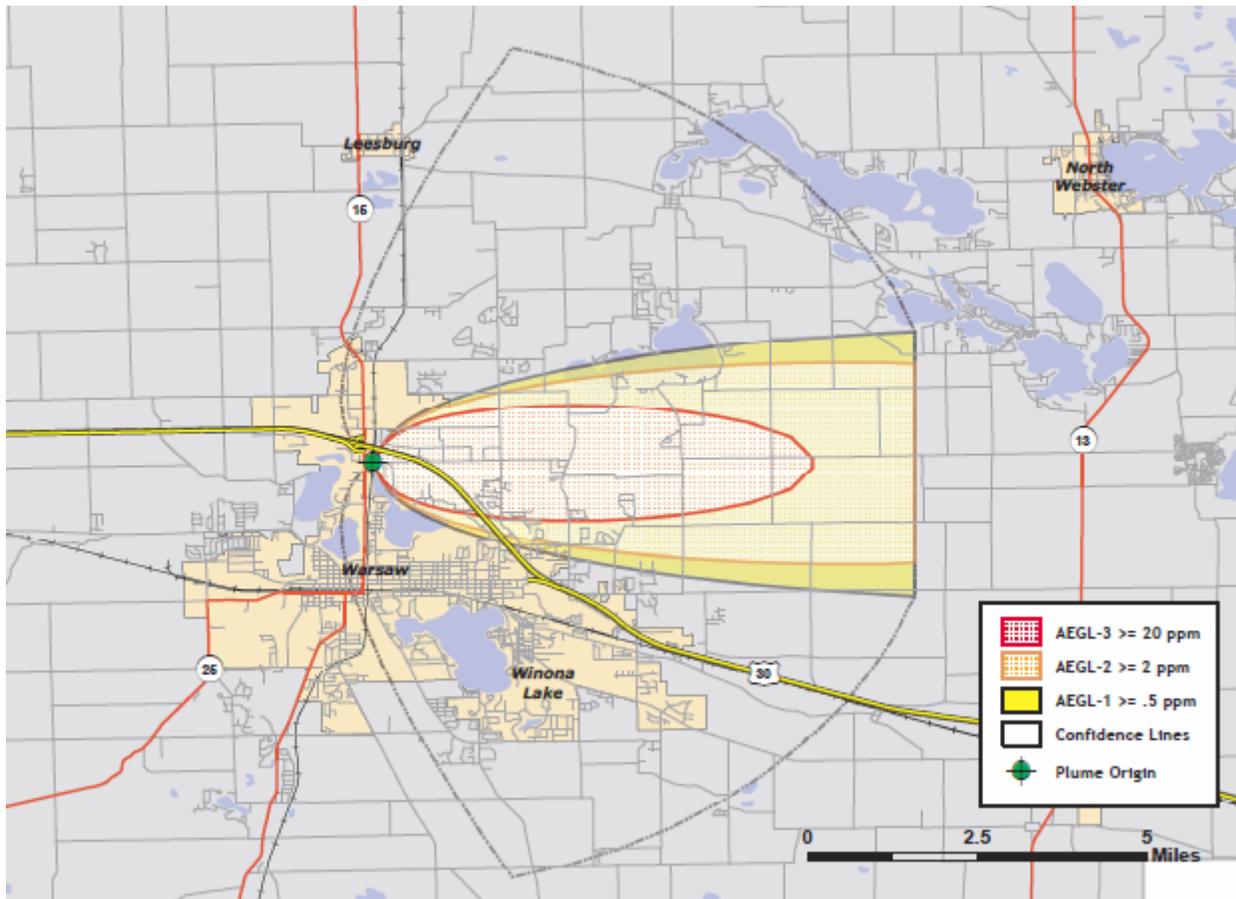
**Figure 5-145: Plume Footprint Generated by ALOHA**



Acute Exposure Guideline Levels (AEGLs) are intended to describe the health effects on humans due to once-in-a-lifetime or rare exposure to airborne chemicals. The National Advisory Committee for AEGLs is developing these guidelines to help both national and local authorities, as well as private companies, deal with emergencies involving spills or other catastrophic exposures. As the substance moves away from the source, the level of substance concentration decreases. Each color-coded area depicts a level of concentration measured in parts per million (ppm). The image in Figure 5-16 depicts the plume footprint generated by ALOHA in ArcGIS.

- **AEGL 3:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death. The red buffer ( $\geq 20$  ppm) extends no more than five miles from the point of release after one hour.
- **AEGL 2:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. The orange buffer ( $\geq 2$  ppm) extends no more than six miles from the point of release after one hour.
- **AEGL 1:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. The yellow buffer ( $\geq 5$  ppm) extends more than six miles from the point of release after one hour.
- **Confidence Lines:** The dashed lines depict the level of confidence in which the exposure levels will be contained. The ALOHA model is 95% confident that the release will stay within this boundary.

Figure 5-156: ALOHA Plume Footprint Overlaid in ArcGIS

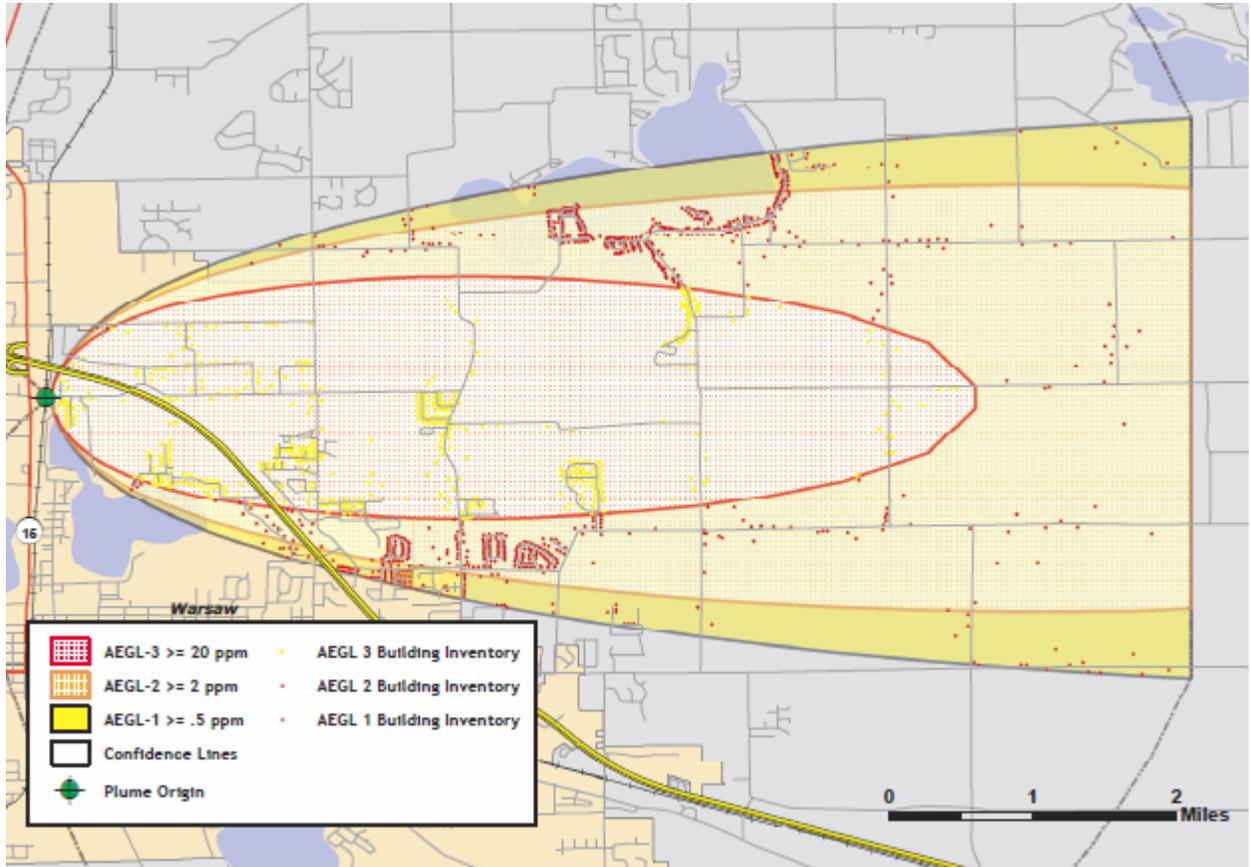


### 5.6.7.11 Results

By summing the building inventory within all AEGL exposure levels (Level 3:  $\geq 20$  ppm, Level 2:  $\geq 2$  ppm and Level 1:  $\geq 0.5$  ppm.), the GIS overlay analysis predicts that as many as 1,349 buildings could be exposed at an adjusted replacement cost of \$397 million. The overlay was performed against parcels provided by Kosciusko County that were joined with Assessor records showing property improvement. If this event were to occur, approximately 2,840 people would be affected.

The Assessor records often do not distinguish parcels by occupancy class when the parcels are not taxable; therefore, the total number of buildings and the building replacement costs for government, religious/non-profit, and education may be underestimated. Figure 5-17: Kosciusko County Building Inventory Classified By Plume Footprint

**Figure 5-167: Kosciusko County Building Inventory Classified By Plume Footprint**



### 5.6.7.12 Building Inventory Damage

The results of the analysis against the Building Inventory points are depicted in Tables 5-29 through 5-32. Table 5-29 summarizes the results of the chemical spill by combining all AEGL levels. Tables 5-30 through 5-32 summarize the results of the chemical spill for each level separately.

**Table 5-29: Estimated Exposure for all AEGL Levels (all pp Table: Estimated Exposure for AEGL Level 3 (>=20 ppm))**

Occupancy	Population	Building Counts	Adj. Building Exposure (thousands)
Residential	2,840	1,136	\$275,356
Commercial	0	56	\$38,642
Industrial	0	38	\$46,726
Agriculture	0	100	\$23,249
Religious	0	16	\$12,780
Government	0	0	\$0
Education	0	3	\$824
<b>Total</b>	<b>2,840</b>	<b>1,349</b>	<b>\$397,577</b>

**Table 5-30: Estimated Exposure for AEGL Level 3 (>=20 ppm)**

Occupancy	Population	Building Counts	Adj. Building Exposure (thousands)
Residential	1,130	452	\$115,890
Commercial	0	31	\$15,908
Industrial	0	36	\$46,324
Agriculture	0	31	\$7,776
Religious	0	7	\$4,767
Government	0	0	\$0
Education	0	3	\$824
<b>Total</b>	<b>1,130</b>	<b>560</b>	<b>\$191,489</b>

**Table 5-31: Estimated Exposure for AEGL Level 2 (>= 2 ppm)**

Occupancy	Population	Building Counts	Adj. Building Exposure (thousands)
Residential	1,318	527	\$106,566
Commercial	0	15	\$15,792
Industrial	0	1	\$158
Agriculture	0	49	\$10,049
Religious	0	8	\$6,845
Government	0	0	\$0
Education	0	0	\$0
<b>Total</b>	<b>1,318</b>	<b>600</b>	<b>\$139,410</b>

**Table 5-32: Estimated Exposure for AEGL Level 1 (>= .5 ppm)**

Occupancy	Population	Building Counts	Adj. Building Exposure (thousands)
Residential	393	157	\$52,901
Commercial	0	10	\$6,941
Industrial	0	1	\$242
Agriculture	0	20	\$5,422
Religious	0	1	\$1,168
Government	0	0	\$0
Education	0	0	\$0
<b>Total</b>	<b>393</b>	<b>189</b>	<b>\$66,675</b>

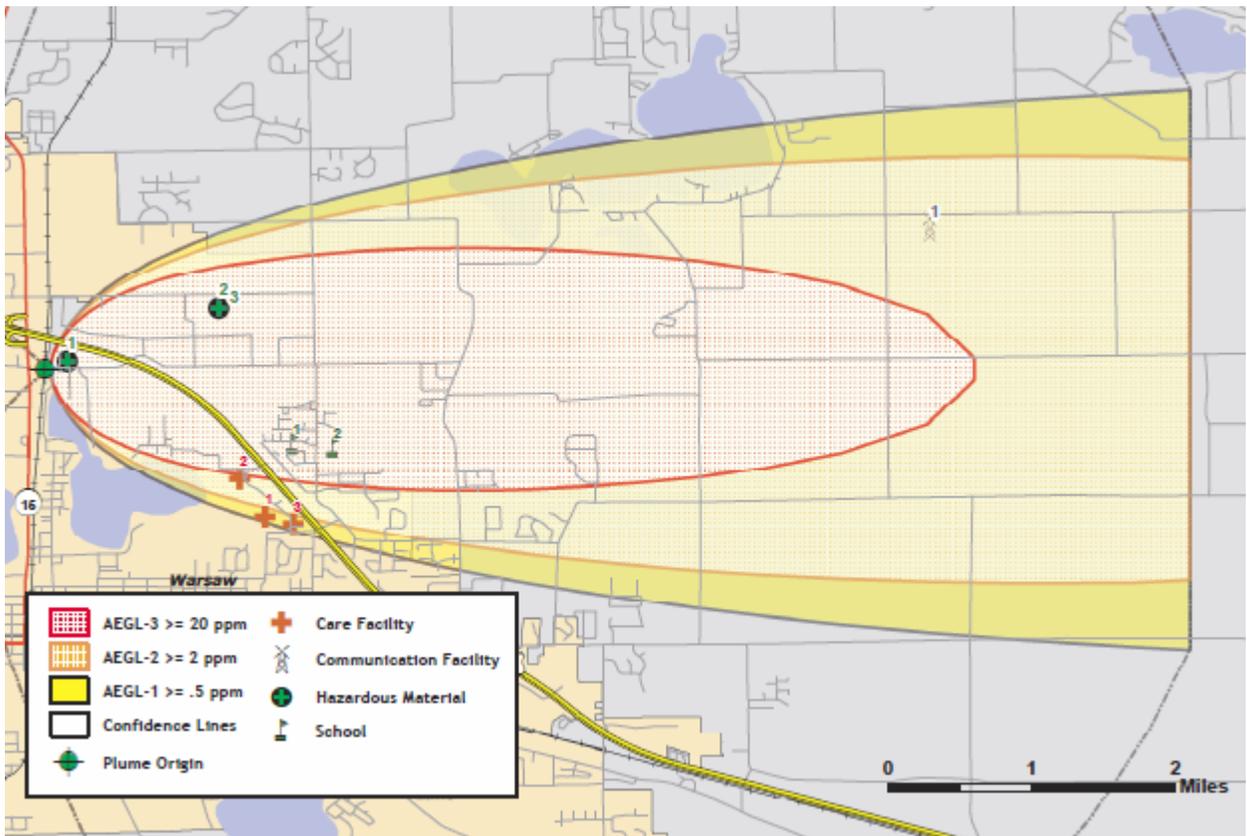
### 5.6.7.13 Critical Facilities Damage

There are eight critical facilities within the limits of the chemical spill plume. The affected facilities are identified in Table 5-33. Their geographic locations are depicted in Figure 5-18.

**Table 5-33: Critical Facilities within Plume Footprint**

Classification	Name
Care Facility	Kosciusko Community Hospital
Care Facility	Bowen Center In-Patient Housing
Care Facility	Home Health Care Service
Care Facility	Parkview Hospital
Communications	Cell tower (E 300 N, Warsaw)
Hazardous Materials	North Central Coop
Hazardous Materials	Texmo Precision Casting
School	Harrison Elementary School

**Figure 5-178: Critical Facilities within Plume Footprint**



#### **5.6.7.14 Vulnerability to Future Assets/Infrastructure for Hazardous Materials Storage and Transport Hazard**

Any new development within the county will be vulnerable to these events, especially development along major roadways.

#### **5.6.7.15 Community Involvement**

Kosciusko has an active Local Emergency Planning Committee (LEPC) that exists solely for the purpose of planning for the inevitable hazardous material release. The LEC has developed and annually tests/exercises the Hazardous Materials Response Plan. These exercises are designed to evaluate responders and community partners response to hazardous materials incidents. The plan is then updated based on lessons learned and documented during the exercise.

#### **5.6.7.16 Analysis of Community Development Trends**

Because the hazardous material hazard events may occur anywhere within the county, future development will be impacted. The major transportation routes and the industries located in Kosciusko County pose a threat of dangerous chemicals and hazardous materials release.

### **5.6.8 Fire Hazard**

#### **5.6.8.1 Hazard Definition for Fire Hazard**

The Kosciusko County Hazard Analysis has identified four major categories of fires within the county—tire fires, structural fires, wildfires, and arson.

#### **5.6.8.2 Tire Fires**

The state of Indiana generates thousands of scrap tires annually. Many of those scrap tires end up in approved storage sites that are carefully regulated and controlled by federal and state officials. However, scrap tires are sometimes intentionally dumped in unapproved locations throughout the state. Kosciusko County has no one approved location for tire disposal and storage, but the number of unapproved locations cannot be readily determined. These illegal sites are owned by private residents who have been continually dumping waste and refuse, including scrap tires, at those locations for many years.

Tire disposal sites can be fire hazards, in large part, because of the enormous number of scrap tires typically present at one site. This large amount of fuel renders standard firefighting practices nearly useless. Flowing and burning oil released by the scrap tires can spread the fire to adjacent areas. Tire fires differ from conventional fires in the following ways:

- Relatively small tire fires can require significant fire resources to control and extinguish.
- Those resources often cost much more than Kosciusko County government can absorb compared to standard fire responses.
- There may be significant environmental consequences of a major tire fire. Extreme heat can convert a standard vehicle tire into approximately two gallons of oily residue that may leak into the soil or migrate to streams and waterways.

### 5.6.8.3 Structural Fires

Lightning strikes, poor building construction, and building condition are the main causes for most structural fires in Indiana. Kosciusko County has a few structural fires each year countywide.

### 5.6.8.4 Wildfires

Kosciusko County land base is heavily wooded or agricultural. When hot and dry conditions develop, crops and woodlands may become vulnerable to devastating wildfires that can easily cross jurisdictional boundaries and consume vast areas throughout the county. In these situations the entire county is at risk due to the coverage of dry vegetation.

### 5.6.8.5 Arson

It is important to note that arson is a contributing factor to fire-related incidents within the county.

### 5.6.8.6 Previous Occurrences for Fire Hazard

There have not been many structural fires with a significant number of deaths or injuries. Table 5-34 lists the previous occurrences of structural fires within Kosciusko County from 2000 to 2017.

**Table 5-34: Kosciusko County Historical Structural Fires**

Date	Location	Characteristics of the Event
October 9, 2000	Warsaw	Overnight fire at the American Table Restaurant caused that business \$200,000 dollars in damage and a closure of several weeks. There were no injuries and the fire was ruled accidental.
August 3, 2001	Pierceton	Mobile home fire completely destroyed the structure and resulted in two fatalities. Lawrwill Fire Department assisted Pierceton Fire Department extinguished the fire. The victims were unknown of until the fire was out.
October 6, 2001	Syracuse	An accidental electrical fire destroyed one home and cause one fatality. The fire took seven hours to extinguish, three area township fire departments responded to the blaze.
March 21, 2002	Warsaw	An industrial fire at Warsaw Plating Works resulted in no injuries or deaths. Damaged resulted in collapsing the roof. Loss of production was extensive.
May 2003	Mentone	A fire/explosion at the local grocery store caused the demise of both arsonists attempting to start the fire and sent one firefighter to the hospital. The structure was a total loss.
Feb 6, 2015	Warsaw	11 AM fire at the Warsaw Chemical plant destroyed large storage building causing \$1 million plus in damages, evacuation of 50 homes. Run-off caused problems in nearby lake.

### 5.6.8.7 Geographic Location for Fire Hazard

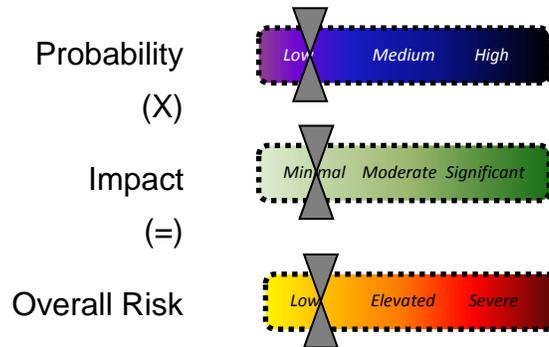
Fire hazards occur countywide and therefore affect the entire county. The heavily vegetated areas in the county have a higher chance of widespread fire hazard.

### 5.6.8.8 Hazard Extent for Fire Hazard

The extent of the fire hazard varies both in terms of the severity of the fire and the type of material being ignited. All communities in Kosciusko County are affected by fire equally.

### 5.6.8.9 Risk Identification for Fire Hazard

Based on historical information, the probability of a fire is low. In Meeting #2, the planning team determined that the potential impact of a fire is minimal; therefore, the overall risk of a fire hazard for Kosciusko County is low.



### 5.6.8.10 Vulnerability Analysis for Fire Hazard

This hazard impacts the entire jurisdiction equally; therefore, the entire population and all buildings within the county are vulnerable to fires and can expect the same impacts within the affected area.

Table 5-5 lists the types and numbers of all essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

The building exposure for Kosciusko County, as determined from the building inventory, is included in Table 5-6. Because of the difficulty predicting which communities are at risk, the entire population and all buildings have been identified at risk.

### 5.6.8.11 Critical Facilities

All critical facilities are vulnerable to a fire hazards. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural damage from fire and water damage from efforts extinguishing fire. Table 5-5 lists the types and numbers of essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

### 5.6.8.12 Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is provided in Table 5-6. Impacts to the general buildings within the county are similar to the damages expected to the critical facilities. These impacts include structural damage from fire and water damage from efforts to extinguish the fire.

### **5.6.8.13 Infrastructure**

During a fire the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these items could become damaged during a fire. Potential impacts include structural damage resulting in impassable roadways and power outages.

### **5.6.8.14 Vulnerability to Future Assets/Infrastructure for Fire Hazard**

Any future development will be vulnerable to these events.

### **5.6.8.15 Analysis of Community Development Trends**

Fire hazard events may occur anywhere within the county, because of this future development will be impacted.

## **5.6.9 Infectious Disease Outbreak**

The Centers for Disease Control and prevention (CDC) characterizes a disease outbreak as a sharp increase in the number of incidences of a disease in the population. When the expected or routine amounts of incidences of a disease rapidly grows into a public health threat, public health and emergency management officials and medical care professionals must act swiftly to limit morbidity and mortality. The CDC requires state and local health departments to report 77 different types of infectious disease. Transmission of infectious diseases may occur through a variety of pathways, including airborne inhalation, food, liquids, bodily fluids, contaminated objects, ingestion, or vector borne spread. Disease outbreaks pose a particular risk to urban and suburban communities due the close environments in which people interact.

The Indiana State Department of Health (ISDH) Epidemiology resource center investigates public health threats by collecting and analyzing threats to human and animal populations. They are committed to their mission of protecting the health of the citizens and visitors of the State of Indiana through surveillance, investigation, education and collaboration.

### **5.6.9.1 Plans and Programs in Place**

The Kosciusko County Health Department is committed to promoting public health and enhancing the quality of life and safety for all residents in Kosciusko County by preventing, planning, and protecting against disease and injury. The Department is a highly utilized and trusted leader offering multiple public health services to better support and prepare the community.

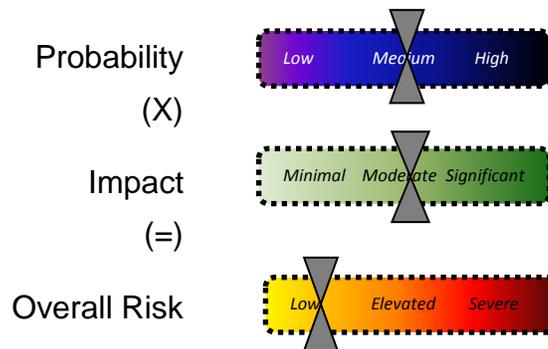
As part of its strategic approach to achieving its mission and vision, the Health Department has balanced itself to provide services to resident health issues ranging from the following:

- Bats
- Bedbugs
- Birth/Death Records
- Ebola Virus
- Water Testing
- Food Service Permits
- Immunizations
- Meth
- Septic Permits

### 5.6.9.2 Probability of Future Occurrences

The probability of future disease epidemics is not known. Global climate change may have an impact on the probability of future events; however, it unclear as to the extent of this impact.

Based on historical information, the probability of an infectious disease outbreak is medium. In Meeting #2, the planning team determined that the potential impact of an infectious disease outbreak is minimal; therefore, the overall risk of an infectious disease outbreak for Kosciusko County is low.



## 6 Section 6 - Mitigation Strategy

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. The goal of mitigation is to build disaster-resistant communities. Mitigation actions and projects should be based on a well-constructed risk assessment, which is provided in Section 5 of this plan. Mitigation should be an ongoing process adapting over time to accommodate a community's needs.

### 6.1 Community Capability Assessment

The capability assessment identifies current activities used to mitigate hazards. The capability assessment identifies the policies, regulations, procedures, programs, and projects that contribute

to the lessening of disaster damages. The assessment also provides an evaluation of these capabilities to determine whether the activities can be improved in order to more effectively reduce the impact of future hazards. The following sections identify existing plans and mitigation capabilities within all of the communities listed in Section 2 of this plan.

## **6.2 National Flood Insurance Program (NFIP)**

The county and the communities of Mentone, Milford, and North Webster, Silver Lake, Warsaw, and Winona Lake are members of the NFIP. The remaining communities of Burket, Claypool, Etna Green, Leesburg, Pierceton, and Sidney, do not have identified flood hazard boundaries and choose not to participate in the program. HAZUS-MH identified approximately 2,989 households located within the Kosciusko County Special Flood Hazard Area; 701 households paid flood insurance, insuring \$119,110,300 in property value. The total premiums collected amounted to \$618,914, which on average was \$882.90 annually. As of July 31, 2017, 399 claims were filed totaling \$4,215,126.06. The average claim was \$10,564.23.

The county and Milford participate in the NFIP'S Community Rating System (CRS). The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: 1) reduce flood losses; 2) facilitate accurate insurance rating; and 3) promote the awareness of flood insurance.

The Indiana Department of Natural Resources (IDNR) oversees the continued compliance of state floodway permitting and was empowered by the Indiana General Assembly to regulate certain development activities in floodway, including the construction of structures, obstructions, and deposits, and/or excavations. These activities on any State waterway (stream less than 1 square mile in drainage area) require Indiana Department of Natural Resources approval prior to beginning the project. The IDNR authority under the Flood Control Act is further described in 312IAC10: Floodplain Management.

In 1945, the Indiana Flood Control Act was passed by the state legislature, enabling the IDNR to have regulatory control over floodway areas produced by regulatory floods. The Indiana "Flood Control Act" (IC 14-28-1) and Flood Hazard Areas Rule (310-IAC 6-1): in the Flood Control Act's preamble, the General Assembly declared that "...the loss of lives and property caused by floods and damage resulting from floods is a matter of deep concern to Indiana affecting the life, health, and convenience of the people and the protection of property". Furthermore, "...the channels and that part of the flood plains of rivers and streams that are the floodways should not be inhabited and should be kept free and clear of interference or obstructions that will cause any undue restriction of the capacity of the floodways".

Within the Flood Control Act, The General Assembly created a permitting program. Two of the fundamental provisions of the Act's regulatory programs consist of the following:

- (1) An abode or place of residence may not be constructed or placed within a floodway.
- (2) Any structure, obstruction, deposit, or excavation within a floodway must receive written approval from the Director of the Department of Natural Resources for the work before beginning construction

The IDNR is a Cooperating Technical Partner for the FEMA Floodplain Mapping program. The IDNR provides floodway site determinations as requested. The IDNR performs the Community Assistance Call and the Community Assistance Visit for the National Flood Insurance Program (NFIP).

The Community Assistance Call and Community Assistance Visit serves as each National Flood Insurance Program communities assurance that the community is adequately enforcing its floodplain management and regulations and provides a chance for technical assistance by the IDN on behalf of FEMA.

The National Flood Insurance Program’s Community Rating System (CRS) recognizes and encourages community floodplain management activities that exceed the minimum NFIP standards. Depending upon the level of participation, flood insurance premium rates for policyholders can be reduced. Besides the benefit of reduced insurance rates, Community Rating System floodplain management activities enhance public safety, reduce damage to property and public infrastructure, avoid economic disruption and losses, reduce human suffering, and protect the environment. Technical Assistance on designing and implementing some activities is available at no charge. Participation in the Community Rating System provides an incentive to maintaining and improving a community’s floodplain management program over the years.

Table 6-1 identifies each community and the date each participant joined the NFIP.

**Table 6-1: Additional Information on Communities Participating in the NFIP**

Community	Participation Date	FIRM Date	CRS Date	CRS Rating	Flood Plain Zoning Ordinance Adopted Last
Kosciusko County	12/27/74	12/27/74	10/01/97	8	9/30/2015
Town of Burket	N/A	N/A	N/A	N/A	9/39/2015
Town of Claypool	N/A	N/A	N/A	N/A	9/39/2015
Town of Etna Green	N/A	N/A	N/A	N/A	9/39/2015
Town of Leesburg	N/A	N/A	N/A	N/A	N/A
Town of Mentone	07/17/79	02/04/87	N/A	N/A	
Town of Milford	03/21/75	03/21/75	10/01/1997	8	9/39/2015
Town of North Webster	02/04/87	02/04/87	10/1/1987	8	9/39/2015
Town of Pierceton	N/A	N/A	N/A	N/A	9/30/2015
Town of Sidney	N/A	N/A	N/A	N/A	N/A
Town of Silver Lake	9/14/2014	2/4/1987	N/A	N/A	9/39/2015
Town of Syracuse	08/09/74	06/11/76	10/1/1987	8	9/39/2015
City of Warsaw	05/10/74	05/28/76	N/A	N/A	9/39/2015
Town of Winona Lake	05/03/74	09/03/85	N/A	N/A	9/39/2015

### 6.3 Stormwater Management Stream Maintenance Ordinance

Kosciusko County unincorporated areas, as well as Milford, Syracuse, North Webster, Etna Green, Pierceton, Claypool, and Silver Lake, are covered by a storm-water management ordinance that was adopted in March 2000. The ordinance, which is regulated by the Kosciusko County Area Plan Commission, seeks to reduce public health hazards caused by excessive storm-water runoff, enhance the quality of runoff water, improve economic objectives, and protect, conserve, and promote the appropriate development of land and water resources within Kosciusko County.

## 6.4 Zoning Management Ordinance

The following communities are regulated by zoning ordinances: Kosciusko County unincorporated areas, Milford, Syracuse, North Webster, Etna Green, Pierceton, Claypool, and Silver Lake. The ordinance, adopted in 1975 and regularly updated, controls development to ensure the safety and health of the county's residents. Table 6-2 lists the adoption dates of Kosciusko County's plans and ordinances.

**Table 6-2: Description of Zoning Plans/Ordinances**

Community	Comp Plan	Zoning Ord	Subd Control Ord	Erosion Control	Storm Water Mgmt	Flood Control Ord.	Burning Ord.	Seismic Ord.	Bldg. Stndrds.
Kosciusko County (Unincorporated)	Spring 1996	3/1/75 Revised 2/17/09	3/4/75 Revised 6/28/05	3/1/00 Revised 5/16/06	3/1/00 Revised 5/16/06	2/4/87 Revised 10/17/07	N/A	N/A	N/A
Pierceton	Spring 1996	1/6/76 Revised 2/17/09	3/4/75 Revised 6/28/05	3/1/00 Revised 5/16/06	3/1/00 Revised 5/16/06	2/4/87 Revised 10/17/07	N/A	N/A	N/A
Claypool	Spring 1996	1/21/75 Revised 2/17/09	3/4/75 Revised 6/28/05	3/1/00 Revised 5/16/06	3/1/00 Revised 5/16/06	2/4/87 Revised 10/17/07	N/A	N/A	N/A
Milford	Spring 1996	6/1/75 Revised 2/17/09	3/4/75 Revised 6/28/05	3/1/00 Revised 5/16/06	3/1/00 Revised 5/16/06	2/4/87 Revised 10/17/07	N/A	N/A	N/A
Silver Lake	Spring 1996	6/1/03 Revised 2/17/09	3/4/75 Revised 6/28/05	3/1/00 Revised 5/16/06	3/1/00 Revised 5/16/06	2/4/87 Revised 10/17/07	N/A	N/A	N/A
North Webster	Spring 1996	4/14/76 Revised 2/17/09	3/4/75 Revised 6/28/05	3/1/00 Revised 5/16/06	3/1/00 Revised 5/16/06	2/4/87 Revised 10/17/07	N/A	N/A	N/A
Syracuse	Spring 1996 Town adopted addendum 4/1/09	8/77 Revised 2/17/09	3/4/75 Revised 6/28/05	3/1/00 Revised 5/16/06	3/1/00 Revised 5/16/06	2/4/87 Revised 10/17/07	N/A	N/A	N/A
Etna Green	Spring 1996	7/11/07 Revised 2/17/09	3/4/75 Revised 6/28/05	3/1/00 Revised 5/16/06	3/1/00 Revised 5/16/06	2/4/87 Revised 10/17/07	N/A	N/A	N/A

## 6.5 Erosion Management Program/ Policy

The erosion management ordinance is included as a section of the storm-water management ordinance, adopted in 2000 and amended in 2006.

## 6.6 Fire Insurance Rating Programs/ Policy

Table 6-3 lists Kosciusko County's fire departments and respective information.

**Table 6-3: Listing of Fire Departments, Ratings, and Number of Firefighters**

Fire Department	Fire Insurance Rating	Number of Firefighters
Atwood	9	24
Burket	9.5	25
Claypool	5	16
Etna Green	7	20
Leesburg	9	26
Mentone	4	27
Milford	6	33
North Webster	7	28
Pierceton	7	25
Sidney	8	19
Silver Lake	3	18
Syracuse	4	38
Warsaw	6	30
Winona Lake	6	30

## 6.7 Land Use Plan

Kosciusko County does not have a separate land use plan; however, current and future land use is extensively addressed within the county comprehensive plan.

## 6.8 Building Codes

Kosciusko County uses the Indiana State Building Code as their guide for Building Standards.

## 6.9 Mitigation goals

In Section 5 of this plan, the risk assessment identified Kosciusko County as prone to eight hazards. The MHMP committee members understand that although hazards cannot be eliminated altogether, Kosciusko County can work toward building disaster-resistant communities.

During Meeting # 2, held September 27, 2017, the planning team reviewed and updated the list of strategies, objectives, and actions for the revision to the plan. Some of the strategies had been completed since the plan was approved in 2009 and have been removed. New goals and strategies were identified by the planning team and have been incorporated into the plan.

The goals represent long-term, broad visions of the overall vision the county would like to achieve for mitigation. The objectives are strategies and steps that will assist the communities to attain the listed goals.

### **Goal 1: Lessen the impacts of hazards to new and existing infrastructure**

(a) Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.

(b) Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards.

(c) Objective: Minimize the amount of infrastructure exposed to hazards.

(d) Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.

(e) Objective: Improve emergency sheltering in Kosciusko County.

## **Goal 2: Create new or revise existing plans/maps for Kosciusko County**

(a) Objective: Support compliance with the NFIP for each jurisdiction in Kosciusko County.

(b) Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation.

(c) Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies.

## **Goal 3: Develop long-term strategies to educate Kosciusko County residents on the hazards affecting their county**

(a) Objective: Raise public awareness on hazard mitigation.

(b) Objective: Improve education and training of emergency personnel and public officials.

### **6.10 Mitigation Actions/Projects**

Upon completion of the risk assessment and development of the goals and objectives, the planning committee was provided a list of the six mitigation measure categories from the *FEMA State and Local Mitigation Planning How to Guides*. The measures are listed as follows:

- **Prevention:** Government, administrative, or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or removal from the hazard area. Examples include acquisition, elevation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

After Meeting #2, September 27, 2017 MHMP members were presented with the task of individually listing potential mitigation activities using the FEMA evaluation criteria. The MHMP members finalized their hazard mitigation activities and goals during meeting #4 held on December 7, 2017. The evaluation criteria (STAPLE+E) involved the following categories and questions.

**Social:**

- Will the proposed action adversely affect one segment of the population?
- Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?

**Technical:**

- How effective is the action in avoiding or reducing future losses?
- Will it create more problems than it solves?
- Does it solve the problem or only a symptom?
- Does the mitigation strategy address continued compliance with the NFIP?

**Administrative:**

- Does the jurisdiction have the capability (staff, technical experts, and/or funding) to implement the action, or can it be readily obtained?
- Can the community provide the necessary maintenance?
- Can it be accomplished in a timely manner?

**Political:**

- Is there political support to implement and maintain this action?
- Is there a local champion willing to help see the action to completion?
- Is there enough public support to ensure the success of the action?
- How can the mitigation objectives be accomplished at the lowest cost to the public?

**Legal:**

- Does the community have the authority to implement the proposed action?
- Are the proper laws, ordinances, and resolution in place to implement the action?
- Are there any potential legal consequences?
- Is there any potential community liability?
- Is the action likely to be challenged by those who may be negatively affected?

- Does the mitigation strategy address continued compliance with the NFIP?

**Economic:**

- Are there currently sources of funds that can be used to implement the action?
- What benefits will the action provide?
- Does the cost seem reasonable for the size of the problem and likely benefits?
- What burden will be placed on the tax base or local economy to implement this action?
- Does the action contribute to other community economic goals such as capital improvements or economic development?
- What proposed actions should be considered but be “tabled” for implementation until outside sources of funding are available?

**Environmental:**

- How will this action affect the environment (land, water, endangered species)?
- Will this action comply with local, state, and federal environmental laws and regulations?
- Is the action consistent with community environmental goals?

**6.11 Implementation Strategy and Analysis of Mitigation Projects**

Implementation of the mitigation plan is critical to the overall success of the mitigation planning process. The first step is to decide, based upon many factors, which action will be undertaken first. In order to pursue the top priority first, an analysis and prioritization of the actions is important. Some actions may occur before the top priority due to financial, engineering, environmental, permitting, and site control issues. Public awareness and input of these mitigation actions can increase knowledge to capitalize on funding opportunities and monitoring the progress of an action.

In Meeting #2, the planning team prioritized mitigation actions based on a number of factors. A rating of high, medium, or low was assessed for each mitigation item and is listed next to each item in Table 6-5. The factors were the STAPLE+E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria listed in Table 6-4.

**Table 6-4: STAPLE + E Planning Factors**

<b>S – Social</b>	Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values.
<b>T – Technical</b>	Mitigation actions are technically most effective if they provide a long-term reduction of losses and have minimal secondary adverse impacts.
<b>A – Administrative</b>	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
<b>P – Political</b>	Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.
<b>L – Legal</b>	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
<b>E – Economic</b>	Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund.
<b>E – Environmental</b>	Sustainable mitigation actions that do not have an adverse effect on the environment, comply with federal, state, and local environmental regulations, and are consistent with the community's

	environmental goals, have mitigation benefits while being environmentally sound.
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For each mitigation action related to infrastructure, new and existing infrastructure was considered. Additionally, the mitigation strategies address continued compliance with the NFIP. While an official cost benefit review was not conducted for any of the mitigation actions, the estimated costs were discussed. The overall benefits were considered when prioritizing mitigation items from high to low. An official cost benefit review will be conducted prior to the implementations of any mitigation actions. Table 6-5 presents mitigation projects developed by the planning committee, as well as actions that are ongoing or already completed.

In the following table (6-5) “Ongoing” indicates that work has either begun or is waiting on funding. Comments should provide clarification.

**Table 6-5: Mitigation Strategies**

Priority Level	Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Progress	Comments
High	Dredge waterways and maintain tiles	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards.	Flood	Kosciusko County	Ongoing	This project is ongoing with County Surveyor correcting as budgets allow.
Low	Create new ordinances to prevent construction in floodplains	Goal: Create new or revise existing plans/maps for Kosciusko County  Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation.	Flood	Kosciusko County	Ongoing	This project is ongoing with regular updates as the Surveyors office is able. The latest occurred on 5/29/18
Medium	Increase culvert sizes, replace culverts, and de-brush as much as possible	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Minimize the amount of infrastructure exposed to hazards.	Flood	Kosciusko County	Ongoing	This project is ongoing with County Highway correcting as budgets and grants allow
Low	Install and map sirens	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.	Tornado, Thunderstorm	Kosciusko County	Complete	The County EMA has mapped existing sirens.
Low	Create literature to distribute to the public regarding hazards affecting Kosciusko County	Goal: Develop long-term strategies to educate Kosciusko County residents on the hazards affecting their county  Objective: Raise public awareness on hazard mitigation.	Flood, Tornado, Earthquake, Thunderstorm, Drought, Winter Storm, Hazmat, Fire	Kosciusko County, Burket, Claypool, Etna Green, Leesburg, Mentone, Milford, Pierceton, Sidney, Silver Lake, Syracuse, Warsaw, Winona Lake	Ongoing	The County EMA has made efforts at distributing public education brochures at public events and will continue to do so.

Priority Level	Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Progress	Comments
High	Establish a mutual aid response agreement	Goal: Develop long-term strategies to educate Kosciusko County residents on the hazards affecting their county  Objective: Improve education and training of emergency personnel and public officials	Hazmat	Kosciusko County	Ongoing	Kosciusko County has mutual aid agreements with South Bend, Elkhart, and Fort Wayne and LEPC continues to provide funding for HazMat training to local responders
Low	Implement a program to develop a database of special needs residents	Goal: Develop long-term strategies to educate Kosciusko County residents on the hazards affecting their county  Objective: Improve education and training of emergency personnel and public officials	Winter Storm	Kosciusko County, Burket, Claypool, Etna Green, Leesburg, Mentone, Milford, Pierceton, Sidney, Silver Lake, Syracuse, Warsaw, Winona Lake	Ongoing	A voluntary sign-up program has been established and managed by Kosciusko 911 Dispatch Center.
Low	Bury new power lines	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Minimize the amount of infrastructure exposed to hazards.	Winter Storm, Thunderstorms, High Winds, Tornadoes	Kosciusko County, Burket, Claypool, Etna Green, Leesburg, Mentone, Milford, Pierceton, Sidney, Silver Lake, Syracuse, Warsaw, Winona Lake	Ongoing	Power lines in new subdivisions are buried by local utilities companies.
High	Construct new storm sewers and a retention pond	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Minimize the amount of infrastructure exposed to hazards.	Flood	Silver Lake	Ongoing	The Surveyors Office will work with INDOT and IDNR to evaluate the current conditions of the community's sewer system and develop a plan. Funding has not been secured as of 2017, but county, state, and federal funding will be sought.
High	Elevate the following roads: Hoppus Road and Miner Dr.	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Minimize the amount of infrastructure exposed to hazards.	Flood	Kosciusko County	Ongoing	The Kosciusko County Highway will oversee this project, working with Warsaw Street departments. INDOT, IDHS, and IDNR are potential funding sources. If funding is available, implementation could begin within three years.
High	Elevate houses that experience significant flooding: Tippecanoe Lake, Barb-B Chain Lake (most houses are one foot above water),	Goal: Create new or revise existing plans/maps for Kosciusko County  Objective: Support compliance with the NFIP for each jurisdiction in Kosciusko County.	Flood	Kosciusko County	Ongoing	The County EMA and Area Plan Commission will oversee this project. Funding will be sought from IDHS. If funding is available, implementation will begin within five years.

Priority Level	Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Progress	Comments
High	Rebuild the manmade levees along Spoils Bank and control structures on lake dams (Winona, Syracuse, Oswego, North Webster, etc.)	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards.	Flood	Kosciusko County, Winona, Syracuse, Warsaw	Ongoing	The County EMA will work with IDNR and IDEM on this project. Funding has not been secured as of 2017, but local resources will be used on private structures and federal and state funding will be sought for other structures. Implementation will begin within one year.
Medium	Dredge lake inlets, rivers, and streams	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards.	Flood	Silver Lake	Ongoing	The County EMA will work with IDNR to oversee implementation of this project. Local resources and IDNR are proposed sources of funding. Implementation will begin within one year.
Medium	Construct bridge culverts in the southeast portion of the county	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Minimize the amount of infrastructure exposed to hazards.	Flood (Dam/Levee Failure)	Kosciusko County, Pierceton	Ongoing	The County EMA will oversee the implementation of this project. Funding has not been secured as of 2017, but INDOT is a possible funding source. Implementation, if funding is available, will begin within three years.
Medium	Conduct a study to determine bridge infrastructure strength	Goal: Create new or revise existing plans/maps for Kosciusko County  Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies.	Tornado, Flood, Earthquake, Thunderstorm, Winter Storm	Kosciusko County	Ongoing	The County Highway is overseeing this project on county roads and has developed a longterm schedule. IDHS and INDOT grants are used for the study.
High	Establish new shelters throughout the county, especially in trailer home parks and at the fairgrounds	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Improve emergency sheltering in Kosciusko County.	Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Fire	Kosciusko County, Burket, Claypool, Etna Green, Leesburg, Mentone, Milford, Pierceton, Sidney, Silver Lake, Syracuse, Warsaw, Winona Lake	Ongoing	The County EMA will oversee the implementation of this project. Local resources and IDHS grants will be sought to establish the shelters. Implementation, if funding is available, is forecasted to begin within one year.
High	Procure new sirens	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.	Tornado, Thunderstorm	Kosciusko County, Silver Lake	Ongoing	The County EMA will oversee this project. Local resources will be used to install the sirens. Funding will be sought from local resources and the PDM program. If funding is available, implementation will begin within one year.

Priority Level	Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Progress	Comments
High	Procure emergency generators or transfer switches for schools, fire stations, community centers, and shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Improve emergency sheltering in Kosciusko County.	Tornado, Thunderstorm, Flood, Earthquake, Winter Storm, Hazmat, Fire	Kosciusko County, Burket, Claypool, Etna Green, Leesburg, Mentone, Milford, Pierceton, Sidney, Silver Lake, Syracuse, Warsaw, Winona Lake	Ongoing	The County EMA will work with the facilities receiving generators to oversee the implementation of this project. Funding has not been secured as of 2017, but the pre-disaster mitigation program and community development grants are possible funding sources. If funding is available, this project is forecasted to begin within one year.
Low	Develop a public education program regarding generator maintenance and circuit policing	Goal: Develop long-term strategies to educate Kosciusko County residents on the hazards affecting their county  Objective: Raise public awareness on hazard mitigation.	Winter Storm	Kosciusko County, Burket, Claypool, Etna Green, Leesburg, Mentone, Milford, Pierceton, Sidney, Silver Lake, Syracuse, Warsaw, Winona Lake	Ongoing	The County EMA will oversee this project. Local resources will be used to develop and disseminate educational materials. If resources and funding are available, implementation will begin within five years.
Medium	Install inertial valves at critical facilities	Goal: Lessen the impacts of hazards to new and existing infrastructure  Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.	Earthquake	Kosciusko County, Warsaw	Ongoing	The County EMA will oversee implementation of this project. Funding has not been secured as of 2017, but the PDM program and community grants are an option. If funding is available, implementation will begin within three years.
Low	Develop a secondary impact assessment to determine potential damage to pipelines, as well as a plan to prepare for population migration in the event of a disaster in southern Indiana	Goal: Develop long-term strategies to educate Kosciusko County residents on the hazards affecting their county  Objective: Raise public awareness on hazard mitigation.	Earthquake	Kosciusko County	Ongoing	The County EMA will work with healthcare facilities and other first responders to develop mitigation plans. If resources and local funding is available, implementation will begin within five years.
High	Develop a hazmat response team	Goal: Develop long-term strategies to educate Kosciusko County residents on the hazards affecting their county  Objective: Improve education and training of emergency personnel and public officials	Hazmat, Fire	Kosciusko County, Burket, Claypool, Silver Lake, Warsaw	Ongoing	Currently the county relies on mutual agreements for response. The EMA director will work with local first responders to develop a team. The county will request funding for training and equipment from IDHS. If funding is available, implementation will begin within five years.

Priority Level	Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Progress	Comments
High	Conduct commodity flow studies along major transportation corridors – Center Street Underpass, Milford, Claypool (Louis Dreyfus); Mentone – SR 25 and SR 19, NS railroad intersection by substation	Goal: Create new or revise existing plans/maps for Kosciusko County  Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies.	Hazmat	Kosciusko County	Ongoing	Community planners and local government leaders will coordinate this study. Funding will be requested from community grants or IDHS.
High	Update, repair, replace and add water level gauges	Goal: Provide data for flood water management  Objective: Increase the number of river gages on rivers and streams, This Information is for allocation of funding	Flood	Kosciusko County, Warsaw	Not yet started	This project will be under the supervision of the County Surveyors Office.
Medium	Update, water tower to add mixer and generator to ensure wellbeing of users and communications	Goal: To reduce the risk to life and property by upgrading water tower and back-up power	Tornado, Thunderstorm, Flood, Earthquake, Winter Storm, Hazmat, Fire	Milford	Not yet started	Communications on water tower rely on battery when power is lost. A generator fixes that problem and maintains the telemetry on the tower. The Town of Milford will find funding
Medium	Stabilize shorelines to prevent bank erosion	Goal: Natural Resource Protection	Flood	Kosciusko County	ongoing	Clean Water Partnership is educating property owners on tactics to stabilize shorelines.
High	Prevent Repetitive flood loss on structures in flood prone areas	Goal: To reduce the risk to life and property by elevating or removing those structures out of high risk areas.	Flood	Kosciusko County	Not yet started	
High	Improve Communications capabilities for emergency service agencies	Goal: Redesign system to enhance capabilities to ensure responder safety	All hazards	Kosciusko County	Ongoing	Extremely important Sites have been identified for additional towers and a “Simo-cast” system is being investigated by county response organizations
High	Maintain Tippecanoe River Debris Clean up volunteers	Goal: Utilize livery service and volunteers to keep log jams from re-occurring.	Flood	Kosciusko county	Ongoing	Kosciusko Lakes and Streams has taken the lead on this project

Priority Level	Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Progress	Comments
High	Prevent Repetitive flood loss on structures in flood prone areas	Construct Bridge to replace culvert on Bruner Road that has been washed out on 2 occasions	Flood	Kosciusko county	Not yet started	The County Highway will oversee implementation of this project. Funding has not been secured as of 2017

The Kosciusko County Emergency Management Agency will be the local champions for the mitigation actions. The County Commissioners and the city and town councils will be an integral part of the implementation process. Federal and state assistance will be necessary for a number of the identified actions

## **6.12 Multi-Jurisdictional Mitigation Strategy**

As a part of the multi-hazard mitigation planning requirements, at least two identifiable mitigation action items have been addressed for each hazard listed in the risk assessment and for each jurisdiction covered under this plan.

Each of the 15 incorporated communities within Kosciusko County was invited to participate in brainstorming sessions in which goals, objectives, and strategies were discussed and prioritized. Each participant in these sessions was armed with possible mitigation goals and strategies provided by FEMA, as well as information about mitigation projects discussed in neighboring communities and counties. When a community was not able to provide representation at these sessions, it was contacted individually and afforded the opportunity to provide input about its specific jurisdiction and the county strategies in general. In Kosciusko County, this occurred from the incorporated communities of Mentone, and Sidney. All potential strategies and goals that arose through this process are included in this plan. The county planning team used FEMA's evaluation criteria to gauge the priority of all items. A final draft of the disaster mitigation plan was presented to all members to allow for final edits and approval of the priorities.

## **7 7 - Plan Maintenance**

### **7.1 Monitoring, Evaluating, and Updating the Plan**

Throughout the five-year planning cycle, the Kosciusko Emergency Management Agency will reconvene the MHMP planning committee to monitor, evaluate, and update the plan on an annual basis. Additionally, a meeting will be held during March of 2022 to address the five-year update of this plan. Members of the planning committee are readily available to engage in email correspondence between annual meetings. If the need for a special meeting, due to new developments or a declared disaster occurs in the county, the team will meet to update mitigation strategies. Depending on grant opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships.

The committee will review the county goals and objectives to determine their relevance to changing situations in the county. In addition, state and federal policies will be reviewed to ensure they are addressing current and expected conditions. The committee will also review the risk assessment portion of the plan to determine if this information should be updated or modified. The parties responsible for the various implementation actions will report on the status of their projects, and will include which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies should be revised.

Updates or modifications to the MHMP during the five-year planning process will require a public notice and a meeting prior to submitting revisions to the individual jurisdictions for approval. The plan will be updated via written changes, submissions as the committee deems appropriate and necessary, and as approved by the county commissioners.

The GIS data used to prepare the plan was obtained from existing county GIS data as well as data collected as part of the planning process. This updated HAZUS-MH GIS data has been returned to the county for use and maintenance in the county's system. As newer data becomes available, this updated data will be used for future risk assessments and vulnerability analyses.

### **7.2 Implementation through Existing Programs**

The results of this plan will be incorporated into ongoing planning efforts. Many of the mitigation projects identified as part of this planning process are ongoing. Kosciusko County and its incorporated jurisdictions will update the zoning plans and ordinances listed in Table 6-2 as necessary and as part of regularly scheduled updates. Each community will be responsible for updating its own plans and ordinances.

### **7.3 Continued Public Involvement**

Continued public involvement is critical to the successful implementation of the MHMP. Comments from the public on the MHMP will be received by the EMA director and forwarded to the MHMP planning committee for discussion. Education efforts for hazard mitigation will be ongoing through periodic updates in the local newspaper, which will announce public meetings scheduled during the five-year update cycle. Once adopted, a copy of this plan will be held at the EMA office. Each incorporated jurisdiction will also receive a copy of the plan.

# GLOSSARY OF TERMS

## A

AEGL – Acute Exposure Guideline Levels  
ALOHA – Areal Locations of Hazardous Atmospheres

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## B

BFE – Base Flood Elevation

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## C

CAMEO – Computer-Aided Management of Emergency Operations  
CEMA – County Emergency Management Agency  
CEMP – Comprehensive Emergency Management Plan  
CPRI – Calculated Priority Risk Index  
CRS – Community Rating System

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## D

DEM – Digital Elevation Model  
DFIRM – Digital Flood Insurance Rate Map  
DMA – Disaster Mitigation Act

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## E

EAP – Emergency Action Plan  
ERPG – Emergency Response Planning Guidelines  
EMA – Emergency Management Agency  
EPA – Environmental Protection Agency

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## F

FEMA – Federal Emergency Management Agency  
FIRM – Flood Insurance Rate Maps  
FIS – Flood Information Study

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## G

GIS – Geographic Information System

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## **H**

HAZUS-MH – **H**azards **USA** **M**ulti-**H**azard  
HUC – Hydrologic Unit Code

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## **I**

IDHS – Indiana Department of Homeland Security  
IDNR – Indiana Department of Natural Resources  
IGS – Indiana Geological Survey

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## **M**

MHMP – Multi-Hazard Mitigation Plan

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## **N**

NCDC – National Climatic Data Center  
NEHRP – National Earthquake Hazards Reduction Program  
NFIP – National Flood Insurance Program  
NOAA – National Oceanic and Atmospheric Administration

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## **P**

PPM – Parts Per Million

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## **S**

SPC – Storm Prediction Center

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## **U**

USGS – United States Geological Survey

## **Appendix A: Minutes of the Multi-Hazard Mitigation Planning Team Meetings**

**Kosciusko County  
Multi-Hazard Mitigation Plan Update  
August 23, 2017  
Meeting Minutes**

Meeting called to order at 5:35pm

Attendees

:

Ed Rock – Kosciusko County Emergency Management Agency

Marvin McClone – Town of Burket

Theresa Sailor – Clean Water Partnership

Matt Sandy – Kosciusko Area Plan Commission

Alex Hall – Kosciusko Lakes and Streams

Jim Moyer – Kosciusko Surveyors Office

Travis Marsh – Town of Milford

Matt Brubaker – Town of Pierceton

John Conley – Town of Silver Lake

Larry Martindale – Town of Syracuse

James Emans – City of Warsaw

Ryan Workman – City of Warsaw

Ed Scott – Whitley County Emergency Management Agency

Avery Consulting Services Representative: Clyde Avery

Presentation:

A power point presentation was given by Clyde Avery, from Avery Consulting Services, discussing the purpose and importance of the Hazard Mitigation Plan update. Mr. Avery also discussed the Hazard Mitigation Plan update questionnaire that would be distributed as well as Capability Assessment Worksheet that will need to be completed prior to the second meeting. A draft of the Mitigation Public Opinion Survey that will be sent out prior to the third meeting was also distributed for review.

Ed Rock discussed that he had previously sent out a copy of the Hazard Identification and Risk Assessment (H.I.R.A.) along with a copy of the Hazard Mitigation Plan for the participants to review.

The second meeting will be used to discuss the results of the Hazard Mitigation Plan update questionnaire in order to rank hazard priorities. We will also review and update the Hazard Mitigation plan strategies, goals and actions and the Community Capacity.

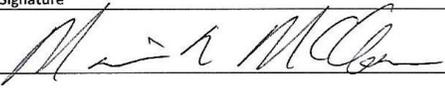
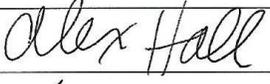
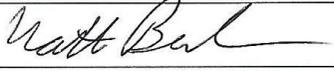
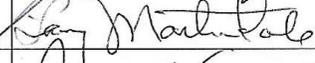
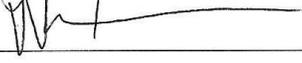
(Note: Community Capacity building is about promoting the “capacity” of local communities to develop, implement and sustain their own solutions to problems in a way that helps them shape and exercise control over their physical, social, economic and cultural environment).

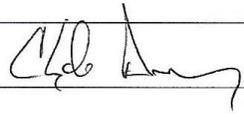
The second meeting will be held on Wednesday, September 27, 2017 at 5:30pm in the basement of the Kosciusko County Justice building located at 121 N. Lake Street in Warsaw, IN. 46580.

With no additional business or discussion, the meeting was adjourned at 6:13pm

Initial Planning Meeting for Kosciusko Multi-Hazard Mitigation Plan Revise

Date: 8/23/17

Town/Organization	Planning Team Member	Member email	Signature
Burket, Town of	MARVIN MCCLONE	Marvin@craigwelding.com	
Claypool, Town of		clerksoffice@townofclaypool.com	
Clean Water Partnership	Theresa Sailor	tsailor@urbanwaterresources.com	
Economic Development		grobertson@kosciuskoedc.com	
Etna Green, Town of	Laura Baker	etnaclerk@gmail.com	
Kosciusko Area Plan Commission	Matt Sandy	msandy@kcgov.com	
Kosciusko EMA	Edward Rock	erock@kcgov.com	
Kosciusko GIS Office	Bill Holder	bholder@kcgov.com	
Kosciusko Lakes and Streams	Alex Hall	alex.hall@grace.edu	
	Nate Bosch	boschns@grace.edu	
Kosciusko Surveyors Office	Jim Moyer	jmoyer@kcgov.com	
Leesburg, Town of	Doug Jones	doug@mastermindcomputers.net	
Mentone, Town of	Josh Shepherd	mwd@ncsbroadband.com	
Milford, Town of	Travis Marsh	police@milford-indiana.org	
North Webster Dam	Kevin Smith	smith_8213@msn.com	
North Webster, Town of	Greg Church	gchurch@northwebster.org	
Piercetown, Town of	Matt Brubaker	ptdfireman839@gmail.com	
Sidney, Town of		jacklanawolfe@frontier.com	
Silver Lake, Town of	John Conley	slfd@townofsilverlake.com	
Syracuse, Town of	Larry Martindale	martindale@embarqmail.com	
Warsaw, City of	James Emans	jemens@warsaw.in.gov	
Warsaw, City of	Ryan Workman	rworkman@warsaw.in.gov	
Winona Lake, Town of	Craig Allebach	townmanger@winonalake.net	
Whitley County	Ed Scott	escott@whitleygov.com	

Avery Consulting	Clyde Avery	c-avery63@hotmail.com	
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# **Kosciusko County Hazard Mitigation Plan Update Planning Team Meeting #2 Minutes September 27, 2017**

Meeting called to order at 5:37pm

Attendees:

Ed Rock – Kosciusko County Emergency Management Agency

Keith Claassen – Town of Etna Green

Matt Sandy – Kosciusko Area Plan Commission

Jim Moyer – Kosciusko Surveyors Office

Travis Marsh – Town of Milford

Matt Brubaker – Town of Pierceton

John Conley – Town of Silver Lake

Larry Martindale – Town of Syracuse

Micky Scott – Town of Syracuse

James Emans – City of Warsaw

Ryan Workman – City of Warsaw

Craig Allebach – Town of Winona Lake

Ed Scott – Whitley County Emergency Management Agency

Clyde Avery – Consultant

A review of the National Climatic Data Center for Kosciusko County was discussed regarding the natural hazards that have been recorded between 1965 and August of 2017.

Past hazard priorities were reviewed and recent survey results were presented regarding localized hazard probabilities and impact.

Planning team members engaged in a very good discussion regarding the ranking of the new hazard priorities for the plan update. Changes were made from the original survey results and the new hazard priorities were identified as being:

- Hazardous Materials Release
- Dam Failure
- Levee Failure
- Winter Storms
- Tornadoes
- Flood
- Flash Flood
- Thunderstorms
- Infectious Disease
- Drought
- Earthquake

- Ground Failure

A review of Community Capacity and capabilities was completed to identify current plans, studies, reports and technical information that are used to assist in implementing hazard mitigation strategies.

Planning team members reviewed and updated previous mitigation goals and strategies, removing those goals that were determined to have been completed.

The Planning team members identified several new goals and strategies that will be included in the updated Hazard Mitigation Plan.

The 3<sup>rd</sup> Planning Team meeting will be held November 2, 2017 at 5:30pm, at the Center Lake Pavilion and will be open to the public. Ed will provide notice to the public regarding the meeting.

With no other business or discussion, the meeting was adjourned at 7:45pm

Meeting #2 for Kosciusko Multi-Hazard Mitigation Plan Revise

Date: 9/27/17

Town/Organization	Planning Team Member	Member email	Signature
Burket, Town of	MARVIN MCCLONE	Marvin@craigwelding.com	
Claypool, Town of		clerkoffice@townofclaypool.com	
Urban Water Resources	Theresa Sailor	tsailor@urbanwaterresources.com	
Economic Development		grobertson@kosciuskoedc.com	
Etna Green, Town of	Keith Claassen	claassencouncil@gmail.com	<i>Keith Claassen</i>
Kosciusko Area Plan Commission	Matt Sandy	msandy@kcgov.com	<i>Matt Sandy</i>
Kosciusko EMA	Edward Rock	erock@kcgov.com	<i>Edward Rock</i>
Kosciusko GIS Office	Bill Holder	bholder@kcgov.com	
Kosciusko Lakes and Streams	Nate Bosch	boschns@grace.edu	
Kosciusko Lakes and Streams	Alex Hall	halla@grace.edu	
Kosciusko Surveyors Office	Jim Moyer	jmoyer@kcgov.com	<i>Jim Moyer</i>
Leesburg, Town of	Doug Jones	doug@mastermindcomputers.net	
Mentone, Town of	Josh Shepherd	mwd@ncsbroadband.com	
Milford, Town of	Travis Marsh	police@milford-indiana.org	<i>Travis Marsh</i>
North Webster Dam	Kevin Smith	smith_8213@msn.com	
North Webster, Town of	Greg Church	gchurch@northwebster.org	
Pierceton, Town of	Matt Brubaker	pfdfireman839@gmail.com	<i>Matt Brubaker</i>
Sidney, Town of		jacklanawolfe@frontier.com	
Silver Lake, Town of	John Conley	sld@townofsilverlake.com	<i>John Conley</i>
Syracuse, Town of	Larry Martindale	martindale@embarqmail.com	<i>Larry Martindale</i> <i>Mickey Scott</i>
Warsaw, City of	James Emans	jemans@warsaw.in.gov	<i>James Emans</i>
Warsaw, City of	Ryan Workman	rworkman@warsaw.in.gov	<i>Ryan Workman</i>
Winona Lake, Town of	Craig Allebach	townmanager@winonalake.net	<i>Craig Allebach</i>
Whitley County	Ed Scott	escott@whitleygov.com	<i>Ed Scott</i>
Avery Consulting	Clyde Avery	c-avery63@hotmail.com	<i>Clyde Avery</i>

**Kosciusko County  
Hazard Mitigation Plan Update  
Meeting # 3 (Public Meeting)  
Agenda  
(November 2, 2017)**

1. Greetings and Introductions
2. Introduction and overview of updated draft plan for new attendees
3. Review 2009 and 2017 hazard priorities
4. Review and discuss 2009 strategies and the identified strategies for 2017
5. Address public questions and concerns
6. Determine Meeting # 4 date, time and location
7. Adjourn meeting

**Kosciusko County  
Hazard Mitigation Plan Update  
Planning Team Meeting #3  
Public Input Meeting Minutes  
November 2, 2017**

Meeting called to order at 5:35pm

**Attendees:**

Ed Rock – Kosciusko County Emergency Management Agency  
Matt Sandy – Kosciusko Area Plan Commission  
Travis Marsh – Town of Milford  
Matt Brubaker – Town of Pierceton  
Larry Martindale – Town of Syracuse  
James Emans – City of Warsaw

**Public:**

Lauren Prater

Clyde Avery – Consultant

Greetings and Introductions were conducted.

Introduction and overview of updated draft plan included the responses from the public survey:  
There were 355 participants to the survey.

Public concerns for hazards included: 1– Winter Storms (3.52), 2 – Extreme Temperatures (2.82), 3 – Infectious Disease (2.68), and 4 – Flood (2.56)

53% of the respondents reported they have never received information about protecting their family from natural disasters.

73.24% indicated that they trust emergency responders to provide that information over any other source.

52.39% indicated that the internet would be the best way to receive emergency/disaster preparedness information.

This information will be reviewed by the planning team and may be incorporated into the mitigation goals and strategies.

72.96% reported that they were not aware of Kosciusko County’s Hazard Mitigation Plan prior to taking the survey.

94.35% reported Hospitals as the most important assets to save in the community followed by Fire and Police Departments at 88.26% and Water & Wastewater Treatment Facilities at 68.24%. 32.42% of responses indicated their support for policies to limit development in areas subject to hazards.

40.21% indicated that it was very important to promote cooperation among public agencies, citizens, non-profits, and businesses.

41.10% responded that strengthening emergency agencies (e.g. police, fire, ambulance services) was the most important mitigation strategy that could be implemented.

36.86% felt that it was very important to provide training on developing an emergency preparedness plan for families and businesses.

Ed indicated that he would make a copy of the DRAFT Plan available on the county website as well as a having a hard copy available in is office for anyone who wished to review it.

A copy will be sent out to each of the Hazard Mitigation Planning Team members for their review and comments.

There were no public questions or concerns regarding the update to the plan

Meeting # 4 will be held on Thursday, December 7, 2017 at 5:30pm in the basement of the Kosciusko County Government building.

Meeting was adjourned at 6:00pm.

Planning team members engaged in a very good discussion regarding the ranking of the new hazard priorities for the plan update. Changes were made from the original survey results and the new hazard priorities were identified as being:

- Hazardous Materials Release
- Dam Failure
- Levee Failure
- Winter Storms
- Tornadoes
- Flood
- Flash Flood
- Thunderstorms
- Infectious Disease

- Drought
- Earthquake
- Ground Failure

A review of Community Capacity and capabilities was completed to identify current plans, studies, reports and technical information that are used to assist in implementing hazard mitigation strategies.

Planning team members reviewed and updated previous mitigation goals and strategies, removing those goals that were determined to have been completed.

The Planning team members identified several new goals and strategies that will be included in the updated Hazard Mitigation Plan.

The 3<sup>rd</sup> Planning Team meeting will be held November 2, 2017 at 5:30pm, at the Center Lake Pavilion and will be open to the public. Ed will provide notice to the public regarding the meeting.

With no other business or discussion, the meeting was adjourned at 7:45pm

11-2-17  
Date: 9/27/17

Town/Organization	Planning Team Member	Member email	Signature
Burket, Town of	MARVIN MCCLONE	Marvin@scrajewelding.com	
Claypool, Town of		clarksoffice@townofclaypool.com	
Urban Water Resources	Theresa Sallor	tsallor@urbanwaterresources.com	
Economic Development		grebertson@kosciuskoedco.com	
Etna Green, Town of	Keith Claassen	claassencouncil@gmail.com	
Kosciusko Area Plan Commission	Matt Sandy	msandy@kco.gov	
Kosciusko EMA	Edward Rock	erock@kco.gov	
Kosciusko GIS Office	Bill Holder	bholder@kco.gov	
Kosciusko Lakes and Streams	Nate Bosch	nbosch@grace.edu	
Kosciusko Lakes and Streams	Alex Hall	ahall@grace.edu	
Kosciusko Surveyors Office	Jim Moyer	jmoyer@kco.gov	
Leesburg, Town of	Doug Jones	doug@mastermindcomputers.net	
Mentone, Town of	Josh Shepherd	jshep@coasttrovethend.com	
Milford, Town of	Travis Marsh	police@milford.indiana.org	<i>T. Marsh</i>
North Webster Dam	Kevin Smith	smith_b213@men.com	
North Webster, Town of	Greg Church	gchurch@northwebster.org	
Pierceton, Town of	Matt Brubaker	gffllwpn839@gmail.com	<i>Matt Brubaker</i>
Sidney, Town of		jacklenawolfe@frontier.com	
Silver Lake, Town of	John Conley	john@townofsilverlake.com	
Syracuse, Town of	Larry Martindale	martindale@amberqmail.com	<i>Larry Martindale</i> <i>James W. Emans</i>
Warsaw, City of	James Emans	jemans@warshaw.in.gov	
Warsaw, City of	Ryan Workman	workman@warshaw.in.gov	
Winona Lake, Town of	Craig Ailebach	townmanager@winonalake.net	
Whitley County	Ed Scott	escott@whitleycounty.com	
Avery Consulting	Clyde Avery	c-avery03@hotmail.com	<i>Clyde Avery</i>

# **Kosciusko County Hazard Mitigation Plan Update**

## **Planning Team Meeting # 4**

### **Meeting Minutes December 7, 2017**

Meeting called to order at 5:35pm

Attendees:

Ed Rock – Kosciusko County Emergency Management Agency

Travis Marsh – Town of Milford

James Emans – City of Warsaw

Alex Hall – Lilly Center for Lakes and Streams

Clyde Avery – Consultant

Meeting was called to order at 5:35pm

Greetings and Introductions were conducted.

Review and discussion was conducted of the New Hazard priorities and ranking for the plan update. Discussion was also held regarding the results of input from both the community survey and the public meeting. Everyone in attendance agreed with the new hazard priorities and ranking.

New Hazard Priorities:

- Hazardous Materials Release
- Dam Failure
- Levee Failure
- Winter Storms
- Tornadoes
- Flood
- Flash Flood
- Thunderstorms

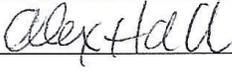
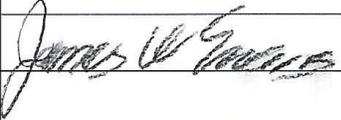
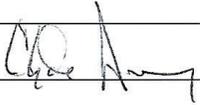
Hazard mitigation goals and objectives were aligned with the respective hazards. The planning team determined the jurisdictions that would be covered by the objectives and determined their status and priority.

The planning team also discussed the benefit cost ratio for each objective and rated it as either High, Medium, or Low.

The planning team identified a responsible entity who will be tasked with following up with progress on the agreed upon objectives.

It was agreed that the planning team will establish a meeting schedule in order to track the plan implementation progress and make revisions when necessary. Ed Rock will serve as the primary point of contact for the planning team.

With no other business, the meeting was adjourned at 7:15pm.

Town/Organization	Planning Team Member	Member email	Signature
Burket, Town of	MARVIN MCCLONE	<a href="mailto:Marvin@craigwelding.com">Marvin@craigwelding.com</a>	
Claypool, Town of		<a href="mailto:clerksoffice@townofclaypool.com">clerksoffice@townofclaypool.com</a>	
Urban Water Resources	Theresa Sailor	<a href="mailto:tsailor@urbanwaterresources.com">tsailor@urbanwaterresources.com</a>	
Economic Development		<a href="mailto:grobertson@kosciuskoedc.com">grobertson@kosciuskoedc.com</a>	
Etna Green, Town of	Keith Claassen	<a href="mailto:claassencouncil@gmail.com">claassencouncil@gmail.com</a>	
Kosciusko Area Plan Commission	Matt Sandy	<a href="mailto:msandy@kcgov.com">msandy@kcgov.com</a>	
Kosciusko EMA	Edward Rock	<a href="mailto:erock@kcgov.com">erock@kcgov.com</a>	
Kosciusko GIS Office	Bill Holder	<a href="mailto:bholder@kcgov.com">bholder@kcgov.com</a>	
Lilly Center for Lakes and Streams	Nate Bosch	<a href="mailto:boschns@grace.edu">boschns@grace.edu</a>	
Lilly Center for Lakes and Streams	Alex Hall	<a href="mailto:hallja@grace.edu">hallja@grace.edu</a>	
Kosciusko Surveyors Office	Jim Moyer	<a href="mailto:jmoyer@kcgov.com">jmoyer@kcgov.com</a>	
Leesburg, Town of	Doug Jones	<a href="mailto:doug@mastermindcomputers.net">doug@mastermindcomputers.net</a>	
Mentone, Town of	Josh Shepherd	<a href="mailto:mwd@ncsbroadband.com">mwd@ncsbroadband.com</a>	
Milford, Town of	Travis Marsh	<a href="mailto:police@milford-indiana.org">police@milford-indiana.org</a>	
North Webster Dam	Kevin Smith	<a href="mailto:smith_8213@msn.com">smith_8213@msn.com</a>	
North Webster, Town of	Greg Church	<a href="mailto:gchurch@northwebster.org">gchurch@northwebster.org</a>	
Pierceton, Town of	Matt Brubaker	<a href="mailto:pffireman839@gmail.com">pffireman839@gmail.com</a>	
Sidney, Town of		<a href="mailto:jacklanawolfe@frontier.com">jacklanawolfe@frontier.com</a>	
Silver Lake, Town of	John Conley	<a href="mailto:sifd@townofsilverlake.com">sifd@townofsilverlake.com</a>	
Syracuse, Town of	Larry Martindale	<a href="mailto:martindale@embarqmail.com">martindale@embarqmail.com</a>	
Warsaw, City of	James Emans	<a href="mailto:jemans@warsaw.in.gov">jemans@warsaw.in.gov</a>	
Warsaw, City of	Ryan Workman	<a href="mailto:rworkman@warsaw.in.gov">rworkman@warsaw.in.gov</a>	
Winona Lake, Town of	Craig Allebach	<a href="mailto:townmanager@winonalake.net">townmanager@winonalake.net</a>	
Whitley County	Ed Scott	<a href="mailto:escott@whitleygov.com">escott@whitleygov.com</a>	
Avery Consulting	Clyde Avery	<a href="mailto:c-avery63@hotmail.com">c-avery63@hotmail.com</a>	

## **Appendix B: Articles Published by the Local News**

## UPDATE: BLIZZARD WARNING NOW IN EFFECT

January 5, 2014 3:56 PM  Stacey Staley Updated: Jan 5, 2014 @ 7:42 PM



Lake Street in Warsaw. (Photo by Stacey Page)

(Kosciusko County Highway Department is pulling snow plows off of the roads at 6 p.m. tonight and stationing them at area fire departments. Only emergency travel is advised.)

The National Weather Service has cancelled the Winter Storm Warning and upgraded our area to a Blizzard Warning.

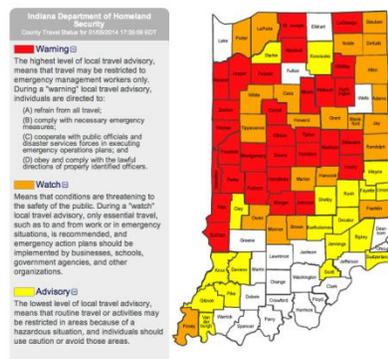
Blizzard conditions are expected until 7 a.m. Monday for Kosciusko, Marshall, Fulton, Elkhart, Starke, Pulaski, St. Joseph, LaPorte, White, Cass, Miami, Wabash, Whitley and Grant counties.

A Wind Chill Warning remains in effect until 8 p.m. Tuesday.

Locally, Kosciusko County is seeing heavy snowfall with accumulations totaling up to 2 inches per hour. That system is expected to continue through the night and end with a total of up to 16 inches on the ground.

Gusty northwest winds up to 35 mph will result in significant blowing and drifting snow into Monday.

Also tonight, temperatures will drastically fall into the negative numbers with lows between 7 below and 20 below zero. Deadly wind chills between 30 below and 45 below zero can be expected through Tuesday. Frostbite and hypothermia will occur in a matter of minutes with these expected wind chills. Death is also possible in precautions are not taken.



Most roads are currently snow covered and slick. Road conditions will continue to deteriorate and some roads will become completely impassable. Visibilities will be reduced to a quarter of a mile or less in heavy snow and blowing snow conditions.

Fulton County, Marshall, Elkhart and Whitley counties have all issued weather emergencies meaning travel may be restricted to emergency management workers only and essential emergency travel. In Whitley County, it now means travel on all county roads is prohibited

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## EMERGENCY MANAGEMENT RECEIVES APPROPRIATION TO FUND MULTI-HAZARD MITIGATION PLAN

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May 12, 2017 9:02 AM  [Melissa Sorensen](#) Updated: May 12, 2017 @ 9:02 AM

WARSAW — The Office of Emergency Management received additional appropriation from the Kosciusko County Council for several grants, Thursday, May 11, including a \$16,738 grant funding a multi-hazard mitigation plan.

Emergency Management Director Ed Rock told the council the grant would go towards the revision of the current multi-hazard mitigation plan to make it up to date.

“We need to have that so that all of the jurisdictions are covered under flood insurance have to have this plan current and up to date,” said Rock.

Rock explained if the plan is up to date, they are able to apply to receive additional funds.

“It will also allow us to apply for mitigation funds to add tornado sirens, shelters, levies, dams, repairs, those type of things,” said Rock.

Rock also requested addition appropriations for a 2016 mobile data grant for \$7,100 and a 2015 EMPG grant for \$5,000.

The council unanimously approved motions to accept the additional appropriations.

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## PUBLIC MEETING FOR MULTI-HAZARD MITIGATION PLAN

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October 30, 2017 2:00 PM  [Press Release](#) Updated: Oct 30, 2017 @ 2:14 PM

KOSCIUSKO — Kosciusko County and the local jurisdictions are in the process of updating the Multi-Hazard Mitigation Plan. This update is a required first step to be eligible for future FEMA grant funds to improve flooding conditions, early warning systems, disaster shelters, drainage concerns and other projects. This plan is also a required element of the Flood Insurance Program.

The public is invited to an informational meeting regarding the plan. The meeting will be held 5:30 p.m. Thursday, Nov. 2, at the Center Lake Pavilion, 119 Canal St., Warsaw.

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## RAINS WASH AWAY ROAD SOUTH OF WARSAW

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July 7, 2017 7:36 PM  [Lauren Prater](#) Updated: Jul 7, 2017 @ 7:37 PM

WARSAW — Kosciusko County received unexpected amounts of rain today, July 7, as torrential downpours started around 10 a.m. and lasted for six hours.

The rain accumulated to anywhere from two to six inches, depending on the location within the county, and low lying areas are currently experiencing flooding. One such area is Palestine Lake, south of Warsaw.

A section of South Bruner Road, Warsaw, just northeast of Palestine off of SR 25, was washed away. An official report of how the incident occurred was not given, but it appears the drainage pipe running under the road could not handle the current of water. This resulted in the stream of water washing away the road.

The road is a dead-end, leading to a mostly residential area. Crews have told people stuck on either side that the repair will take a few hours, assuming the rocks they are putting in place don't also get washed away.

If you are experiencing flooding, the county highway department, 2936 E. Old Road 30, Warsaw, has sandbags for public use.



Heavy rain washed away a section of South Bruner Road, Warsaw, July 7.



Crews are working to repair the road. It's estimated to take a few hours.

## **Appendix C: Adopting Resolution**

Resolution # \_\_\_\_\_

**ADOPTING THE KOSCIUSKO COUNTY MULTI-HAZARD MITIGATION PLAN**

**WHEREAS**, the Town of XXXXXXXXX recognizes the threat that natural hazards pose to people and property; *and*

**WHEREAS**, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; *and*

**WHEREAS**, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; *and*

**WHEREAS**, the Town of XXXXXXXXX participated jointly in the planning process with the other local units of government within Kosciusko County to prepare a Multi-Hazard Mitigation Plan;

**NOW, THEREFORE, BE IT RESOLVED**, that the Town of XXXXXXXXX hereby adopts the Kosciusko County Multi-Hazard Mitigation Plan as an official plan; *and*

**BE IT FURTHER RESOLVED**, that the Kosciusko County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Indiana Department of Homeland Security and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS \_\_\_\_\_ Day of \_\_\_\_\_, 2018.

\_\_\_\_\_  
Town President

\_\_\_\_\_  
Town Council Member

\_\_\_\_\_  
Town Council Member

\_\_\_\_\_  
Attested by: Town Clerk

## **Appendix D: Historical Hazards from NCDC 1965 - 2017**

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
Kosciusko	6/28/1965	Tornado	F1	0	0	0K	0	None Reported
Kosciusko	9/14/1965	Tornado	F1	0	0	3K	0	None Reported
Kosciusko	10/24/1967	Tornado	F2	0	5	250K	0	None Reported
Kosciusko	8/9/1969	Tornado	F	0	0	0K	0	None Reported
Kosciusko	5/5/1971	Hail	1.50 "	0	0	0	0	None Reported
Kosciusko	4/3/1974	Tornado	F4	1	39	0K	0	None Reported
Kosciusko	6/20/1974	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	6/20/1974	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	1/10/1975	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	4/19/1975	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	11/10/1975	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	5/29/1977	Tornado	F0	0	0	0K	0	None Reported
Kosciusko	6/30/1977	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	6/20/1979	Hail	1.00 "	0	0	0	0	None Reported
Kosciusko	6/20/1979	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	6/29/1979	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	10/1/1979	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	4/8/1980	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	6/2/1980	Hail	1.75 "	0	0	0	0	None Reported
Kosciusko	6/2/1980	Hail	2.75 "	0	0	0	0	None Reported
Kosciusko	6/2/1980	Tornado	F1	0	1	25K	0	None Reported
Kosciusko	7/5/1980	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	7/5/1980	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	8/10/1980	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	4/13/1981	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	4/28/1981	Tstm Wind	50 kts	0	0	0	0	None Reported
Kosciusko	9/19/1981	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	10/17/1981	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	6/27/1983	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	7/1/1983	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	7/1/1983	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	3/28/1985	Hail	0.75 "	0	0	0	0	None Reported
Kosciusko	3/28/1985	Hail	0.75 "	0	0	0	0	None Reported
Kosciusko	9/9/1985	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	4/25/1986	Hail	1.50 "	0	0	0	0	None Reported
Kosciusko	4/25/1986	Hail	0.75 "	0	0	0	0	None Reported
Kosciusko	4/25/1986	Hail	0.75 "	0	0	0	0	None Reported
Kosciusko	4/25/1986	Hail	1.50 "	0	0	0	0	None Reported
Kosciusko	7/15/1986	Tstm Wind	52 kts	0	0	0	0	None Reported
Kosciusko	7/15/1986	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	6/12/1987	Tstm Wind	0 kts	0	0	0	0	None Reported

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
Kosciusko	7/29/1987	Hail	1.50 "	0	0	0	0	None Reported
Kosciusko	7/29/1987	Hail	1.50 "	0	0	0	0	None Reported
Kosciusko	7/29/1987	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	7/14/1988	Tstm Wind	0 kts	0	6	0	0	None Reported
Kosciusko	7/15/1988	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	8/18/1988	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	9/19/1988	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	5/31/1989	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	7/11/1989	Hail	0.75 "	0	0	0	0	None Reported
Kosciusko	9/7/1989	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	6/2/1990	Hail	0.75 "	0	0	0	0	None Reported
Kosciusko	6/2/1990	Hail	1.00 "	0	0	0	0	None Reported
Kosciusko	8/28/1990	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	3/27/1991	Hail	1.00 "	0	0	0	0	None Reported
Kosciusko	3/27/1991	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	5/30/1991	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	5/30/1991	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	6/15/1991	Tornado	F0	0	0	0K	0	None Reported
Kosciusko	6/15/1991	Tstm Wind	0 kts	0	3	0	0	None Reported
Kosciusko	6/15/1991	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	7/7/1991	Hail	1.75 "	0	0	0	0	None Reported
Kosciusko	7/2/1992	Tstm Wind	0 kts	0	0	0	0	None Reported
Kosciusko	8/3/1992	Tornado	F0	0	0	3K	0	None Reported
Kosciusko	9/9/1992	Tornado	F0	0	0	0K	0	None Reported
Warsaw	8/26/1993	Tstm Winds	0 kts	0	0	50K	0	Antennas and trees were downed, and roofs were damaged.
Wawasee	9/2/1993	Lightning	N/A	0	2	5K	0	Two men who were fishing from a boat on Lake Wawasee were injured by a lightning strike. The lightning also damaged the boat's motor.
Kosciusko	1/14/1994	Extreme Cold	N/A	3	0	5.0M	0	Bitter cold weather settled over Indiana during the third week of January. Many locations recorded daily minimum temperatures below zero each day from January 14 to January 21. The coldest temperatures were recorded on the morning of January 19, when a new record minimum for the state of Indiana was established with a reading of -36 at the National Weather Service cooperative weather station at New Whiteland in Johnson County. Other record low temperatures recorded on the 19th included an all time record low of -27 at Indianapolis, and record lows for the day of -17 at Evansville, -18 at Fort Wayne, and -21 at South Bend. Some locations with official temperatures of -30 or colder on the 19th included Cambridge City with -35, Martinsville with -35, Spencer with -33, the Bloomington Airport with -33, Salem with -32, Rushville with -31, and Brookville with -31. Three people in Vanderburgh County died as a result of the extreme cold. A 79 year woman died from hypothermia in her home, a 77 year old male man died from exposure while working on his farm, and a 46 year old male froze to death after he passed out in his car. (F79P)(M77O)(M46V) INZ030-032>092,16,1600EST-* Central and,17,1200EST,,0,?,5.0,Heavy Snow/Ice Storm Southern Indiana A major winter storm brought heavy snow to central and southern Indiana. In parts of southern Indiana one-quarter to one-half inch of freezing rain accumulated before the precipitation changed to snow. Most of central and southern Indiana received between six and nine inches of snow. However, heavier amounts fell in extreme southern Indiana, with 16 inches being reported over Harrison, Floyd, and Clark Counties, and close to a foot of snow being reported over the southern parts of Spencer and Perry Counties. Many businesses and schools were closed for several days following the storm, with some schools remaining closed for an entire week. Many roads in

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								southern Indiana were impassable for several days following the storm. IOWA
Kosciusko	2/25/1994	Heavy Snow/blowing Snow	N/A	0	0	0	0	Snow moved into northwest Indiana late on the morning of the 25th, and spread east across the northern part of the state during the afternoon. At times snow fell at the rate of one to two inches per hour. Most of northern Indiana received between three and five inches of snow, although there were some spots that reported six inches or more. Eight to ten inches of snow fell over Pulaski and Elkhart Counties, and six to seven inches fell in Starke County. After the snow tapered off strong winds developed and caused severe blowing and drifting snow. At times whiteout conditions were reported in northern Indiana, with wind gusts of 40 to 60 mph. Numerous roads had to be closed, and many motorists were stranded. Three foot drifts were reported in Elkhart County. Interstate 65 had to be closed north of Lafayette. Snow emergencies were declared in Benton, Jasper, White, Marshall, Clinton, Cass, Howard, and Tippecanoe Counties. State Emergency Management reported that approximately 1,400 stranded motorists were housed at shelters.
Kosciusko	4/26/1994	Tstm Winds	0 kts	0	0	50K	0	Sixty mph winds blew roofs off of sheds and downed power lines across the northern part of the county.
Warsaw	5/25/1994	Hail	2.00 "	0	0	0	0	
Leesburg	6/13/1994	Tstm Winds	0 kts	0	0	5K	0	Power lines were blown down.
Leesburg	6/13/1994	Tstm Winds	0 kts	0	0	0	0	Trees were uprooted or snapped off.
Leesburg	6/13/1994	Tstm Winds	0 kts	0	0	50K	0	A tractor semi-trailer was blown over and damaged. Downed trees blocked several roads.
Kosciusko	7/5/1994	Lightning	N/A	0	1	0	0	A man was injured by lightning after he took cover under a tree.
Kosciusko	11/21/1994	High Wind	0 kts	0	0	50K	0	An intense low pressure system over the Great Lakes and its associated cold front produced high winds across all of Indiana. Winds in excess of 50 mph were common across the state beginning near midnight in western Indiana. High winds spread to eastern Indiana by noon EST. Scattered power outages and downed trees were reported across many parts of Indiana including the South Bend, Lafayette, Indianapolis areas as well as rural areas northeast of Evansville.
Kosciusko	11/27/1994	High Wind	0 kts	0	0	120K	0	An intense low pressure area and its 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. The high winds resulted in a roof collapse at the ATF automotive business in Indianapolis around 2 PM EST. Also, a church steeple was damaged late Sunday evening on Indianapolis' eastside.
Kosciusko	2/27/1995	Glaze	N/A	0	0	0	0	Light glazing of ice on trees and power lines caused brief and minor power outages, several car accidents and several school closures.
Kosciusko	4/10/1995	Ice Storm	N/A	0	0	0	0	Freezing rain occurring during the night and early morning caused power outages due to the weight of ice on power lines and due to tree limbs falling on lines.
Atwood	6/7/1995	Tstm Winds	0 kts	0	0	5K	0	A chicken house in Atwood was destroyed. At Warsaw, winds of 60 to 70 mph forced a car off the road.
Warsaw	6/7/1995	Tstm Winds	0 kts	0	0	0	0	A chicken house in Atwood was destroyed. At Warsaw, winds of 60 to 70 mph forced a car off the road.
Kosciusko	7/13/1995	Heat Wave	N/A	14	0	1.0M	0	Heat wave conditions developed across all of Indiana. High temperatures reached between 95 and 105 degrees with heat indices between 100 and 120 degrees. The Evansville area temperatures reached or exceeded 95 degrees from July 11-17. Nearly all heat related deaths occurred in the sick or elderly populations and most occurred in northwest Indiana. Also, nearly 800,000 baby chickens died at the Rose Acre Farms in Seymour resulting in losses totaling near one million dollars. F81PH,M47PH,F71PH,F81PH,M87PH,M75PH,F65PH,M52OU,F71PH,M52PH,M72PH,M40OU,M68OU,F02PH
Kosciusko	8/21/1995	Heat Wave	N/A	1	0	0	0	Heat wave conditions initially developed over southwest Indiana on the 12th then overspread all but northwest Indiana for the remainder of the week. Heat wave conditions ended across the north and central sections on the 19th and over the south by the 21st. High temperatures were in the 90s throughout the period and near 100 across the south. High humidity also yielded Heat Index values between 100 and 115 degrees most of the

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								week. These extreme conditions resulted in a heat stroke and death of an elderly male. The Indiana State Fair lost over \$400 thousand due to low turnouts and most of Indiana crops suffered some due to the heat. M72PH
Kosciusko	12/8/1995	Winter Storm	N/A	0	0	0	0	A low pressure system and cold front swept across Indiana bringing the first significant snowfall and cold temperatures of the winter season. Though snowfall amounts only averaged from two to four inches across the state, numerous vehicle accidents occurred, several resulting in fatalities. The cold front brought the first subzero temperatures to the state and prompted wind chill advisories for all of Indiana.
Kosciusko	12/18/1995	Winter Storm	N/A	0	0	0	0	A low pressure system moving east through the Ohio and Tennessee River Valleys brought significant ice and snow to the northern two thirds of Indiana. Freezing rain began during the evening on the 18th across central and northeast Indiana while snow fell in northwest and north central sections. The freezing rain changed to snow between 0600 and 1100 on the 19th across central and northeast sections. Total snowfall amounts of four to eight inches were common across central and northeast Indiana. Ice accumulations of a quarter to a half inch were common in east-central Indiana. The ice accumulation caused widespread power outages in central and east central Indiana leaving up to 65,000 homes without power at one point. Locations near Muncie did not have power restored until the 21st.
Kosciusko	2/2/1996	Extreme Cold	N/A	0	0	0	0	Bitter cold weather occurred in northwest and north central Indiana February 2 through February 4. At South Bend records set included; record low of -13 on February 3rd, record low maximum of -7 on February 3rd (this was the lowest maximum for the month of February) and record low of -13 on February 4th. There were no known fatalities from the cold.
Kosciusko	3/25/1996	High Wind	46 kts	0	0	0	0	A powerful storm brought strong winds to northwest Indiana on March 25th. The strongest winds occurred in the early morning hours. A barn was blown down at 130 am EST at Wolcott in White County. A peak wind gust of 53 mph was recorded at Michiana Airport in South Bend. The winds also blew down tree limbs and caused scattered power outages from downed power lines.
Milford	4/19/1996	Tornado	F0	0	0	0	0	State Police reported a tornado on the ground near Milford. No damage was reported.
Kosciusko	10/29/1996	Tstm Wind	0 kts	0	0	0	0	A fast moving squall line produced wind gusts of 45 to 65 mph across northern Indiana. In Lake County trees fell on homes in Gary, 6 power poles were blown down near Cedar Lake and a large neon sign at a restaurant in Schererville blew down in the parking lot around 650 pm CST. In Newton County tree limbs and power lines were blown down around 650 pm CST. A wind gust to 63 mph was recorded at the EOC in Fowler in Benton County. In Porter County a barn roof was damaged. Trees were blown down in Rensselaer in Jasper County around 720 pm CST. In Michigan City in La Porte County a 58 mph wind gust was reported by the Coast Guard at about 730 pm CST. A fuel shed was blown off a dock and trees were downed. Trees, tree limbs and power lines were reported downed by winds in North Judson in Starke County just before 800 pm CST, at Monticello in White County around 900 pm EST and throughout St. Joseph, Marshall, and Pulaski Counties and at Rochester in Fulton County at 930 pm EST. Tree limbs and power lines were downed in Elkhart and Goshen in Elkhart County between 930 and 940 pm EST. The roof of a house was damaged by winds in Syracuse in Kosciusko County at 940 pm EST.
Kosciusko	1/9/1997	Winter Storm	N/A	0	0	0	0	On January 9th 5 to 10 inches of snow fell across northwest and north central Indiana. Some snowfall amounts were 7.5 inches at South Bend, 6.8 inches at LaPorte and 10 inches at Monticello.
Kosciusko	1/15/1997	Winter Storm	N/A	0	0	0	0	A winter storm brought 4 to 6 inches of snow to northern Indiana on January 15. The snow was followed by strong winds and cold temperatures creating wind chills of 20 to 40 below zero. Lake effect snow developed in north central Indiana on the 16th. The NWS office at South Bend recorded 8.6 inches of snow. The coldest low temperatures recorded at the NWS office at South Bend during that time are as follows: -9 on the 17th and -4 on the 18th.
Warsaw	5/18/1997	Tstm Wind	0 kts	0	0	0	0	Trees and limbs downed.
Syracuse	7/2/1997	Hail	1.00 "	0	0	0	0	Strong thunderstorms, producing downburst winds and heavy rains, developed over north central Indiana during the afternoon. Hail diameter ranging from one-inch to one and one-quarter inch was reported in Rochester and Syracuse.
Kosciusko	7/14/1997	Tstm Wind	50 kts	0	0	0	0	Trees and power lines were downed throughout the county.
Kosciusko	7/18/1997	Tstm Wind	50 kts	0	0	0	0	Severe thunderstorms produced large hail and 70 mph winds in Lakeville in southern St. Joseph county. The storms moved southeast through Marshall, Fulton and Kosciusko counties, blowing down tree limbs and power lines.

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
Oswego	3/28/1998	Tstm Wind	0 kts	0	0	1K	0	trees blown down in town. shed destroyed.
Etna Green	6/11/1998	Tornado	F1	0	4	800K	0	THIS WAS ANOTHER TORNADO SPAWNED FROM THE SAME TORNADIC SUPERCELL THAT CAUSED DAMAGE IN PULASKI COUNTY EARLIER IN THE EVENING. 30 MOBILE HOMES AT THE MIKEL MOBILE ESTATES WERE DAMAGED, MANY SEVERELY. SOME WERE SIMPLY OVERTURNED WHILE OTHERS WERE COMPLETELY FLATTENED. 4 PEOPLE SUSTAINED MINOR INJURIES. Synoptic and mesoscale conditions for June 11, 1998... Morning sfc and upper air analysis revealed a potent upper short wave trough across North Dakota with an intensifying area of sfc low pressure across southwest Kansas. An unseasonably strong 140 knot jet streak was ejecting out of this trough across Kansas with the left front exit region progged into central Indiana after 18Z. Increasing moisture convergence and theta-e advection along the northward lifting warmfront was seen as 850 mb winds were forecast to increase to 55 knots. By 21Z, the sfc low had moved into eastern Iowa and deepened to 994 mb. The prestorm environment was characterized by moderate to extreme instability (LI values -7 to -9 and CAPE values in excess of 2000 J/kg) with temperatures in the lower 80s and dewpoints in the low/mid 70s. This combined with a dry punch at 700mb and deep layer shear along the warm front, where storm relative helicity values increased to 400 M2/S2, lay the foundation for an outbreak of damaging tornadoes across Indiana.
North Webster	6/12/1998	Hail	1.00 "	0	0	0	0	None Reported
Mentone	6/12/1998	Hail	1.00 "	0	0	0	0	None Reported
Mentone	6/12/1998	Tstm Wind	0 kts	0	0	250K	0	MANY LARGE TREES WERE BLOWN DOWN THROUGHOUT TOWN. SEVERAL HOUSES SUSTAINED MINOR TO MODERATE STRUCTURAL DAMAGE.
Barbee	6/18/1998	Tstm Wind	0 kts	0	0	0K	0	TREE LIMBS AND POWER LINES DOWN.
Warsaw	6/29/1998	Tstm Wind	0 kts	0	0	0K	0	SEVERAL TREES AND POWER LINES DOWN IN CITY.
Warsaw	7/3/1998	Tstm Wind	50 kts	0	0	0	0	WIND DAMAGE - POWER LINES DOWN AT SR-25 AND CR-100 SOUTH AND NEAR ETNA GREEN. Synoptic and mesoscale conditions for July 4th... A cold front moved into southern Michigan and northern Indiana early in the morning on July 4th. Severe thunderstorms developed along this front over the southern part of lake Michigan and quickly transformed into a bow echo as the system raced southeastward at 50 mph. Most unstable parcel Cape values exceeded 2500 J/kg. Deep layer shear was impressive but unidirectional as a mid level speed max of 60 knots and left over mesoscale vorticity max moved out of northeast Illinois that morning. Deviant storm motions to the southeast produced impressive storm relative helicity values but the elevated nature of the convection and stable boundary layer helped to prevent most of the rear inflow jet momentum from mixing down to the surface. Where the rear flank downdraft was able to mix to the surface... one weak, brief tornado touchdown was observed near Walkerton. As the outflow along the western edge of the bow became stationary... thunderstorms with heavy rain redeveloped and trained southeast producing flash flooding across a few counties.
Beaver Dam	7/3/1998	Tstm Wind	50 kts	0	0	0	0	POWER LINES DOWN. Synoptic and mesoscale conditions for July 4th... A cold front moved into southern Michigan and northern Indiana early in the morning on July 4th. Severe thunderstorms developed along this front over the southern part of lake Michigan and quickly transformed into a bow echo as the system raced southeastward at 50 mph. Most unstable parcel Cape values exceeded 2500 J/kg. Deep layer shear was impressive but unidirectional as a mid level speed max of 60 knots and left over mesoscale vorticity max moved out of northeast Illinois that morning. Deviant storm motions to the southeast produced impressive storm relative helicity values but the elevated nature of the convection and stable boundary layer helped to prevent most of the rear inflow jet momentum from mixing down to the surface. Where the rear flank downdraft was able to mix to the surface... one weak, brief tornado touchdown was observed near Walkerton. As the outflow along the western edge of the bow became stationary... thunderstorms with heavy rain redeveloped and trained southeast producing flash flooding across a few counties.
Warsaw	7/19/1998	Tstm Wind	52 kts	0	0	0	0	NUMEROUS TREES DOWN THROUGHOUT WARSAW AND ALONG STATE ROAD 15 FROM WARSAW TO LEESBURG.
Packerton	7/21/1998	Lightning	N/A	0	0	250K	0	A LIGHTNING INDUCED FIRE COMPLETELY DESTROYED THE PACKERTON FOREST PRODUCTS PLANT.
Syracuse	7/21/1998	Tstm Wind	50 kts	0	0	0	0	TREES DOWN.
Warsaw	7/21/1998	Tstm Wind	50 kts	0	0	500K	0	NUMEROUS TREES DOWN IN TOWN. ONE HOME COMPLETELY DESTROYED BY LARGE FALLEN TREE

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								WHICH CRUSHED THE THEN UNOCCUPIED HOME. A TENTS AT THE COOK CHAPEDL CHURCH WERE BLOWN AWAY AND NEVER FOUND. SEVERAL OTHER HOMES SUFFERED MINOR TO MODERATE DAMAGE ESPECIALLY TO ROOFS FROM FALLEN TREES AND LIMBS.
Pierceton	7/21/1998	Tstm Wind	0 kts	0	0	200K	0	A HOUSE WAS FLATTENED BY A LARGE OAK TREE. NO ONE WAS HOME AT THE TIME FORTUNATELY.
Warsaw	7/21/1998	Tstm Wind	64 kts	0	0	0	0	NUMEROUS TREES DOWN.
Pierceton	7/21/1998	Tstm Wind	50 kts	0	0	10K	0	TREE FELL ON HOME AND DAMAGED ROOF AND PORCH.
Milford	8/24/1998	Tstm Wind	0 kts	0	0	50K	0	SEVERAL TREES AND POWER LINES DOWN.
Syracuse	8/24/1998	Tstm Wind	0 kts	0	0	50K	0	SEVERAL TREES AND POWER LINES DOWN.
North Webster	11/10/1998	Tstm Wind	52 kts	0	0	0	0	None Reported
Kosciusko	1/2/1999	Heavy Snow	N/A	0	0	0	0	Synoptic and mesoscale conditions on the 1st of January 1999... The northern hemishperic longwave pattern began the year in transition as a high zonal index hinted at major changes to the longwave pattern over the New Year's Day weekend. Two potent shortwaves...one associated with the northern branch of the jet stream and the other associated with the southern branch...were progged to phase over the central plains on the 2nd of January. Lee troughing developed during the day on the 1st with the eventual surface low developing across the Texas panhandle that afternoon. Tremendous moisture was advected off the gulf of mexico during the afternoon as the low deepened. Moderate to heavy snow began to break out across the county warning area by late evening. On the 2nd of January...intense low pressure was located across northeast Arkansas and slowly moved northeastward into northwest Indiana by late evening. Snowfall rates of 1 to 2 inches per hour were common throughout the day with even heavier snow noted as the system wrapped up and closed off over northern Illinois that evening. Nearly all the snowfall across the county warning area was due to the tremendous warm advection that occurred on the nose of a 60 knot low level jet overtop the shallow cold dome that was in place. Precipitation in areas along and east of a Lafayette Indiana to Defiance Ohio line eventually changed to freezing rain and sleet as 850 millibar temperatures warmed to above freezing. Snowfall amounts were the highest observed since the Blizzard of 1978 in many areas. Several cooperative observer stations reported all-time record 24 hour snowfalls as well. Storm totals ranged from two feet across northwest Indiana and southwest lower Michigan...12 to 18 inches across north central Indiana into south central Michigan and northwest Ohio... 6 to 8 inches across east central Indiana into western Ohio, where significant sleet and freezing rain later fell on top of the heavy snow. Impacts on the people across the area were significant. Many rural roads remained impassable for several days. Some schools were closed for up to two weeks after the snowstorm. Many buildings... especially manufacturing warehouses and large retail stores in areas that received the heavier snow... reported collapsed roofs due to the weight of the snow. Damage estimates were not known at the time of this report.
Syracuse	4/10/1999	Hail	1.00 "	0	0	0	0	None Reported
Etna Green	4/22/1999	Tstm Wind	0 kts	0	0	5K	0	Sheiff and amateur radio operator reported several trees blown down and a roof blown off of a repair shop. A warm front across the southern Great Lakes region served as the focus for strong to severe thunderstorms. Overrunning precipitation was heavy enough to cause localized flooding over a narrow portion of northeastern Indiana. Thunderstorms training along the warm front dumped up to 2 inches of rain per hour across the region. Dew points were in the lower 60s south of the warm front and provided ample moisture for the convection to sustain itself. A low-level jet over southern Illinois and Indiana aided in the thunderstorm development.
Warsaw	4/22/1999	Tstm Wind	60 kts	0	0	0	0	Thunderstorm wind gusts of 55 to 60 MPH reported by an off-duty NWS employee. A warm front across the southern Great Lakes region served as the focus for strong to severe thunderstorms. Overrunning precipitation was heavy enough to cause localized flooding over a narrow portion of northeastern Indiana. Thunderstorms training along the warm front dumped up to 2 inches of rain per hour across the region. Dew points were in the lower 60s south of the warm front and provided ample moisture for the convection to sustain itself. A low-level jet over southern Illinois and Indiana aided in the thunderstorm development.
North Webster	5/17/1999	Hail	0.75 "	0	0	0	0	Synopsis for May 17th... A moist low-level atmosphere and an upper-level trough over the western Great Lakes combined to produce very unstable conditions across the region. Convection formed along a lake breeze boundary southeast of Lake Michigan. With the numerous outflow boundaries from earlier convection the thunderstorms continued to move east throughout the evening.

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
Milford	6/1/1999	Tstm Wind	0 kts	0	0	50K	0	13 large trees were blown down in town. A metal roof was torn off a machine and tool shop. A pickup truck was damaged when a large tree was toppled onto it.
Etna Green	7/28/1999	Tstm Wind	0 kts	0	0	25K	0	Power lines were downed from Etna Green to Atwood.
Silver Lake	4/20/2000	Hail	0.88 "	0	0	0	0	None Reported
Winona Lake	4/20/2000	Hail	0.88 "	0	0	0	0	None Reported
North Webster	4/20/2000	Hail	0.88 "	0	0	0	0	None Reported
Warsaw	5/9/2000	Hail	0.75 "	0	0	0	0	None Reported
Silver Lake	5/9/2000	Tstm Wind	0 kts	0	0	0	0	Tree down.
Winona Lake	5/9/2000	Tstm Wind	0 kts	0	0	0	0	Tree down.
North Webster	5/9/2000	Tstm Wind	0 kts	0	0	0	0	Large limbs down.
Atwood	5/12/2000	Hail	1.75 "	0	0	0	0	None Reported
Pierceton	5/12/2000	Hail	0.88 "	0	0	0	0	None Reported
Claypool	5/18/2000	Tstm Wind	0 kts	0	0	0	0	Few trees down on power lines.
Etna Green	5/18/2000	Tstm Wind	0 kts	0	0	0	0	Few trees down on power lines.
Silver Lake	5/18/2000	Tstm Wind	0 kts	0	0	0	0	Few trees down on power lines.
Sidney	6/14/2000	Tornado	F2	0	0	200K	10K	The last farm was hit when the tornado was located just west of 1300 S and 400 E in Kosciusko County. Two barns, a garage, and several outbuildings were completely destroyed with some of the foundations swept clean. The house and two cars were severely damaged from large pieces of flying debris. A 17 foot boat was thrown about 20 yards and severely damaged. Most of the trees on this farm were destroyed. Debris from this farm was carried up to one half mile away as the tornado crossed 400 E and then lifted back into the clouds. Synoptic and mesoscale conditions for June 14th... A significant mid-level shortwave trough was located over Iowa on the morning of June 14th with an outflow dominated squall line across western Illinois. Rapid destabilization ensued later in the morning across eastern Illinois and northern Indiana with CAPES to 3500 j/kg by early afternoon. VAD wind profiles showed 850 millibar winds in excess of 50 knots in advance of the upper trough by afternoon and as storms developed along the left over outflow boundary across Illinois... they quickly became severe and organized into a large bow echo and moved quickly eastward into northern Indiana causing extensive wind damage. By late afternoon... a short segmented squall line developed just ahead of this bow echo squall line and extended from a St. Joseph to Fulton county line. Along the southern end of this line... an embedded tornadic supercell developed and interacted with a left over storm-scale outflow boundary to produce the Wabash/Kosciusko and DeKalb county tornadoes. The lack of significant low level shear likely prevented a much larger and more widespread tornado event especially across Whitley and Allen counties where several funnel clouds were captured on film but failed to touch down.
North Webster	8/2/2000	Hail	0.75 "	0	0	0	0	None Reported
Syracuse	8/2/2000	Hail	0.75 "	0	0	0	0	None Reported
Syracuse	8/2/2000	Tstm Wind	0 kts	0	0	0	0	Tree down.
Warsaw	8/6/2000	Tstm Wind	0 kts	0	0	0	0	Trees down. Synoptic and mesoscale conditions for August 6th... A significant shortwave trough of low pressure combined with a mid level speed max of 60 knots and rapid prefrontal destabilization during the day of August 6th ahead of a strong cold front led to convective initiation across eastern Iowa by late morning. Given favorable deep layer shear of 50 knots and extreme instability present from Northern Illinois into Northwest Ohio that afternoon... storms quickly organized into a bow echo squall line as they rapidly moved eastward at speeds of up to 50 knots. As the bow echo matured... dramatic yet elevated rear inflow jet developed along the backside with isolated wind damage along and west of a Elkhart to Wabash line. However, with time the rear inflow jet descended causing widespread wind damage across Whitley, Noble and Allen counties.
Kosciusko	9/11/2000	Flood	N/A	0	0	400K	0	Widespread street and basement flooding. Between 4 and 5 inches of rainfall was reported in town. Several people were rescued from stranded vehicles in flood waters.
Milford	9/11/2000	Hail	0.75 "	0	0	0	0	None Reported
Warsaw	9/11/2000	Hail	0.75 "	0	0	0	0	None Reported
Warsaw	9/11/2000	Lightning	N/A	0	0	150K	0	Lightning struck a barn causing a fire which gutted the barn and its contents.

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
Syracuse	9/11/2000	Tstm Wind	0 kts	0	0	0K	0	Large limbs blown down.
Kosciusko	12/11/2000	Heavy Snow	N/A	0	0	0K	0	...Synoptic and mesoscale conditions on December 11th... An unseasonably cold arctic airmass spilling southward out of southern Canada on the 10th combined with a very strong upper level disturbance and upper level jet of 160 knots came together over the Midwest early on the 11th. Surface low pressure developed over Oklahoma early on the 11th and rapidly deepened as it lifted northeastward into central Indiana by late afternoon. Heavy snow developed quickly during the morning and mixed with some sleet at times due to the tremendous warm air advection out ahead of the intensifying system. Heavy snow continued into the early morning hours of the 12th with thunder snow reported at several locations in northwest Indiana and southwest Michigan within the mid level deformation zone of the upper low. As the surface low continued to intensify and pull out into Ohio during the night of the 11th...strong gradient winds developed creating near blizzard conditions over northwest Indiana and southwest Michigan and caused some damage to trees and power lines over northwest Ohio with wind gusts of 59 mph reported in Putnam Ohio and 56 mph in Lima Ohio. Some notable storm total snowfall reports included 16 inches in Cassopolis... 14 in Elkhart... 13.5 in Goshen... 12 in Niles, St. Joseph, Salem Center, and the South Bend airport... and 10 inches in Berrien Springs, Westville, Middlebury, Mishawaka, Union, and White Pigeon with 6 to 8 inches elsewhere.
Kosciusko	12/16/2000	Heavy Snow	N/A	0	0	0K	0	...Synoptic and mesoscale conditions on December 17th... The last in a series of strong upper level disturbances and associated upper level jet streaks moving northward out of the lower Mississippi valley combined with another arctic cold front dropping down out of southern Canada on the 17th. Developing surface low pressure along the advancing arctic front was initially quite weak...however as the strong upper level low ejected out of the mean long wave trough through the central US and two distinct upper jet streaks coupled...the surface low bombed as it moved northeast from Louisville Kentucky to Toledo Ohio late that evening. Very heavy snow developed within the developing mid level deformation zone due in part to considerable moisture wrapping westward in advance of the upper level low, increasing deep upward vertical motion as the jet streak coupling occurred and rapid intensification of the system in general. Several locations reported thunder snow with snowfall rates of 1 to 2 inches per hour for a 6 hour period during the early morning hours of the 17th. Some notable storm total snowfall reports included 10.5 inches in Lagrange... 9 in Sturgis and Albion, 8 in Warsaw and La Otto, 7 in Columbia City, Cromwell, Kendallville and Middlebury and 6 inches in Rochester, Royal Center, Logansport and Fort Wayne.
North Webster	4/10/2001	Hail	0.75 "	0	0	0	0	Synoptic and mesoscale conditions on April 9th, 2001... A stalled frontal boundary extended from northern Ohio back west into northeast Missouri with a developing surface low pressure wave near Quincy, Illinois monday afternoon. This wave intensified late in the afternoon as a shortwave trough embedded within the southern periphery of a significant upper jet maxima of 120 knots over Minnesota pulled out into the upper Midwest. Wind profilers at both Wolcott, Indiana and Winchester, Illinois indicated rapid backing low level winds and increasing speed convergence around 2500 feet coincident with rapid convective initiation along the frontal boundary from Logansport to Rensselaer. Storms rapidly intensified with CAPES (Convective Available Potential Energy, a measure of parcel buoyancy) south of the frontal boundary up to 3000 J/kg. In addition...several storm scale mergers were observed with a left over outflow boundary from prior convection. Thunderstorm intensification was very rapid owing to the large amount of instability in place along and south of a Monticello to Muncie line. Deep layer shear to 50 knots was more than sufficient for supercell development. Indeed most storms along the outflow boundary exhibited strong rotation...mainly at mid-levels but two storms in particular that moved across Cass, Miami, Grant, Blackford and Jay exhibited persistent, deep rotation with several funnel cloud reports but failed to produce any confirmed tornadoes. However...these two storms did produce prodigious large hail...up to 4.5 inches in diameter just north of Hartford City.
North Webster	4/23/2001	Tstm Wind	0 kts	0	0	0K	0	Large limb blown down.
North Webster	6/12/2001	Tstm Wind	60 kts	0	0	0	0	60 mph wind gust measured by Off-Duty NWS employee.
North Webster	6/12/2001	Tstm Wind	0 kts	0	0	0	0	Large tree branches down.
North Webster	6/12/2001	Tstm Wind	0 kts	0	0	5K	0	Large tree limb down on house.
North Webster	6/12/2001	Tstm Wind	0 kts	0	0	3K	0	Several large trees down and boat piers blown onshore in Mead Park.
North Webster	6/12/2001	Tstm Wind	0 kts	0	0	20K	0	Large tree down crushed side of small house.
Piercetown	6/19/2001	Hail	0.75 "	0	0	0	0	None Reported

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
Pierceton	6/19/2001	Hail	0.75 "	0	0	0	0	None Reported
North Webster	6/19/2001	Tstm Wind	0 kts	0	0	0	0	Large tree blown down on Armstrong Rd.
Burket	8/22/2001	Lightning	N/A	0	0	50K	0	Lightning struck a house on CR 900S. When the lightning bolt hit the house items were knocked off the wall and electrical sockets were blown out of the wall. Damage to the residence was estimated at \$50,000.
Warsaw	8/22/2001	Lightning	N/A	0	0	20K	0	Lightning apparently started a fire which destroyed a barn near the intersection of CR 450S and County Farm Road. The remains of the barn were discovered around 1:20 am EST by a Kosciusko County Sheriff's deputy on routine patrol.
Warsaw	8/22/2001	Tstm Wind	0 kts	0	0	0	0	Tree blown down on SR 25.
North Webster	8/22/2001	Tstm Wind	0 kts	0	0	0	0	Tree blown down.
Syracuse	8/22/2001	Tstm Wind	0 kts	0	0	0	0	Trees blown down.
Warsaw	8/22/2001	Tstm Wind	0 kts	0	0	0	0	Trees blown down.
Warsaw	8/22/2001	Tstm Wind	0 kts	0	0	0	0	Trees blown down.
Oswego	8/22/2001	Tstm Wind	0 kts	0	0	0	0	Trees blown down.
Warsaw	8/22/2001	Tstm Wind	0 kts	0	0	0	0	Two oak trees completely uprooted at the corner of High and Market Streets in downtown Warsaw.
Syracuse	9/7/2001	Tstm Wind	0 kts	0	0	0K	0	Numerous trees down.
North Webster	10/24/2001	Hail	0.75 "	0	0	0	0	None Reported
Mentone	10/24/2001	Tornado	F1	0	14	2.5M	0	None Reported
Kosciusko	1/31/2002	Ice Storm	N/A	0	1	10K	0	The first major winter storm of the season brought an ice storm to much of Southwest Lower Michigan, Northern Indiana, and extreme Northwest Ohio with ice accumulations from one quarter to over one half inch on trees and power lines, with up to one and one half inches of ice reported in some locations. Roads were ice covered mainly along and north of the Indiana and Michigan state line. Over 250,000 homes were without power at some point during the storm. Trees and power lines were down across the entire area, and AEP electric reported the most outages ever for the Michiana region, surpassing any previous severe weather event. A Pulaski county employee was injured working near a power line. Some customers did not have power restored for over three days. Despite this, actual property damage was quite limited, with only isolated minor damage to some vehicles. Several communities issued state of emergencies for over 48 hours, with the Red Cross and local churches opening shelters.
Kosciusko	2/26/2002	Winter Storm	N/A	0	0	0	0	Widespread moderate to heavy snow occurred across portions of northern Indiana. Much of the accumulation that occurred across the area were the result of synoptic snows in association with low pressure that moved through the lower Great Lakes/Ohio Valley. Total snowfall amounts from the area ranged from 6 to 12 inches. The heaviest snow fell in a narrow band covering much of Kosciusko county into extreme southwestern Noble county. A foot of snow was measured at the NWS in Syracuse, with 9 inches in Warsaw. In La Porte and St. Joseph counties, accumulations were a combination of synoptic and lake enhanced snow, with the majority of it falling during the evening of the 26th and early morning hours of the 27th. Accumulations generally ranged from 8 to 12 inches for the entire storm. The South Bend observing site recorded 16.7 inches of snow for the event, with the majority of this lake enhanced snow. Daily snowfall records for the 26th and 27th were broken in South Bend.
Kosciusko	3/9/2002	High Wind	55 kts	0	0	0	0	An unusually strong cold front moved through the region during the daylight hours of the 9th. A strong pressure gradient existed with the front as 3 hour pressure falls of 4 millibars ahead of the front combined with 3 hour pressure rises of 11 millibars. Winds just above the surface ranged from 70 to 80 mph. The combination of these 2 factors was tapped by a narrow line of showers immediately ahead of the cold front. Widespread reports of trees, tree limbs and power lines being blown down were received as surface winds of 50 to 70 mph were experienced by many areas. Damage was mainly confined to the northeast part of the county.
Pierceton	7/29/2002	Tstm Wind	0 kts	0	0	0	0	Local utility reported trees and power lines down north of Pierceton.
Warsaw	9/19/2002	Tstm Wind	0 kts	0	0	0	0	Law enforcement reported trees were reported blown down in Warsaw, Leesburg and Milford.
Kosciusko	12/24/2002	Heavy Snow	N/A	0	0	0	0	Low pressure tracked from Kentucky into Ohio during the overnight hours of Christmas Eve into Christmas Day morning, spreading a large area of snow across the region. Most locations received 6 to 8 inches of snow. A narrow band of 8 to 10 inches occurred from Monticello, to Rochester, to Albion. Isolated reports of 9 inches of snow were received in Adams and Grant counties. Gusty northwest winds created widespread blowing and

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								drifting snow.
Leesburg	3/20/2003	Hail	0.88 "	0	0	0	0	Dime size hail was reported between Leesburg and North Webster, with the storm then producing nickel size hail in the town of North Webster.
Leesburg	4/30/2003	Hail	0.75 "	0	0	0	0	None Reported
North Webster	4/30/2003	Hail	1.00 "	0	0	0	0	One inch hail occurred at the weather service office north of North Webster.
Leesburg	4/30/2003	Tstm Wind	55 kts	0	0	2K	0	Local media reported a grain bin was blown down west of Leesburg.
Warsaw	5/9/2003	Hail	0.75 "	0	0	0	0	None Reported
Leesburg	5/9/2003	Hail	1.00 "	0	0	0	0	Off duty NWS employees in the same area reported hail the size of quarters covering the ground.
North Webster	5/9/2003	Hail	1.00 "	0	0	0	0	None Reported
Pierceton	5/9/2003	Hail	2.50 "	0	0	0	0	Local residents reported hail up to the size of tennis balls falling with the storm.
Pierceton	5/9/2003	Tornado	F1	0	0	5K	0	A mini van driving southbound on a county road, about 6.5 miles south of Pierceton, was picked up by the tornado and deposited 10 to 15 feet west of the road in a field. The driver reported not being able to see out of the van, was pressing the accelerator but not going anywhere. The driver and her granddaughter were unharmed and there was no visible damage to the van. Just north of this location, 2 large trees, each roughly 2 to 3 feet in diameter and 8 to 10 feet of their top trunks removed by the tornado. An RV in the yard received extensive damage from the tornado, with debris striking a car in the yard, breaking out both the front and rear windows. .
Pierceton	5/9/2003	Tstm Wind	52 kts	0	0	0	0	Several trees were uprooted 6 miles south of Pierceton, along county roads 550 E and 750 S. One tree fell onto the porch of a home, destroying the porch, but leaving the remainder of the house undamaged. The owners, who were in their basement at the time of the damage, were not injured. The roof was torn off a over 100 year old barn at one residence. Large trees were also uprooted in the general area of the barn damage. A unsecured, unoccupied mobile home was blown approximately 50 yards and destroyed in the area as well.
North Webster	7/4/2003	Hail	1.00 "	0	0	0	0	Quarter size hail at the NWS office north of North Webster.
North Webster	7/4/2003	Hail	1.50 "	0	0	0	0	Ping-pong ball size hail at the NWS office north of North Webster.
Warsaw	7/4/2003	Hail	0.75 "	0	0	0	0	None Reported
Warsaw	7/4/2003	Tstm Wind	50 kts	0	0	0	0	A trained spotter reported large tree limbs down west of Warsaw.
Palestine	7/6/2003	Hail	0.75 "	0	0	0	0	None Reported
North Webster	7/7/2003	Tstm Wind	50 kts	0	0	0	0	Public reported trees down in North Webster.
Leesburg	7/8/2003	Tstm Wind	50 kts	0	0	0	0	Off duty NWS employee reported trees down east of Leesburg.
North Webster	7/8/2003	Tstm Wind	58 kts	0	0	0	0	A wind gust was measured at 67 MPH at the NWS office north of North Webster.
Warsaw Arpt	7/8/2003	Tstm Wind	53 kts	0	0	0	0	The Warsaw airport AWOS measured a wind gust to 61 MPH.
North Webster	8/21/2003	Tstm Wind	50 kts	0	0	0	0	Trees were reported down.
Kosciusko	8/26/2003	Tstm Wind	50 kts	0	0	0	0	Trees were reported down throughout the county.
North Webster	8/26/2003	Tstm Wind	52 kts	0	0	0	0	None Reported
North Webster	8/26/2003	Tstm Wind	50 kts	0	0	0	0	Trees and power lines were blown down.
Kosciusko	11/12/2003	High Wind	56 kts	0	0	50K	0	Winds gusted to 65 MPH behind a strong cold front that moved across the region during the late afternoon and evening. Numerous power outages occurred with trees and power lines down. Damage was reported to some roofs with extensive damage to the Knox City Court Building in Starke County.
Kosciusko	3/5/2004	High Wind	52 kts	0	0	0	0	An intense area of low pressure moving across Michigan produced sustained winds of 40 MPH with measured gusts to 60 MPH across all of Northern Indiana, Northwest Ohio and Southwest Lower Michigan from late morning through early evening. Widespread reports of trees and power lines down were received from law enforcement across the region.
Warsaw	5/6/2004	Hail	0.75 "	0	0	0	0	None Reported
Silver Lake	5/7/2004	Hail	1.00 "	0	0	0	0	None Reported
Leesburg	5/21/2004	Hail	0.75 "	0	0	0	0	None Reported

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
Milford	5/21/2004	Tstm Wind	50 kts	0	0	0	0	Law enforcement reported trees down in Milford.
Warsaw	5/22/2004	Tstm Wind	51 kts	0	0	0	0	An off duty NWS employee estimated wind gusts to 60 MPH in Warsaw.
Sidney	5/23/2004	Hail	0.88 "	0	0	0	0	None Reported
North Webster	6/14/2004	Tstm Wind	50 kts	0	0	0	0	Law enforcement reported trees and power lines down in North Webster.
Warsaw	7/13/2004	Hail	1.00 "	0	0	0	0	Reported on US 30.
Syracuse	7/21/2004	Tstm Wind	50 kts	0	0	0	0	Trees reported knocked down.
Warsaw	7/21/2004	Tstm Wind	50 kts	0	0	0	0	Trees reported knocked down.
Kosciusko	10/30/2004	Strong Wind	48 kts	0	0	9K	0	Winds across portions of northern Indiana were sustained in the 25 to 35 mph range with some areas reporting gusts between 45 to as high as 69 mph. Reports of small branches and a few power lines were received. The 69 mph wind gust was recorded at the Michigan City Coast Guard observation site. A Michigan City man was injured after pushing his 7 year old grandson out of the way of a falling tree. The 51 year old was unable to move out of the way after this and was subsequently struck by the falling tree in the back. His back was broken in three places. No other injuries were reported. Other recorded wind gusts across northern Indiana were: South Bend 55 mph, North Webster NWS 52 mph, Fort Wayne 51 mph and Goshen 49 mph.
Kosciusko	1/5/2005	Winter Storm	N/A	0	0	0	0	A band of significant sleet accumulations occurred in many locations north of State Route 14 and south of US 6. Total sleet accumulations ranged from one half to one inch. In addition to the sleet, many locations received up to a quarter inch of freezing rain and a few inches of snow. North of US 6, 4 to 8 inches of snow fell in many locations. One fatality occurred in Steuben county, indirectly related to the storm. A 54 year old woman was killed after her car was struck by another vehicle that lost control on a snow covered curve on State Route 827. The driver of the other vehicle sustained minor injuries.
Kosciusko	1/8/2005	Heavy Snow	N/A	0	0	0	0	A narrow band of heavy snow occurred across portions of Kosciusko, Noble and Fulton counties in northern Indiana. The heaviest snowfall fell between 2 am and 6 am when snowfall rates were as high as 3 inches per hour. Total snowfall ranged from 6 to nearly 7.5 inches of snow in parts of these counties.
Kosciusko	1/12/2005	Dense Fog	N/A	0	0	420K	0	Widespread dense fog developed across much of Northern Indiana during the morning hours. Visibility was reported to be at or near zero in many locations. Numerous accidents were reported as a result of the fog. The fog was indirectly responsible for a total of 2 deaths and at least 11 injuries. A 32 vehicle pile-up occurred on the Indiana Toll Road, 4 miles east of State Route 9 near the Indiana/Michigan state line at approximately 11 am EST. A 27 year old male was killed when the car he was traveling in as a passenger was crushed between 2 semi's involved in the pile up. 8 other injuries were reported in this pile up. 2 ambulances were also involved in the pile up when they were struck by semi-trucks. None of the emergency workers were injured, but one ambulance was severely damaged. In a separate accident in Noble county, a 54 year old woman was killed when her car was broadsided by another vehicle in near zero visibility. Three other accidents resulted in one injury each in various parts of De Kalb county. The unusually dense fog was the result of very warm and moist air moving over a rapidly diminishing snowpack.
Kosciusko	1/22/2005	Winter Storm	N/A	0	0	0	0	A major snow storm developed in response to the last in a series of potent "Clipper" systems dropping into the Great Lakes. The heaviest snowbands developed during the late evening hours of the 21st and continued well into the 22nd as surface low pressure moving east-southeast out of Illinois intensified. Two dominant mesoscale bands developed and were responsible for the majority of the accumulations. As the low passed by, strong north winds caused areas of blowing and drifting snow into the late evening hours of the 22nd. 6 inches or more of snow generally fell north of U.S.30 with amounts generally in the 7 to 9 inch range as you went north towards the Michigan state line. The highest report was in Fremont (Steuben county) of a foot of new snow.
Kosciusko	3/1/2005	Winter Storm	N/A	0	0	0	0	A strong storm system moved across the southern Great Lakes region, bringing with it a large area of snow. The snow began on February 28th across much of the area, increasing in intensity and coverage into the overnight hour of the 28th into much of March 1 and even into the early hours of March 2nd in some areas. As the event unfolded, the relatively warm waters of Lake Michigan allowed for lake enhanced snowfall to occur in the typical lake effect areas, increasing snow accumulations in a narrow band across portions of northern Indiana. While most reports were in the 4 to 8 inch range, 2 narrow bands of locally higher accumulations occurred with one band extending through northeast St Joseph County as well as extreme northeastern Marshall and northwest Kosciusko County where up to 10 inches was reported. A second band extended from western Elkhart County into northeastern Kosciusko and northwestern Whitley County where 6 to 9 inches was reported.

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
Warsaw	5/13/2005	Heavy Rain	N/A	0	0	0	0	2.45 inches of rain reported between 630 and 730 pm EST. Ponding of water noted on roads in the area.
Leesburg	5/13/2005	Heavy Rain	N/A	0	0	0	0	2.05 inches of rain reported in 1 hour.
Winona Lake	5/13/2005	Tstm Wind	52 kts	0	0	0	0	None Reported
Syracuse	6/5/2005	Tstm Wind	51 kts	0	0	0	0	A few large limbs were reported down in Syracuse. A spotter estimated a wind gust to 60 mph.
Kosciusko	7/5/2005	Funnel Cloud	N/A	0	0	0	0	Numerous reports were received of well developed cold air funnel clouds in the southern part of the county as a result of interacting boundaries. No thunderstorms were in the area.
Atwood	7/6/2005	Tornado	F0	0	0	0	0	A trained spotter in the area observed several funnel clouds, one of which briefly touched down in an open field and dissipated. No damage could be found by the survey team associated with the touchdown.
atwood	7/6/2005	Tstm Wind	55 kts	0	0	0	0	While performing a survey on a possible tornado in the area, NWS personnel observed a few large trees damaged or uprooted as well as some corn stalks down on the south side of Hoffman Lake. Winds were estimated in the 60 to 65 mph range.
Milford	7/18/2005	Tstm Wind	55 kts	0	0	0	0	A tree was snapped about three feet off the ground, with several large tree branches also reported down.
Syracuse	7/21/2005	Tstm Wind	55 kts	0	0	1K	0	Very large limb, as well as power lines were blown down.
Syracuse	7/25/2005	Tstm Wind	55 kts	0	0	2K	0	Several trees and power lines were blown down east of Syracuse.
Syracuse	11/6/2005	Tstm Wind	55 kts	0	0	10K	0	A large tree and power lines were blown down on State Route 13, near Syracuse.
Silver Lake	11/6/2005	Tstm Wind	50 kts	0	0	1K	0	Trees were blown down across State Route 15.
Kosciusko	12/1/2005	Winter Weather/mix	N/A	0	0	0	0	A fast moving weak low pressure moved through the Ohio Valley and produced a widespread light snowfall across most of the region, with accumulations around 1 inch. The snow resulted in slippery spots on untreated roads. The fatality occurred on U.S. route 30 in eastern Kosciusko County, IN. A 69 year old male lost control of his pickup truck on a patch of ice and rammed into a guard rail.
Kosciusko	12/8/2005	Heavy Snow	N/A	0	0	0	0	A low pressure system combined with a strong upper level disturbance moved slowly through the Ohio Valley and brought a widespread heavy snow to the entire region. Accumulating snow began in the mid to late afternoon on the 8th and reached 6 inches during the late evening. The accumulating snow tapered off during the pre-dawn hours of the 9th. Storm total accumulations reached 6 to 9 inches throughout the region with local amounts of up to 10 inches. Snowfall was moderate to occasionally heavy during the late afternoon and evening of the 8th with rates of 1 to 2 inches per hour. A fatal accident occurred in Elkhart county around 330 pm on Thursday the 8th, near the Goshen Municipal airport. A 37 year old female, who was a passenger in one of the vehicles, was pronounced dead at the scene.
Leesburg	3/13/2006	Tstm Wind	55 kts	0	0	0	0	Top 8 feet of a roughly 20 foot high, 14 inch diameter tree was broke off, falling into a private yard.
Milford	3/13/2006	Tstm Wind	60 kts	0	0	265K	0	A survey of damage at the Maple Leaf Farms Distribution center, southeast of Milford, concluded that straight line winds were the cause of damage to a cold storage building. As winds striking the west side of the building interacted with the pressure within the cold storage vault, causing a vacuum that resulted in numerous panels, as well as insulation, being pulled off the building. The refrigeration equipment did not suffer any damage. However, much of its contents were exposed to the outside air, resulting in some loss of the food. Roof damage was also reported at 3 smaller buildings. As the winds continued east, trees and power lines were knocked down in an around Blueberry Island, on Dewart Lake. Damage is estimated at \$250,000 at Maple Leaf Farms and roughly \$15,000 on Blueberry Island.
Sidney	4/12/2006	Lightning	N/A	0	0	100K	0	Lightning struck the transmission tower of WLZQ-FM, damaging the main transmitter beyond repair. Service was fully restored in early May. Damage estimates to replace the transmitter are around \$100,000.
North Webster	5/17/2006	Hail	0.75 "	0	0	0	0	None Reported
Warsaw	5/25/2006	Tstm Wind	55 kts	0	0	0	0	Several large trees down.
Warsaw	6/21/2006	Hail	0.75 "	0	0	0	0	None Reported
North Webster	6/21/2006	Hail	0.75 "	0	0	0	0	None Reported
Warsaw	6/21/2006	Tstm Wind	65 kts	0	0	0	0	Several trees were blown down with a 75 mph wind gust being recorded just south southwest of North Webster.
Milford	7/2/2006	Tstm Wind	60 kts	0	0	5K	0	Approximately 50 trees were either uprooted or knocked down at Camp Mack on Waubee Lake. Most of the trees fell in open areas, but one tree did fall onto a building. No one was in the building at the time. Power lines were also reported down. Damage is estimated at \$5,000.
Syracuse	7/18/2006	Tstm Wind	50 kts	0	0	0	0	One tree, plus several tree limbs were blown down.

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
Warsaw	9/5/2006	Hail	1.00 "	0	0	0	0	None Reported
Kosciusko	2/13/2007	Blizzard	N/A	0	0	OK	OK	The highest report recieved was 10.5 inches southwest of North Webster.A powerful winter storm blanketed all of northern Indiana with heavy snow and strong winds. This caused widespread whiteout conditions across the area with many roads becoming impassable due to drifting snowfall. Numerous schools and businesses were closed on Valentines day as a result of the dangerous weather. The blowing and drifting was so widespread, that many counties pulled the snow plows from the roads and declared travel restrictions to all but emergency vehicles. Two weather related deaths were reported, one in Ashley in Steuben county and the other in Springville in Laporte county. Both deaths were traffic accident related. Accumulations ranged from 6 inches across the far north, to 17 inches from White county towards Grant county.
Kosciusko	2/13/2007	Blizzard	N/A	0	0	OK	OK	The highest report recieved was 10.5 inches southwest of North Webster.A powerful winter storm blanketed all of northern Indiana with heavy snow and strong winds. This caused widespread whiteout conditions across the area with many roads becoming impassable due to drifting snowfall. Numerous schools and businesses were closed on Valentines day as a result of the dangerous weather. The blowing and drifting was so widespread, that many counties pulled the snow plows from the roads and declared travel restrictions to all but emergency vehicles. Two weather related deaths were reported, one in Ashley in Steuben county and the other in Springville in Laporte county. Both deaths were traffic accident related. Accumulations ranged from 6 inches across the far north, to 17 inches from White county towards Grant county.
Kosciusko	2/13/2007	Winter Storm	N/A	0	0	OK	OK	On average 9 to 12 inches of snow fell across the county. A report of 14 inches was received southwest of Laporte. A 19 year old woman was killed in a head on collision on US 20 just west of the Indiana 39 intersection, near Springville. Her vehicle slid on slippery roads and collided with a westbound pickup truck. She was pronounced dead at the scene. The driver of the other vehicle was taken in serious condition to a local hospital.A powerful winter storm blanketed all of northern Indiana with heavy snow and strong winds. This caused widespread whiteout conditions across the area with many roads becoming impassable due to drifting snowfall. Numerous schools and businesses were closed on Valentines day as a result of the dangerous weather. The blowing and drifting was so widespread, that many counties pulled the snow plows from the roads and declared travel restrictions to all but emergency vehicles. Two weather related deaths were reported, one in Ashley in Steuben county and the other in Springville in Laporte county. Both deaths were traffic accident related. Accumulations ranged from 6 inches across the far north, to 17 inches from White county towards Grant county.
Kosciusko	2/13/2007	Winter Storm	N/A	0	0	OK	OK	On average 9 to 12 inches of snow fell across the county. A report of 14 inches was received southwest of Laporte. A 19 year old woman was killed in a head on collision on US 20 just west of the Indiana 39 intersection, near Springville. Her vehicle slid on slippery roads and collided with a westbound pickup truck. She was pronounced dead at the scene. The driver of the other vehicle was taken in serious condition to a local hospital.A powerful winter storm blanketed all of northern Indiana with heavy snow and strong winds. This caused widespread whiteout conditions across the area with many roads becoming impassable due to drifting snowfall. Numerous schools and businesses were closed on Valentines day as a result of the dangerous weather. The blowing and drifting was so widespread, that many counties pulled the snow plows from the roads and declared travel restrictions to all but emergency vehicles. Two weather related deaths were reported, one in Ashley in Steuben county and the other in Springville in Laporte county. Both deaths were traffic accident related. Accumulations ranged from 6 inches across the far north, to 17 inches from White county towards Grant county.
Kosciusko	2/24/2007	Ice Storm	N/A	0	0	25K	OK	Two to four tenths of an inch of ice covered roads and power lines, creating hazardous driving conditions and widespread power outages along with tree limbs downed. No injuries or deaths were reported in the county.A late February storm system brought widespread precipitation in the form of mainly freezing rain. Several locations did see periods of sleet during the event, however the ice accumulations posed the greatest threat. Reports of around one quarter inch of ice along with a few tenths of an inch of sleet was reported across parts of northern Indiana. 10 to 20 mph winds caused additional problems with fallen tree limbs and power lines, causing road closures and power outages. Temperatures rose above freezing during the overnight hours keeping overall damage to a minimum.
Kosciusko	2/24/2007	Ice Storm	N/A	0	0	25K	OK	Two to four tenths of an inch of ice covered roads and power lines, creating hazardous driving conditions and widespread power outages along with tree limbs downed. No injuries or deaths were reported in the county.A late February storm system brought widespread precipitation in the form of mainly freezing rain. Several

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								locations did see periods of sleet during the event, however the ice accumulations posed the greatest threat. Reports of around one quarter inch of ice along with a few tenths of an inch of sleet was reported across parts of northern Indiana. 10 to 20 mph winds caused additional problems with fallen tree limbs and power lines, causing road closures and power outages. Temperatures rose above freezing during the overnight hours keeping overall damage to a minimum.
Kosciusko	4/1/2007	Strong Wind	45 kts	0	0	25K	0K	A downburst from a collpasing shower produced damage to two 50 foot storage tanks. Neither tank had a roof or dome on them. Winds were estimated around 50 mph. Several showers developed across northern Indiana on April 1st. Strong winds aloft were brought down during collapse of the showers, with a report of damage in Kosciusko county being received.
Kosciusko	4/1/2007	Strong Wind	45 kts	0	0	25K	0K	A downburst from a collpasing shower produced damage to two 50 foot storage tanks. Neither tank had a roof or dome on them. Winds were estimated around 50 mph. Several showers developed across northern Indiana on April 1st. Strong winds aloft were brought down during collapse of the showers, with a report of damage in Kosciusko county being received.
Barbee	5/1/2007	Hail	0.75 "	0	0	0K	0K	A cold front advanced across northern Indiana producing numerous storms. As the storms encounter a more favorable environment, several began to produce hail.
Warsaw	5/15/2007	Lightning	N/A	0	0	40K	0K	A maple tree fell onto a business in Winona Lake causing roof damage to the building. A combination of a prefrontal outflow boundary drapped across northern Indiana and a MCV from overnight convection across Nebraska the night before provided the focus for convection to develop. In addition, unstable conditions develop during the late morning and early afternoon with SBCAPES of 1500 to 2500 j/kg. Storms began to develop on this boundary during the mid afternoon hours and rapidly became severe. A line of storms associated with the MCV and an approaching trough moved across the northern part of Indiana. This line evolved into several small bowing segments which produced numerous reports of damaging winds and isolated tornadoes.
Syracuse	5/15/2007	Tstm Wind	53 kts	0	0	0K	0K	Recorded at the National Weather Service office. A combination of a prefrontal outflow boundary drapped across northern Indiana and a MCV from overnight convection across Nebraska the night before provided the focus for convection to develop. In addition, unstable conditions develop during the late morning and early afternoon with SBCAPES of 1500 to 2500 j/kg. Storms began to develop on this boundary during the mid afternoon hours and rapidly became severe. A line of storms associated with the MCV and an approaching trough moved across the northern part of Indiana. This line evolved into several small bowing segments which produced numerous reports of damaging winds and isolated tornadoes.
Milford	5/15/2007	Tstm Wind	60 kts	0	0	50K	0K	Sporadic tree and power line damage was reported across the county. However the highest concentration of damage was found along a path from Hastings to Milford. In and around the Hastings area, A house suffered damage to a add on room where the shingles were peeled off and thrown into the yard. Numerous trees and power lines down in the town of Milford, closing several streets, with a partially rotten tree falling onto a parked van, destroying the back half of the van and lifting the front right wheel off the ground several inches. A combination of a prefrontal outflow boundary drapped across northern Indiana and a MCV from overnight convection across Nebraska the night before provided the focus for convection to develop. In addition, unstable conditions develop during the late morning and early afternoon with SBCAPES of 1500 to 2500 j/kg. Storms began to develop on this boundary during the mid afternoon hours and rapidly became severe. A line of storms associated with the MCV and an approaching trough moved across the northern part of Indiana. This line evolved into several small bowing segments which produced numerous reports of damaging winds and isolated tornadoes.
Oswego	5/15/2007	Tstm Wind	55 kts	0	0	10K	0K	Two large trees at least 2 feet in diameter were snapped and hit the corner of a house. A combination of a prefrontal outflow boundary drapped across northern Indiana and a MCV from overnight convection across Nebraska the night before provided the focus for convection to develop. In addition, unstable conditions develop during the late morning and early afternoon with SBCAPES of 1500 to 2500 j/kg. Storms began to develop on this boundary during the mid afternoon hours and rapidly became severe. A line of storms associated with the MCV and an approaching trough moved across the northern part of Indiana. This line evolved into several small bowing segments which produced numerous reports of damaging winds and isolated tornadoes.
Oswego	5/15/2007	Tstm Wind	55 kts	0	0	10K	0K	A 12 inch diameter maple tree snapped off and fell onto a garage and power lines. A combination of a prefrontal outflow boundary drapped across northern Indiana and a MCV from overnight convection across Nebraska the

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								night before provided the focus for convection to develop. In addition, unstable conditions develop during the late morning and early afternoon with SBCAPES of 1500 to 2500 j/kg. Storms began to develop on this boundary during the mid afternoon hours and rapidly became severe. A line of storms associated with the MCV and an approaching trough moved across the northern part of Indiana. This line evolved into several small bowing segments which produced numerous reports of damaging winds and isolated tornadoes.
Warsaw	5/15/2007	Tstm Wind	55 kts	0	0	15K	OK	A maple tree fell onto a business in Winona Lake causing roof damage to the building. A combination of a prefrontal outflow boundary draped across northern Indiana and a MCV from overnight convection across Nebraska the night before provided the focus for convection to develop. In addition, unstable conditions develop during the late morning and early afternoon with SBCAPES of 1500 to 2500 j/kg. Storms began to develop on this boundary during the mid afternoon hours and rapidly became severe. A line of storms associated with the MCV and an approaching trough moved across the northern part of Indiana. This line evolved into several small bowing segments which produced numerous reports of damaging winds and isolated tornadoes.
Winona Lake	6/22/2007	Lightning	N/A	0	0	OK	OK	Four teenagers were camping at a music festival at a local college and sought shelter under a tree, which was struck by lightning. The teenagers were indirectly injured from the strike. They ranged in age from 14 to 19. Two were admitted to a local hospital in fair conditions, with the other two being treated and released. Thunderstorms developed during the late evening into the overnight hours. A cloud to ground strike caused injuries to some teenagers attending a concert.
Warsaw	7/18/2007	Flash Flood	N/A	0	0	10K	OK	Several roads in the northern part of the county, including the city of Warsaw, had up to a foot of flowing water on them. 5 roads in Warsaw were closed for a period of time. Weak, but persistent warm air advection moved into the region extending from eastern Iowa into northern Indiana. Extreme instability developed to the west across Illinois where CAPEs exceeded 5000 j/kg and LI's reached -10 C. As the instability advected east along this area of isentropic lift, thunderstorms rapidly developed. Due to the slow movement of these storms as well as precipitable water values at or above 2 inches, widespread heavy rain was observed in many locations. With northwest flow aloft, the line drifted south and accelerated as a wave approached the area. While flooding ended up the main threat, embedded wind damage was observed in a few of the stronger storms.
Nappanee	8/15/2007	Tstm Wind	55 kts	0	0	OK	OK	A 10 to 12 inch tree branch was blown down. A strong low level jet, remnants of a morning complex of storms from Iowa, and increasing instability all combined to create favorable conditions for damaging winds and isolated supercells. One supercell in particular had a storm motion towards the southeast when the line it was associated with moved mainly eastward. This supercell did produce a tornado in Marshall county.
Barbee	8/24/2007	Tstm Wind	70 kts	0	0	150K	OK	A 10 to 12 inch tree branch was blown down. A strong low level jet, remnants of a morning complex of storms from Iowa, and increasing instability all combined to create favorable conditions for damaging winds and isolated supercells. One supercell in particular had a storm motion towards the southeast when the line it was associated with moved mainly eastward. This supercell did produce a tornado in Marshall county.
Clunette	10/18/2007	Tstm Wind	55 kts	0	0	OK	OK	Several reports of trees blown down northwest of Warsaw. A combination of strong dynamics, wind shear, and rapid low level moisture return all combined to produce severe weather across much of Northern Indiana. One of several supercell thunderstorms produced a long tracked tornado which reached the high end of EF3.
Leesburg	10/18/2007	Tstm Wind	55 kts	0	0	OK	OK	A two foot (2') diameter tree down across State Road 15, just south of Leesburg. A combination of strong dynamics, wind shear, and rapid low level moisture return all combined to produce severe weather across much of Northern Indiana. One of several supercell thunderstorms produced a long tracked tornado which reached the high end of EF3.
Nappanee	10/18/2007	Tornado	F2	0	0	3.0M	OK	The tornado continued tracking northeast from Marshall county into extreme northwestern Kosciusko county. 116 structures were reported to have some sort of damage. 17 homes were destroyed, 6 suffered major damage and 17 minor damage. A horse was killed in a barn that was destroyed. Damage estimated around 3 million dollars. A combination of strong dynamics, wind shear, and rapid low level moisture return all combined to produce severe weather across much of Northern Indiana. One of several supercell thunderstorms produced a long tracked tornado which reached the high end of EF3.
Kosciusko	12/1/2007	Winter Storm	N/A	0	0	OK	OK	A brief burst of light to moderate snow quickly switched over to sleet and eventually all freezing rain during much of the evening of December 1 into the early morning hours of the 2nd. Around 2 tenths of an inch of rain fell in the form of freezing rain, as well as between a tenth and one quarter inch of sleet and snow. Numerous accidents and slide offs plus some isolated power outages as winds of 15 to 25 mph blew the ice laden power lines. Temperatures rose above freezing after 2 am EDT allowing for a slow melting of the ice. Warm air pushed

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								north across northern Indiana allowing temperatures above the surface to climb above freezing. However surface temperatures remained in the middle to upper 20s. Several rounds of precipitation moved in, first starting as snow and sleet then quickly changing to freezing rain with several locations seeing ice accumulations of over a quarter inch.
Kosciusko	12/1/2007	Winter Storm	N/A	0	0	OK	OK	A brief burst of light to moderate snow quickly switched over to sleet and eventually all freezing rain during much of the evening of December 1 into the early morning hours of the 2nd. Around 2 tenths of an inch of rain fell in the form of freezing rain, as well as between a tenth and one quarter inch of sleet and snow. Numerous accidents and slide offs plus some isolated power outages as winds of 15 to 25 mph blew the ice laden power lines. Temperatures rose above freezing after 2 am EDT allowing for a slow melting of the ice. Warm air pushed north across northern Indiana allowing temperatures above the surface to climb above freezing. However surface temperatures remained in the middle to upper 20s. Several rounds of precipitation moved in, first starting as snow and sleet then quickly changing to freezing rain with several locations seeing ice accumulations of over a quarter inch.
Kosciusko	12/4/2007	Heavy Snow	N/A	0	0	OK	OK	Spotters in Middle bury reported 6.3 inches of snow and 5.5 inches in Simonton Lake. An Alberta clipper moved quickly southeast across the Great Lakes, leaving a swath of 3 to 5 of snow in most areas. Isolated locations received from 5 to 7 inches in some of the heavier bands across parts of northern Indiana.
Kosciusko	12/4/2007	Heavy Snow	N/A	0	0	OK	OK	Spotters in Middle bury reported 6.3 inches of snow and 5.5 inches in Simonton Lake. An Alberta clipper moved quickly southeast across the Great Lakes, leaving a swath of 3 to 5 of snow in most areas. Isolated locations received from 5 to 7 inches in some of the heavier bands across parts of northern Indiana.
Kosciusko	12/9/2007	Ice Storm	N/A	0	0	OK	OK	A warm front moved north across the area during the day of December 9th. Abundant moisture traveled north of this front into a below freezing air mass across much of Northern Indiana, setting the stage for ice accumulations. Widespread icing on the order of 0.25 to 0.30 inches was observed, causing numerous accidents and slide offs as well closure of many school and business for the day. Temperatures warmed above freezing during the afternoon and evening hours, allowing the ice to melt.
Kosciusko	12/15/2007	Winter Storm	N/A	0	0	OK	OK	Nine to twelve inches of snow fell along with blowing and drifting snow, creating difficult travel conditions for the entire county. A powerful winter storm tracked in from the gulf states with abundant moisture. Cold air was in place across all of northern Indiana, allowing the precipitation to fall in the form of snow, which was heavy in many locations. Accumulations range from six to more than fourteen inches across the area. The highest amounts, ranging from 14 to 17 inches were found along a swath from Kosciusko county northeast into parts of Elkhart, Noble and Lagrange counties. Many schools and business were closed the following day due to the snow as well as strong winds which caused large drifts.
Barbee	12/23/2007	Tstm Wind	53 kts	0	0	OK	OK	An off duty NWS employee recorded a 61 mph wind gust at his residence. Unseasonable warm and moist air interacted with a powerful cold front to bring several small lines of thunderstorms. While the majority of the stronger winds were not able to reach the ground, some wind gusts in the 60 to over 80 mph range were noted across parts of Northern Indiana.
Warsaw	12/23/2007	Tstm Wind	56 kts	0	0	OK	OK	A nearly 40 foot tall tree was blown down by thunderstorm winds. Unseasonable warm and moist air interacted with a powerful cold front to bring several small lines of thunderstorms. While the majority of the stronger winds were not able to reach the ground, some wind gusts in the 60 to over 80 mph range were noted across parts of Northern Indiana.
Mentone	1/8/2008	Flood	N/A	0	0	200K	OK	Numerous roads were either closed or had high water signs up for several days due to rainfall of 2 to 4 inches across the county. Several creeks and the Tippecanoe river also went over their banks, causing part of the flooding problems in addition to creeks, ditches and low areas filling beyond capacity. No exact damage figures are available but are estimated at \$200,000. An unseasonable moist atmosphere and slow moving cold front set the stage for the training of rain and thunderstorms across much of northern Indiana. In addition, a dense snowpack rapidly melted as a result of the warm temperatures and rainfall, resulting in rapid rises on river and streams as well as widespread problems with flooding of low areas and ditches. Rainfall amounts ranging from a couple inches to locally over 7 inches was reported, with the highest amounts in and around White county.
Kosciusko	2/1/2008	Winter Storm	N/A	0	0	OK	OK	Two to four inches of a combination of sleet and snow fell, as well as up to a tenth of an inch of ice, causing difficult travel. A winter storm developed in the Southern Plains and tracked into the area with a swath of mainly snow for northern Indiana. The precipitation did start as a period of sleet and even freezing rain. Most areas north and west of a Marion to south of Fort Wayne line received 6 to 8 inches of snow along with blowing and drifting snow. Many schools were closed for the day, giving students a long weekend.

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Milford	2/5/2008	Flood	N/A	0	0	15K	0K	Water was reported over State Route 15, near Milford. Numerous other county roads had high water including a few road closures due to standing water. A snowpack of one to three inches rapidly melted as warm air arrive in the region. This snowmelt, combined with a partially frozen, very moist ground and rainfall from two to locally over 3 inches, resulted in an increase in low land and river flooding running along and south of a Knox to north of Millersburg line. At the onset, some flash flooding occurred in areas experiencing rainfall rates of one-half to one inch per hour.
Kosciusko	3/4/2008	Winter Storm	N/A	0	0	0K	0K	Spotters reported one to three inches of snow, up to one quarter inch of sleet, and a tenth of an inch of ice, causing slippery roads. Strong low pressure tracked from Arkansas into central Ohio, bringing a swath of precipitation to all of northern Indiana. A band of heavy snow, with amounts ranging from six to ten inches, extended from Cass county Indiana northeast through Whitley and Allen counties. Some sleet was also mixed in with higher amounts noted north and south of the heavy snow. Drier air allowed for lighter snow amounts and a bit more in the way of sleet into northwestern Indiana where amounts were in the one to four inch range. At least one fatality was reported in the area when a 78 year old Kosciusko county resident was killed when her car was struck by another, sending the woman's vehicle into a tree. She was pronounced dead at a local hospital.
Silver Lake	6/13/2008	Hail	0.75 "	0	0	0K	0K	An outflow boundary moving in from Wisconsin and Illinois, combined with moderate shear and instability to allow for the development of a line of strong to locally severe thunderstorms across much of northern Indiana. While most of the storms remained below severe levels, a few reports of hail, damaging winds, and even some flash flooding were received.
North Webster	6/15/2008	Hail	0.88 "	0	0	0K	0K	Nickel size hail was observed by NWS Northern Indiana staff at the office. Morning convection helped stabilize the area until early afternoon when strong heating and an approaching short wave and front set the stage for rapid thunderstorm development. While instability was considered moderate, steep mid-level lapse rates allowed for a favorable profile for large hail and damaging winds. The storms began as very proficient hail producers and evolved into causing wind damage as they evolved.
North Webster	6/15/2008	Tstm Wind	50 kts	0	0	0K	0K	A NWS official investigated a report of a tree down onto a house on the north side of North Webster. The tree was blown down, but laid out across the top of the house and no damage was reported to the structure by fire department officials. Morning convection helped stabilize the area until early afternoon when strong heating and an approaching short wave and front set the stage for rapid thunderstorm development. While instability was considered moderate, steep mid-level lapse rates allowed for a favorable profile for large hail and damaging winds. The storms began as very proficient hail producers and evolved into causing wind damage as they evolved.
Oswego	6/15/2008	Hail	0.75 "	0	0	0K	0K	Morning convection helped stabilize the area until early afternoon when strong heating and an approaching short wave and front set the stage for rapid thunderstorm development. While instability was considered moderate, steep mid-level lapse rates allowed for a favorable profile for large hail and damaging winds. The storms began as very proficient hail producers and evolved into causing wind damage as they evolved.
Oswego	6/21/2008	Tstm Wind	55 kts	0	0	0K	0K	A trained spotter reported a large tree being blown down blocking a cul-de-sac in Stanton Lakes Estates on the south side of Tippecanoe Lake. A cluster of thunderstorms developed during the morning hours across portions of central Illinois in advance of a weak trough and upper level system. These storms expanded and intensified as they moved into northern Indiana, producing areas of wind damage and hail.
Oswego	6/22/2008	Hail	0.75 "	0	0	0K	0K	Another weak wave tracked across the area, allowing numerous storms to develop. Several produced one-quarter to half-inch size hail, but a few better-organized storms produced isolated golf-ball sized hail.
Barbee	6/22/2008	Hail	1.00 "	0	0	0K	0K	Another weak wave tracked across the area, allowing numerous storms to develop. Several produced one-quarter to half-inch size hail, but a few better-organized storms produced isolated golf-ball sized hail.
North Webster	6/22/2008	Hail	0.88 "	0	0	0K	0K	Another weak wave tracked across the area, allowing numerous storms to develop. Several produced one-quarter to half-inch size hail, but a few better-organized storms produced isolated golf-ball sized hail.
Warsaw	8/4/2008	Tstm Wind	60 kts	0	0	0K	0K	Law enforcement officials reported tree limbs and power lines down across the southern half of the county. A line of thunderstorms developed in northern Illinois and rapidly became severe, producing wind damage as it moved into northern Indiana. The swath of damage continued into northwestern Indiana where winds of 60 to 80 mph caused several areas of tree damage and some structure damage. One person lost their life when a tree limb fell onto their car in Laporte County.
Northern Indiana	12/18/2008	Ice Storm	N/A	0	0	0K	0K	Mixed wintry precipitation overspread the area late December 18th and continued through about noon on December 19th. Precipitation started out as a brief period of snow and sleet before changing over to moderate

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								freezing rain. Snow and sleet accumulations were generally near 1 inch. The area also picked up a quarter of an inch or more of ice accumulation. Utility companies reported numerous customers with power outages due to significant ice accumulations on power lines and trees. There were also school closers across the county due to icy roads. Significant ice accumulations and light snow/sleet amounts affected the region as a quick moving area of low pressure tracked eastward through central portions of Indiana and Ohio on late December 18th into the first half of December 19th. Precipitation started out as a brief period of snow and sleet, with accumulations of a trace to 2 inches. The precipitation then changed over to freezing rain with most locations receiving between a quarter and half an inch of ice accumulation.
Northern Indiana	12/18/2008	Ice Storm	N/A	0	0	0K	0K	Mixed wintry precipitation overspread the area late December 18th and continued through about noon on December 19th. Precipitation started out as a brief period of snow and sleet before changing over to moderate freezing rain. Snow and sleet accumulations were generally near 1 inch. The area also picked up a quarter of an inch or more of ice accumulation. Utility companies reported numerous customers with power outages due to significant ice accumulations on power lines and trees. There were also school closers across the county due to icy roads. Significant ice accumulations and light snow/sleet amounts affected the region as a quick moving area of low pressure tracked eastward through central portions of Indiana and Ohio on late December 18th into the first half of December 19th. Precipitation started out as a brief period of snow and sleet, with accumulations of a trace to 2 inches. The precipitation then changed over to freezing rain with most locations receiving between a quarter and half an inch of ice accumulation.
Nappanee	12/27/2008	Tstm Wind	60 kts	0	0	15K	0K	A brief downburst caused a wood framed, sheet metal pole barn to be blown off its concrete foundation. The survey revealed the wind struck the south facing door and caused the entire building to be lifted and then deposited next to the foundation. The owner of the building could not remember if the doors were open or not prior to the winds. Wind speeds were estimated between 60 and 65 mph. Damage is estimated at around \$15,000. A narrow line of showers brought down strong winds just above the surface as they moved east across northern Indiana during the late afternoon and early evening hours. Little in the way of thunder or lightning was observed with this line. Isolated damage occurred in the Medaryville area as well as just southwest of Nappanee.
<a href="#">KOSCIUSKO (ZONE)</a>	1/12/2009	Heavy Snow		0	0	0.00K	0.00K	A clipper system brought light to moderate system snow, followed by heavy lake-effect snow showers late January 12th into January 13th. Total snowfall accumulations of 3 to 7 inches were observed, with a report of 5.6 inches 3 miles southwest of North Webster. Gusty winds created blowing snow and low visibilities. There were reports of accidents and slide-offs across the region.
<a href="#">MENTONE</a>	5/14/2009	Thunderstorm Wind	55 kts. EG	0	0	5.000M	0.00K	Emergency management officials reported two livestock barns, containing chickens, suffered damage. One building suffered severe damage with roughly 200,000 chickens having to be relocated. Debris from the barns was thrown up to a half mile northeast of the location, with a barn on 900 West south of 100 North suffering some damage. Damage by the business owners is estimated in excess of five million dollars due to structural damage, costs to move the chickens to other facilities and other expenses.
<a href="#">WINONA LAKE</a>	5/14/2009	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Several lines of strong to locally severe thunderstorms affected portions of Illinois during the evening hours of May 13th and moved east into western Indiana into the early morning hours of the 14th. While instability was marginal, very strong wind fields were in place with a few of the strongest storms able to bring the strong winds to the surface.
<a href="#">SYRACUSE</a>	5/16/2009	Flash Flood		0	0	100.00K	0.00K	Spotters and local officials reported between two and four inches of rain falling over a 3 to 5 hour period. This resulted in numerous roads becoming flooded with flowing water in several locations, especially south of Warsaw. At least 6 roads were reported closed due to the flowing water. Specific damage amounts weren't available, but are estimated at \$100,000.
<a href="#">REDMOND PARK</a>	6/19/2009	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	A small cluster of thunderstorms developed in eastern Wisconsin and rapidly expanded eastward. A large cold pool developed and forced the convection towards the southeast with portions of northern Indiana experiencing pockets of wind damage.
<a href="#">SYRACUSE</a>	6/19/2009	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	A small cluster of thunderstorms developed in eastern Wisconsin and rapidly expanded eastward. A large cold pool developed and forced the convection towards the southeast with portions of northern Indiana experiencing pockets of wind damage.
<a href="#">VAWTER PARK</a>	6/19/2009	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K	A small cluster of thunderstorms developed in eastern Wisconsin and rapidly expanded eastward. A large cold pool developed and forced the convection towards the southeast with portions of northern Indiana experiencing

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								pockets of wind damage.
<a href="#">ATWOOD</a>	7/16/2009	Lightning		0	0	20.00K	0.00K	Lightning struck a tree adjacent to a mobile home in the West Haven Estates, traveled along a tree root and blew a hole in the floor of the home. A woman in the trailer heard a loud bang and then observed her couch on fire. She, another adult and 2 children were able to escape unharmed. Damage was estimated at around \$20,000.
<a href="#">REDMOND PARK</a>	7/16/2009	Thunderstorm Wind	55 kts. EG	0	0	0.50K	0.00K	A NWS employee reported a 12 foot by 12 foot shed blown onto its side on Mock Road between County Road 300 East and Rookstool Road. Damage is estimated at \$500.
<a href="#">BARBEE</a>	7/16/2009	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	A warm and unstable environment led to the development of thunderstorms. Moderate wind fields were brought down by a few of the stronger storms, causing isolated wind damage.
<a href="#">ATWOOD</a>	8/17/2009	Flash Flood		0	0	0.00K	0.00K	Numerous roads were flooded for several hours as five to as much as ten inches of rain fell across the northern part of the county. The hardest hit areas were from Lake Tippecanoe west to Leesburg and then north into Milford, where reports of seven to ten inches of rain were received. Low spots in these areas had water several feet deep, with water reported to have been flowing over some roads, including portions of State Route 15, between Leesburg and Warsaw. Many of the roads in Leesburg were reported to have water with several vehicles being stranded for a short time. Vehicles were also stranded in portions of Warsaw. The highest rainfall amount was reported by a CoCoRaHS observer southeast of Milford, where 9.90 inches of rain was recorded.
<a href="#">KOSCIUSKO (ZONE)</a>	2/9/2010	Winter Storm		0	0	0.00K	0.00K	A steady light to moderate snow fell February 9th into early February 10th with snowfall totals ranging between 6 and 8 inches across the county. A trained spotter reported 7.5 inches of total snow accumulation 4 miles north of Warsaw. Winds of 15 to 25 mph allowed for some blowing and drifting of the snow. The accumulating snow and wind led to slide-offs and accidents, with many schools closing across the region.
<a href="#">CLAYPOOL</a>	5/31/2010	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Local media reported a tree was uprooted and fell onto a building. Numerous tree limbs were also blown down.
<a href="#">WARSAW</a>	5/31/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	
<a href="#">OSWEGO</a>	6/12/2010	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	trees and power lines down at the Lake Tippecanoe Country Club.
<a href="#">OSWEGO</a>	6/12/2010	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	two foot diameter maple tree was down across County Road 650 North. Power lines were also down in the area.
<a href="#">WARSAW</a>	6/12/2010	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	a ten inch diameter branch down southeast of Warsaw.
<a href="#">MILFORD</a>	6/18/2010	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K	multiple trees and power lines were down. At least one power pole was snapped.
<a href="#">MONOQUET</a>	6/23/2010	Tornado	EF1	0	0	300.00K	0.00K	weak circulation embedded in a initially stronger microburst south of US-30. Lofting of debris from a destroyed pole barn was evident in the area suggesting the tornado touched down near a residence south of Fox Farm Road, near North 200 West. The circulation continued to intensify as it tracked southeast into the Center Lake area. Numerous trees were damaged or uprooted along the track with a manufactured home being shifted off its blocks. As the tornado passed over State Route 15, it impacted the Warsaw Foundry, causing the southwest portion of the roof of a building to be torn off (DI: MBS, DOD: 3). The circulation continued across Pike Lake, causing damage to several homes and apartments as well as uprooting trees around the lake and an adjacent cemetery. As it approached U.S. 30, the circulation crossed a large residential area just south of the Kosciusko Community Hospital, uprooting several trees. One large tree fell into the center of a home on Parker Street, destroying it. The circulation crossed US 30 and began to weaken with scattered tree damage. The circulation finally dissipated along Old US 30 east of South 250 East. Maximum winds were estimated around 100 mph. Damage is estimated at \$300,000.
<a href="#">NORTH WEBSTER</a>	6/23/2010	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K	Estimated 65 mph gusts at NWS Office.
<a href="#">LEESBURG</a>	6/23/2010	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Large trees downed

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
<a href="#">SYRACUSE</a>	6/23/2010	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K	A tree fell down into a house with estimated 80 mph wind gusts
<a href="#">PACKERTON</a>	7/15/2010	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Several tree limbs down near the intersection of County Road 800 South and County Farm Road.
<a href="#">PACKERTON</a>	7/15/2010	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	power pole down as well as numerous tree limbs on Packerton Road, north of State Route 14.
<a href="#">MENTONE</a>	7/28/2010	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	Law enforcement officials reported numerous trees down from Mentone to Warsaw.
<a href="#">WARSAW ARPT</a>	10/26/2010	Tornado	EF0	0	0	0.00K	0.00K	weak circulation touched down just to the southeast of the intersection of County Roads 450 North and 100 East, in the North Winds subdivision. Minor damage occurred in the subdivision with shingle damage to one roof and a swing and trampoline being thrown into a pond adjacent to 450 North. The tornado then crossed 450 North where the southeast portion of a corn field ready for harvest was flattened and a few tree tops and limbs were snapped. The circulation lifted near County Road 175 East just south of the Tippecanoe River where a power pole was snapped and antenna bent. The maximum width of the tornado was around 30 yards with estimated winds of around 80 mph.
<a href="#">VAWTER PARK</a>	10/26/2010	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	one foot diameter tree limb down near Lake Wawasee
<a href="#">KOSCIUSKO (ZONE)</a>	12/12/2010	Winter Storm		0	0	0.00K	0.00K	Rain changed to snow during the morning hours of December 12th and continued through the entire day. Snowfall totals generally ranged between 2 and 6 inches across the county. The IWX WFO reported a storm total snowfall accumulation of 5.3 inches. Winds increased Sunday afternoon into Monday morning, with gusts of 25 to 35 mph at times. This, combined with the fallen snow, created widespread blowing and drifting snow that led to numerous car accidents and school closings across the region.
<a href="#">KOSCIUSKO (ZONE)</a>	2/1/2011	Blizzard		0	0	0.00K	0.00K	Blizzard conditions were experienced during the late afternoon and evening hours of February 1st as an intense low pressure system approached from the southwest. Wind gusts in excess of 40 mph, combined with the falling heavy snow and sleet, created reduced visibilities below an eighth of a mile at times. Snowfall rates of 1 to 3 inches per hour were common, with snow and sleet totals across the county generally ranging between 6 and 10 inches. The NWS office 2 miles north of North Webster reported 8.8 inches of total snow and sleet accumulation, along with snow drifts of 2 to 3 feet. The significant blowing and drifting snow resulted in accidents and school closings across the region.
<a href="#">LEESBURG</a>	4/4/2011	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K	a large pine tree uprooted at a residence northeast of Leesburg.
<a href="#">BARBEE</a>	4/4/2011	Thunderstorm Wind	53 kts. MG	0	0	0.00K	0.00K	A 61 mph wind gust was recorded at a NWS employee's home during the storm.
<a href="#">WARSAW</a>	4/4/2011	Thunderstorm Wind	50 kts. EG	0	0	6.00K	0.00K	a 12 inch diameter tree had fallen on a mobile home on Wexford Place in Warsaw. The report initially came in from the Warsaw Times Union newspaper. The west side of the structure suffered damage as branches penetrated the roof. Damage is estimated around \$6,000.
<a href="#">MILFORD</a>	5/29/2011	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K	Emergency management officials reported numerous trees and power lines down from Milford extending east into Syracuse.
<a href="#">WARSAW</a>	6/21/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	large branches down west northwest of Warsaw
<a href="#">OSWEGO</a>	7/2/2011	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	An off duty NWS employee reported a healthy 12 to 18 inch diameter tree down at the intersection of County Roads 400 East and 750 North.
<a href="#">SYRACUSE</a>	7/11/2011	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	Bow echo complex moved from Illinois and Wisconsin into northern Indiana. In addition, a separate area of thunderstorms developed ahead of the main line. Strong instability and a continued feed of moisture fed the line as it raced east at speeds of up to 60 mph. Trained spotters reported multiple telephone poles down.
<a href="#">WINONA LAKE</a>	7/22/2011	Thunderstorm Wind	78 kts. EG	0	0	500.00K	0.00K	A two to three mile wide area of damage was found across the southern part of Warsaw, into much of the Village of Winona Lake. Eyewitness and video footage indicates that a funnel had formed on the leading edge of the storm just prior to the wind damage. No indications of the funnel touching down could be located. However, damage patterns and video footage indicated a downburst occurred. Winds were not fully able to reach the ground, with damage confined to numerous trees being snapped at higher levels or uprooted. Power poles and lines were also knocked down, mainly due to falling trees and tree limbs. Reports of trees falling onto

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								several homes and cars were also received with no injuries noted. Some roof damage was observed in a few locations, including Warsaw Foundry, TTP, Inc. and Whimet, Inc. Winds were estimated between 85 and 90 mph. No specific damage figures were available, but estimates of at least \$500,000 are being entered.
<a href="#">NORTH WEBSTER</a>	7/22/2011	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K	A line of thunderstorms developed along a cold front and moved into northern Indiana, where extreme instability and moderate shear were in place. As mergers of storms began, damaging winds and large hail was reported, with the reports then transitioning to mainly damaging winds as the storms evolved and cold pools established. estimated 60 mph winds.
<a href="#">PIERCETON</a>	7/23/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Law enforcement officials reported a few trees blown in the area of State Route 13 and East County Road 500 South.
<a href="#">CLAYPOOL</a>	8/3/2011	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Additional thunderstorms developed and moved into portions of northern Indiana. The time of day as well as convective inhibition from storms to the north, kept strong to severe storms isolated. Law enforcement officials reported a tree limb down onto power lines on County Road 450 West just north of County Road 600.
<a href="#">NORTH WEBSTER</a>	8/7/2011	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Reports of 60 to 70 mph wind gusts and large hail were received. Trained spotters reported several large tree limbs down
<a href="#">KOSCIUSKO (ZONE)</a>	11/29/2011	Heavy Snow		0	0	0.00K	0.00K	Rain changed over to heavy wet snow Tuesday afternoon and continued into the evening hours before ending. There was a tight snowfall gradient across the county, with total snow accumulations ranging from 3 inches in far northwest portions of the county to between 7 and 9 inches across eastern Kosciusko County. The National Weather Service reported 8.7 inches of total snow accumulation 2 miles north of north Webster. Snow fell at 1 to 2 inches per hour at times. The heavy wet snow created localized power outages, along with hazardous driving conditions which resulted in accidents and slide-offs. There were also reports of school delays and cancellations the next morning, mainly across central and eastern Kosciusko County.
<a href="#">WARSAW</a>	6/29/2012	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K	trained spotter reported multiple trees and power lines down in the Warsaw area. Estimated wind gusts of 65 to 70 mph occurred for approximately 7 minutes.
<a href="#">WARSAW ARPT</a>	6/29/2012	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	two large healthy trees were blown down.
<a href="#">SYRACUSE</a>	6/29/2012	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	A trained spotter reported a two foot diameter oak tree down onto a house on North Ogden Point Road.
<a href="#">MENTONE</a>	6/29/2012	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	A trained spotter reported several large branches down and one tree down near Mentone on State Route 19.
<a href="#">WINONA LAKE</a>	7/1/2012	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	A trained spotter reported a two foot diameter tree down onto power lines on South Country Club Road. four foot diameter tree was uprooted about a quarter mile north of County Road 300 on South Country Club Road. A four inch limb was also blown down onto power lines in the area.
<a href="#">CLAYPOOL</a>	7/1/2012	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	two and one half foot diameter tree was uprooted across County Farm Road, near County Road 450 South.
<a href="#">WARSAW</a>	8/4/2012	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Law enforcement officials reported numerous trees were blown down in Warsaw, Winona Lake and northern portions of the county.
<a href="#">NORTH WEBSTER</a>	8/4/2012	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K	NWS officials estimated wind gusts to 65 mph at the National Weather Service office, just north of North Webster.
<a href="#">KOSCIUSKO (ZONE)</a>	3/5/2013	Heavy Snow		0	0	0.00K	0.00K	Snow overspread the area during the afternoon hours of March 5th and became heavy at times during the evening and early overnight hours. Total snow accumulations across the county generally ranged between 9 and 12 inches. There was a report of 11.9 inches 2 miles north of North Webster. The intensity of the heavy snow and sub-freezing surface temperatures allowed the snow to accumulate on roadways. This resulted in hazardous travel conditions across the region with numerous school closings the morning of March 6th.
<a href="#">MONOQUET</a>	4/18/2013	Flood		0	0	0.00K	0.00K	High water was noted on several roadways across mainly the southeastern part of the county where two to four inches of rain fell. This included portions of State Route 14 near Silver Lake.
<a href="#">PIERCETON</a>	5/31/2013	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	six to eight inch diameter, 20 foot long tree branch down across County Road 350 South, near State Route 13.
<a href="#">BARBEE</a>	6/1/2013	Flash Flood		0	0	0.00K	0.00K	Torrential rainfall caused rapid run-off on already moist ground, resulting in nearly a dozen roads being closed due the flood waters. Several others roads that typically flood during heavy rain, were marked with high water signs. Spotters and radar estimates showed that between three and five inches of rain fell over a several hour

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								period. The highest amount, 5.47 inches, was reported by an off duty NWS employee in the Winona lake area.
<a href="#">WARSAW</a>	6/24/2013	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	NWS employee reported 55 to 60 mph winds with the outflow from a thunderstorm, with small tree limbs were falling. large branch and power lines down northeast of Warsaw. a two and one half foot (2.5 foot) diameter healthy tree snapped roughly five feet from the ground. A one and one half foot (1.5 foot) diameter healthy tree was snapped at the 15 foot level. A one foot tree limb was blown down with a six inch tree snapped at the base.
<a href="#">NORTH WEBSTER</a>	6/25/2013	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K	Numerous tree limbs, ranging from three to eight inches in diameter, were observed blown down in and around the town of North Webster; estimated a 65 mph wind gust. Penny size hail was also observed.
<a href="#">ATWOOD</a>	6/27/2013	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	The public reported two trees were blown down onto a road near the Atwood Fire Station.
<a href="#">WARSAW</a>	7/10/2013	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Social media pages indicated that several trees and tree limbs were blown down in the town of Leesburg. The public reported a one foot diameter tree limb down onto a residence. Social media pages indicated that several trees and tree limbs were blown down in the town of Leesburg.
<a href="#">SILVER LAKE</a>	8/2/2013	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Local law enforcement officials reported numerous trees and tree limbs down.
<a href="#">NORTH WEBSTER</a>	8/2/2013	Flash Flood		0	0	0.00K	0.00K	Numerous roads across the southern half of the county had flowing water. The greatest concentration was from North Webster south to Silver Lake, along and either side of State Route 15. County Road 450 North, one-quarter mile west of County Road 375 E was closed due to two feet of flowing water over the road. Three to five inches of rain fell in these areas.
<a href="#">BARBEE</a>	11/17/2013	Thunderstorm Wind	55 kts. MG	0	0	0.00K	0.00K	extensive tree damage in North Webster, with several trees onto roadways.
<a href="#">BURKET</a>	11/17/2013	Tornado	EF1	0	0	0.00K	0.00K	A survey of damage east of Mentone by a NWS Survey team revealed that a EF1 tornado produced damage along a roughly 1 mile path. Touchdown occurred southwest of the intersection of State Route 25 and County Road 800 West with the tornado quickly moving northeast and impacting a residence and barn on the southeast corner of the same intersection. A few small hardwood trees were snapped with the adjacent residence suffering minor shingle damage. An adjacent barn was shifted off its foundation with the north facing doors and wall buckled. As the tornado crossed State Route 25 it clipped a residence, causing roughly 75 percent of the roof and trusses to be ripped off and thrown to the north northwest about 250 yards. Power poles on the north side of the road were also blown down. As the tornado continued northeast it cause widespread tree damage in a wooded area, as well as minor structural damage to a home along South Tinkey Road. The tornado lifted shortly after this point, southeast of the intersection of Tinkey and Shilling Roads. Maximum wind speeds with the tornado are estimated at 100 mph.
<a href="#">SILVER LAKE</a>	11/17/2013	Tornado	EF2	0	0	0.00K	0.00K	A survey of damage in Wabash and Kosciusko counties by a NWS Survey team revealed that a tornado, which reached a maximum intensity of EF2, touched down just south of the Wabash/Kosciusko county line, west of State Route 15. The tornado crossed into Kosciusko county approximately 4 tenths of a mile east of State Route 15 and continued to the northeast over mainly open fields, occasionally causing tree damage until it hit a farm on CR 300 W approximately half a mile south of SR 14. At this location, there were 4 cattle barns completely destroyed with their contents thrown east-northeast into the field (DI:SBO DOD: 8). There were 600 cattle at the farm at the time the tornado hit and 10 of them were killed with another 10 injured. There was a two story home on this property that had part of the second story roof removed and the second story bedroom shifted as the east wall buckled outward. The debris field from this tornado continued to the NE and power poles were snapped at the base along SR 14. The tornado dissipated shortly after this as it crossed S County Farm Rd. The total path length across both counties was around 4.2 miles with a maximum estimated wind speed of 115 mph.
<a href="#">PIERCETON</a>	11/17/2013	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	A state official reported a tree down south of Pierceton.
<a href="#">OSWEGO</a>	11/17/2013	Tornado	EF1	0	0	0.00K	0.00K	A survey of damage southwest of Oswego by a NWS Survey team revealed that a EF1 tornado produced damage along a roughly 1.7 mile path. Touchdown occurred in a harvested field southwest of the intersection

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								of County Roads 450 North and 250 East. Several segments of a center pivot were flipped in this area. The tornado continued northeast crossing County Road 450 North, severely damaging 7 power poles, which were either snapped or bent at more than a 45 degree angle. One pole had 3 large transformers for the center pivot on it, with these being pushed on to the roadway. The tornado then impacted the Pines subdivision, northeast of 450 North and 250 East. Two to three dozen healthy pine trees between 30 and 50 feet tall were snapped or uprooted (DI: TS DOD: 4). One house was impacted on both sides with the roof being penetrated. Two vehicles had trees fall onto them, crushing them. The tornado moved through the remainder of the subdivision and adjacent properties with varying degrees of mainly roof and tree damage. The last noted damage involved a home on County Road 300 East, just south of Rader Road where moderate roof damage occurred and a narrow path of trees snapped in an adjacent wooded area. The tornado lifted shortly after this point prior to crossing Armstrong Road. Maximum wind speeds with the tornado are estimated at 95 mph.
<a href="#">OSWEGO</a>	11/17/2013	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	Half of the east facing side of a older barn roof was blown off into an field to the north. A center pivot irrigation system in the same field has 2 segments flipped.
<a href="#">OSWEGO</a>	11/17/2013	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	Several pine trees and other varieties of trees were snapped just south of the Lake Tippecanoe Country Club.
<a href="#">OSWEGO</a>	11/17/2013	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	12 inch diameter tree was twisted and split on the north side of Lake Tippecanoe. Other tree damage was found in the general area.
<a href="#">KOSCIUSKO (ZONE)</a>	12/13/2013	Winter Storm		0	0	0.00K	0.00K	Snow, moderate at times, overspread the area late December 13th and continued into December 14th. Total snow accumulations across the county ranged between 6 and 9 inches. There were reports of slide-offs and accidents as roads became snow covered and hazardous.
<a href="#">KOSCIUSKO (ZONE)</a>	1/5/2014	Winter Storm		0	0	0.00K	0.00K	Moderate to heavy snow developed during the morning hours of January 5th and continued into the early morning hours of January 6th. Total snow accumulations ranged between 12 and 16 inches across the county. Winds picked up and gusted to between 30 and 40 mph by late in the afternoon and evening creating blizzard-like conditions at times. This led to snow emergencies and closings of schools and businesses the next morning as many roads became impassable.
<a href="#">KOSCIUSKO (ZONE)</a>	1/6/2014	Extreme Cold/wind Chill		0	0	0.00K	0.00K	Temperatures dropped into the single digits and teens below zero as arctic air filtered in behind a powerful winter storm that dropped more than a foot of heavy snow on the region. Strong westerly winds, with gusts between 30 and 40 mph, created deadly wind chills and significant blowing and drifting snow. Dangerous winds chills between 30 and 45 degrees below zero were common. The extremely cold temperatures and significant blowing snow kept many north-south roads impassable or restricted to single lanes. There were numerous reports of accidents and slide-offs across the region due to the slick roadways, with many businesses and schools closed each day.
<a href="#">KOSCIUSKO (ZONE)</a>	2/4/2014	Winter Storm		0	0	0.00K	0.00K	Snow developed during the early evening hours of February 4th and became heavy at times during the morning hours of February 5th. Impressive snowfall rates of 1 to 2 inches per hour and reduced visibilities to a quarter of a mile at times created hazardous travel conditions. Numerous schools and businesses were closed on Wednesday, February 5th, due to the heavy snow and poor road conditions. Total snow accumulations across the county generally ranged between 10 and 13 inches.
<a href="#">KOSCIUSKO (ZONE)</a>	3/12/2014	Winter Storm		0	0	0.00K	0.00K	Rain changed over to snow during the early morning hours of March 12th, becoming moderate to heavy at times during the remainder of the morning. Wind gusts of 30 to 40 mph, combined with the falling snow, reduced visibilities to less than a quarter of a mile at times. Snowfall totals across the county generally ranged between 5 and 8 inches. A few accidents and slide-offs were reported across the region due to snow covered and slick roads. Many schools were either closed or delayed.
<a href="#">WARSAW</a>	6/18/2014	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Law enforcement officials reported a tree was blown down onto Wooster Road.
<a href="#">MILFORD</a>	6/18/2014	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Law enforcement officials reported utility lines were blown down.
<a href="#">REDMOND PARK</a>	6/18/2014	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	Emergency management officials reported a tree was uprooted onto power lines in the Dewart Lake area.
<a href="#">PALESTINE</a>	7/1/2014	Tornado	EF1	0	0	0.00K	0.00K	A brief EF-1 tornado was confirmed on the edge of a larger swath of damaging winds by a NWS Storm survey. The tornado touched down near a residence on South County Road 400 West where several tree trunks were snapped at the tops with 2 trees uprooted. A small barn suffered extensive roof damage and partial wall failure. The tornado quickly shifted towards the southeast, crossing State Route 25 where it began to lift. As it was

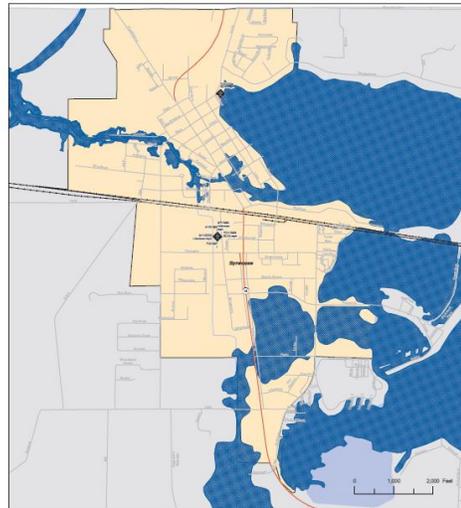
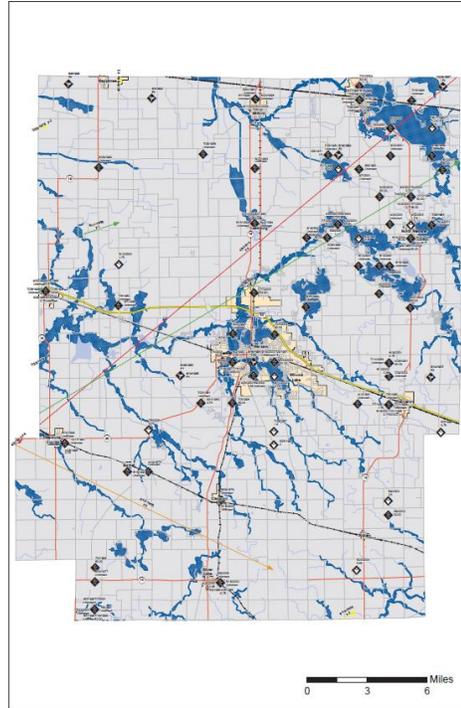
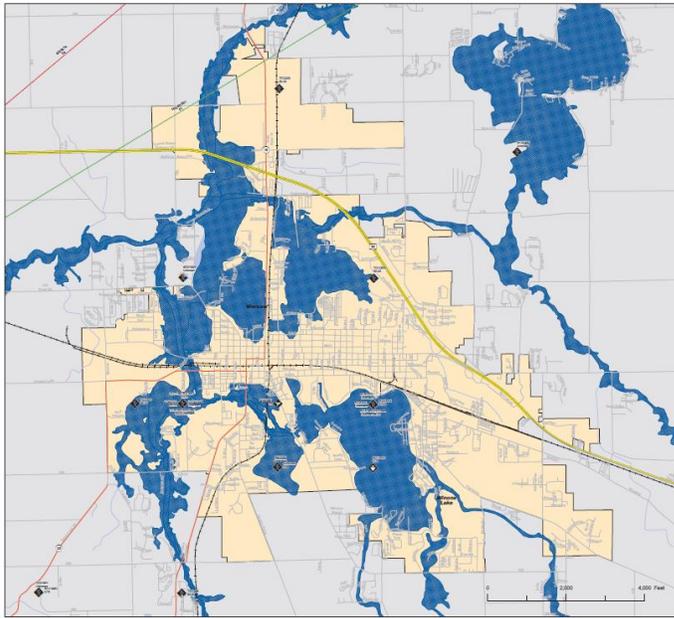
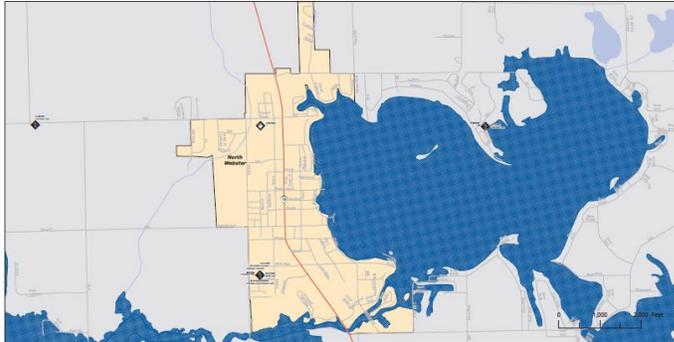
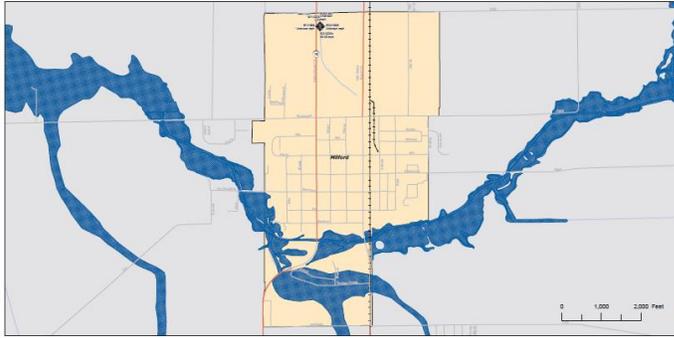
Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
								lifting, over twenty 50 to 75 foot tall healthy trees were uprooted or snapped several feet in the air (DI: TS, DOD: 4). One of the trees fell onto a residence, but no injuries were reported. Maximum winds were estimated at 95 mph.
<a href="#">GRAVELTON</a>	7/1/2014	Tornado	EF0	0	0	0.00K	0.00K	A NWS survey of damage revealed a brief tornado occurred south of Gravelton. The touchdown occurred just south of County Road 1250 North and east of County Road 400 West where a large metal barn was destroyed. The tornado crossed 1250 North and went through a corn field and impacted a small barn near County Road 200 West, north of County Road 1250 North where debris was thrown into another corn field where the circulation finally lifted. Maximum winds were estimated at 80 mph.
<a href="#">OSWEGO</a>	7/1/2014	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K	estimated wind gusts to 65 mph.
<a href="#">SYRACUSE</a>	7/1/2014	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	observed a large tree down, blocking the roadway
<a href="#">SILVER LAKE</a>	7/1/2014	Tornado	EF0	0	0	0.00K	0.00K	A NWS Storm survey confirmed a tornado touched down in Wabash County and crossed into Kosciusko County east of County Road 100 West. One farm just inside the Kosciusko county border had a hog barn destroyed with much of the debris being thrown to the southeast into a large grain silo facility. One large grain bin was completely flattened and severe damage occurred to a harvester silo. In addition, a corn crop field to the south of the county line road and east of the farm was flattened and shredded. Additional extensive crop and tree damage continued before the tornado dissipated in a grove of trees just west of County Road 400 East. The total track of the tornado across both counties was around 7 miles with maximum winds of around 100 mph.
<a href="#">ENCHANTED HILLS</a>	7/1/2014	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Local media reported a tree fell onto South County Road (on the Elkhart/Kosciusko County line), west of County Road 43. A 61 year old male driver seen the tree and swerved away from the tree, but crashed into a ditch and other trees, suffering minor injuries.
<a href="#">WARSAW</a>	7/1/2014	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K	Emergency management officials reported numerous trees and power lines down across the county.
<a href="#">WARSAW</a>	7/1/2014	Thunderstorm Wind	60 kts. EG	1	0	0.00K	0.00K	Emergency management officials reported a large, rotten tree fell onto the bedroom of a mobile home in the Fairlane Mobile Home Park. Two adults and two children were inside the home at the time. One child escaped the impacted room, but a 14 year old male did not and was subsequently killed.
<a href="#">NORTH WEBSTER</a>	7/1/2014	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K	Wind gusts to 65 mph were estimated at the NWS office near North Webster.
<a href="#">NORTH WEBSTER</a>	7/27/2014	Thunderstorm Wind	58 kts. EG	0	0	0.00K	0.00K	Amateur radio operators reported a large tree was blown down, covering Epworth Forest Road.
<a href="#">MILFORD</a>	8/19/2014	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Three telephone poles were snapped over railroad tracks, briefly blocking them.
<a href="#">REDMOND PARK</a>	9/5/2014	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Local officials reported trees were blown down at the intersection of County Roads 1050 North and 350 East.
<a href="#">ATWOOD</a>	9/5/2014	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Local officials reported trees were blown down onto Old U.S. 30 between County Roads 750 and 800 West.
<a href="#">REDMOND PARK</a>	9/5/2014	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	several large tree limbs down in the area.
<a href="#">NORTH WEBSTER</a>	9/20/2014	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K	Wind gusts were estimated to 60 mph at the NWS office north of North Webster.
<a href="#">KOSCIUSKO (ZONE)</a>	1/8/2015	Extreme Cold/wind Chill		0	0	0.00K	0.00K	Wind chills during the morning and early afternoon hours of January 8th ranged between 20 below zero and 30 below zero. This dangerous cold led to numerous school closings and delays across the region.
<a href="#">KOSCIUSKO (ZONE)</a>	2/1/2015	Heavy Snow		0	0	0.00K	0.00K	Light snow developed during the late evening hours of January 31st and became heavy at times February 1st into early February 2nd. Total snow accumulations across the county generally ranged between 11 and 16 inches, heaviest along and north of US 30. Wind gusts of 20 to 30 mph, combined with the falling snow, created reduced visibilities and blowing snow. Numerous events were cancelled across the region, along with reports of slide-offs and accidents due to snow covered and slick roads. There were also reports of road closures in rural areas as unplowed roads became impassible. The heavy, wet, nature of the snow also led to sporadic power outages.

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
<a href="#">KOSCIUSKO (ZONE)</a>	2/14/2015	Winter Storm		0	0	0.00K	0.00K	Wind gusts up to 45 mph and snow squalls enhanced by Lake Michigan created near whiteout conditions at times on February 14th. Visibilities were reduced to less than 100 feet in heavier snow showers, with total snow accumulations generally ranging between 1 and 3 inches. This created difficult driving conditions with some roads becoming impassible due to significant blowing and drifting snow. Several multi-vehicle accidents were reported across the region due to reduced visibilities and slick roads.
<a href="#">OSWEGO</a>	5/8/2015	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K	A trained spotter estimated wind gusts to 65 mph with a wet microburst. Pea size hail was also observed.
<a href="#">WARSAW</a>	5/30/2015	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	he public reported over a dozen trees and tree limbs were blown down along the Winona Lake Cycling and Walking trails.
<a href="#">OSWEGO</a>	5/30/2015	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Broadcast media reported a large gazebo was blown over and damaged.
<a href="#">OSWEGO</a>	6/10/2015	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K	Several end segments of two center pivot irrigation systems were blown over and severely damaged.
<a href="#">OSWEGO</a>	6/10/2015	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K	Multiple trees and powerlines down.
<a href="#">VAWTER PARK</a>	7/13/2015	Flash Flood		0	0	0.00K	0.00K	Water over State Road 13 has traffic restricted to one lane
<a href="#">OSWEGO</a>	7/18/2015	Flood		0	0	0.00K	0.00K	Reports of water on several roadways around Barbee Lake area. Some roads nearly impassable.
<a href="#">VAWTER PARK</a>	8/17/2015	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K	A survey of the area around Waco Drive on the southwest side of Lake Wawasee revealed several tree limbs were blown down as a result of a wet microburst from a stationary storm over the area.
<a href="#">REDMOND PARK</a>	8/17/2015	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	a tree was uprooted in her yard, with high water into her garage. Tree was uprooted to the east. Result of an isolated wet microburst.
<a href="#">KOSCIUSKO (ZONE)</a>	11/21/2015	Heavy Snow		0	0	0.00K	0.00K	Snow overspread the area during the morning hours and became heavy at times in the afternoon on November 21st. There were reports of a few accidents and slide-offs across the region due to reduced visibilities and slushy accumulations on roadways. Total snow accumulations across the county ranged between 5 and 8 inches, with a total of 7.2 inches 2 miles north of North Webster.
<a href="#">KOSCIUSKO (ZONE)</a>	2/24/2016	Winter Storm		0	0	0.00K	0.00K	Snow, heavy at times, with reduced visibility and gusty winds of 25 to 35 mph created difficult travel conditions February 24th into early February 25th. Slide-offs and accidents were common across the region. Many schools were closed on both February 24th and February 25th. Snowfall totals generally ranged between 6 and 11 inches. There was a report of 9.5 inches near North Webster.
<a href="#">MILFORD</a>	6/20/2016	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Local newspapers reported significant wind damage to a barn and silo on the east side of Milford.
<a href="#">SYRACUSE</a>	6/20/2016	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	The public reported and photographed a tree down onto a home near State Route 13 in Syracuse.
<a href="#">VAWTER PARK</a>	6/20/2016	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Local media reported several large trees were blown down on the south side of Lake Wawasee. Damage occurred to a boat canopy with pieces of a pier blown into the lake.
<a href="#">WARSAW</a>	6/22/2016	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	a tree was blown down across 7th Street and Kings Highway.
<a href="#">CLAYPOOL</a>	6/22/2016	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K	Several trees and tree limbs were down in parts of Claypool. A large tree was uprooted, lifting the rear of a parked small RV several feet into the air.
<a href="#">MILFORD</a>	7/12/2016	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	he public reported multiple large tree limbs were blown down on Main and Section Street on the south side of Milford. Two trees were also uprooted with 1 falling onto a mobile home. No injuries were reported.
<a href="#">BARBEE</a>	8/17/2016	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Several trees were blown down in the Barbee Lakes area.
<a href="#">HASTINGS</a>	8/20/2016	Tornado	EF0	0	0	0.00K	0.00K	A flyover of farm land southwest of Milford revealed a sporadic path of damage through several soy bean and corn fields. The circulation was found to touch down in a field on North County Road 425 West, about a half mile north of West County Road 900 North. An erratic pattern was observed in the crops suggesting a weak, disorganized circulation was in contact with the ground at times, crossing West County Road 1000 N and N County Road 300 West before dissipating. Damage to the crops was not visible from road survey. At the present time, the EF scale does not identify any crops as a Damage Indicator (used to determine the intensity of the tornado) and no other objects were impacted. Given the evidence of a weak tornado, this will be classified as EF-0 with maximum winds of 65 mph.

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
<a href="#">ETNA GREEN</a>	11/18/2016	Thunderstorm Wind	55 kts. EG	0	1	0.00K	0.00K	Emergency management officials reported a tree was blown down onto a vehicle. One occupant was injured.
<a href="#">WARSAW ARPT</a>	11/18/2016	Thunderstorm Wind	55 kts. MG	0	0	0.00K	0.00K	The Warsaw airport automated wind sensor recorded a 63 mph wind gust.
<a href="#">BEAVER DAM</a>	11/18/2016	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Local media reported a few trees were blown down near Beaver Dam Lake.
<a href="#">LEESBURG</a>	11/18/2016	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	4 end segments of a center pivot were flipped.
<a href="#">REDMOND PARK</a>	11/18/2016	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Local media reported a portion of metal roofing was tore off a building and thrown. Debris likely struck nearby electrical wires, causing a transformer to blow.
<a href="#">KOSCIUSKO (ZONE)</a>	12/11/2016	Heavy Snow		0	0	0.00K	0.00K	Light snow developed early on December 11th and became moderate to heavy at times during the day. Some freezing rain mixed in for a time late in the afternoon and evening before precipitation ended early on December 12th. Snowfall totals across the county generally ranged between 6 and 9 inches. There was a report of 7.8 inches 2 miles southwest of Tippecanoe Lake. Light ice accretions were also reported. Roads were snow covered and slick with a few reports of slide-offs and accidents across the region. Many schools were delayed or cancelled the following day (December 12th).
<a href="#">SYRACUSE</a>	3/1/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	privacy fence was blown over.
<a href="#">WINONA LAKE</a>	3/1/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	Law enforcement officials reported power lines down in the area.
<a href="#">OSWEGO</a>	3/1/2017	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K	estimated wind gusts of 60 to 65 mph.
<a href="#">WARSAW</a>	3/1/2017	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K	Local law enforcement estimated wind gusts to 70 mph.
<a href="#">WARSAW ARPT</a>	3/1/2017	Thunderstorm Wind	51 kts. MG	0	0	0.00K	0.00K	Automated Weather Observation System at the Warsaw Airport recorded a 59 mph wind gust.
<a href="#">NORTH WEBSTER</a>	3/1/2017	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Law enforcement reported a tree was blown down onto a home.
<a href="#">NORTH WEBSTER</a>	3/1/2017	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K	Wind gusts to 65 mph were estimated at the National Weather Service office north of North Webster.
<a href="#">BEAVER DAM</a>	5/18/2017	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Local officials reported a tree was blown down on South County Road 675 West, between Beaver Dam and Silver Lake.
<a href="#">SILVER LAKE</a>	5/26/2017	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K	Local fire officials reported several trees snapped or uprooted on properties along West County Road 950 South, between South 500 West and State Route 15. A few of these trees fell onto a residence, causing roof damage. Two barns suffered roof damage and a several spans of center pivot irrigation system were flipped. No injuries were reported.
<a href="#">WARSAW</a>	6/4/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	reported a tree limb was blown down.
<a href="#">SIDNEY</a>	6/13/2017	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	Emergency management officials reported multiple trees down in the area.
<a href="#">ETNA GREEN</a>	7/7/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	A trained spotter reported large tree limbs down, ranging from eight to twelve inches in diameter, near the intersection of Indiana 19 and County Road 800 North.
<a href="#">ATWOOD</a>	7/7/2017	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K	he public reported three large, healthy trees, roughly two to three feet in diameter, uprooted at a residence. A few smaller trees and tree limbs were also blown down in the area.
<a href="#">ATWOOD</a>	7/7/2017	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K	he public reported a six inch and eight inch diameter tree branch down onto a fence, breaking it.
<a href="#">ATWOOD</a>	7/7/2017	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	The public reported a tree was blown down.
<a href="#">WARSAW</a>	7/7/2017	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	A trained spotter reported a large oak tree limb down near County Road 225 East and 100 North.
<a href="#">WARSAW</a>	7/7/2017	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	The public reported a healthy, one foot diameter tree was blown down onto a garage.

Location or County	Date	Type	Mag	Dt h	Inj	Prop Damage	Crop Damage	Description
<a href="#">WINONA LAKE</a>	7/7/2017	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	A off duty NWS employee reported a privacy fence was blown over, with four of the posts snapped and moved about six feet. One section was lifted over a small tree. Six tree limbs, ranging up to five inches in diameter were also blown down.
<a href="#">REDMOND PARK</a>	7/7/2017	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K	A large tree was blown down onto County Road North 800 West.
<a href="#">ETNA GREEN</a>	7/7/2017	Flash Flood		0	0	0.00K	0.00K	Training thunderstorms over much of southwestern Kosciusko county dropped between 4 and 6 inches of rain in the span of a few hours, causing widespread flooding and areas of flash flooding. At least a dozen roads were closed at one point due to water flowing over them. South Bruner Street, just northeast of Palestine, was washed away over Magee Robbins Ditch when the water flow exceeded the drainage pipe limits. This resulted in residents on the other side being stranded for several hours until the water receded and temporary repairs could be made.
<a href="#">ENCHANTED HILLS</a>	9/19/2017	Lightning		0	0	75.00K	0.00K	Residents of a home on the northeast side of Lake Wawasee reported a loud crack around 6 am EDT during a thunderstorm. Shortly after, smoke was noted and the residents evacuated. Fire spread across much of the home with the greatest damage in the second story and garage areas. Damage is estimated at around \$75,000.

## **Appendix E: Hazard Maps**

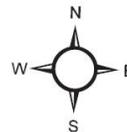


**Kosciusko County  
Pre-Disaster Mitigation Plan**  
*Historical Natural Hazards Map*

**Legend**

- |                                    |      |                 |                       |
|------------------------------------|------|-----------------|-----------------------|
| ◆ Severe Thunderstorm (Hail Event) | — F1 | — US Highway    | — River               |
| ◆ Severe Thunderstorm (Wind Event) | — F2 | — State Highway | — 100 Year Flood Area |
| ◆ Tornado Touchdown                | — F3 | — Local Road    | — Lake                |
|                                    | — F4 | — Railroad      | — City                |

Data Sources: NOAA - National Climatic Data Center; Indiana Department of Transportation; Indiana Department of Natural Resources; Kosciusko County GIS; National Hydrologic Dataset; US Census Bureau



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## **Appendix F: Complete List of Critical Facilities**

**Airport Facilities**

ID	Class	Name	Address	City	Contact	Use	Year Built	Cost(000)
2	ADFLT	MENTONE	12296 W 600 S	MENTONE		Public		\$5,614
4	ADFLT	Wawasee Airport	12670 N Bishop Rd.	SYRACUSE		Private		\$5,614
5	ADFLT	WARSAW MUNI	300 N Airport Rd.	WARSAW		Public		\$5,614

**Care Facilities**

ID	Class	Name	Address	City	NumBeds	Use	Year Built	Cost
	EFHM	Parkview Hospital	1355 MARINERS DR	WARSAW	12	Hospital		\$10,150
1	EFHM	KOSCIUSKO COMMUNITY	2101 E DUBOIS DR	WARSAW	72	Hospital		\$11,157
2	EFHS	Bowen Center In-Patient Housing	1535 Provident Dr.	WARSAW	16	Hospital		\$3,605
5	EFHL	MASON HEALTH CARE CENTER	900 PROVIDENT DR	WARSAW	89	Long_Term		\$14,420
6	EFHL	MILLER'S MERRY MANOR	1630 S COUNTY FARM RD	WARSAW	137	Long_Term		\$14,420
7	EFHL	LAKELAND REHABILITATION	505 W 4TH ST	MILFORD	60	Long_Term		\$14,420
8	EFHL	MILLER'S MERRY MANOR	500 E PICKWICK DR	SYRACUSE	66	Long_Term		\$14,420
9	EFHL	Warsaw Meadows	300 PRAIRIE STREET	WARSAW	113	Long_Term		\$14,420
10	EFHL	GRACE VILLAGE HEALTH CARE	337 GRACE VILLAGE DR	WINONA LAKE	107	Long_Term		\$14,420
12	MDFLT	Chapman House	425 Chinworth Ct	Warsaw	150	Unknown		\$14,420

**Communication Facilities**

ID	Class	Name	Address	City	Contact	Use	Year Built	Cost
54	CDFLT	VERIZON WIRELESS	3530 S COUNTY FARM RD	WARSAW		Communication		\$130
55	CDFLT	VERIZON WIRELESS	9585 N 700 E	SYRACUSE		Communication		\$130
56	CDFLT	VERIZON WIRELESS	2365 N 700 W	WARSAW		Communication		\$130
57	CDFLT	VERIZON WIRELESS	863 S SR 13	PIERCETON		Communication		\$130
58	CDFLT	AT&T WIRELESS	991 N LAKE ST	WARSAW		Communication		\$130
59	CDFLT	US CELLULAR	1609 W CENTER ST	WARSAW		Communication		\$130
60	CDFLT	CENTENNIAL WIRELESS	12477 N 950 W	NAPPANEE		Communication		\$130
61	CDFLT	CENTENNIAL WIRELESS	5806 S 525 E	PIERCETON		Communication		\$130
62	CDFLT	CENTENNIAL WIRELESS	10131 N 800 W	SYRACUSE		Communication		\$130
63	CDFLT	CENTENNIAL WIRELESS	4050 CORRIDOR DR	WARSAW		Communication		\$130
64	CDFLT	CENTENNIAL WIRELESS	3260 W SR 14	SILVER LAKE		Communication		\$130
65	CDFLT	CENTENNIAL WIRELESS	3558 S 900 W	MENTONE		Communication		\$130

66	CDFLT	US CELLULAR	5114 N 750 E	NORTH WEBSTER	Communication	\$130
67	CDFLT	US CELLULAR	8256 N SR 15	LEESBURG	Communication	\$130
68	CDFLT	US CELLULAR	2650 DURBIN ST	WARSAW	Communication	\$130
69	CDFLT	CENTENNIAL WIRELESS	2255 N DETROIT ST	WARSAW	Communication	\$130
70	CDFLT	US CELLULAR	13899 N SR 19	NAPPANEE	Communication	\$130
71	CDFLT	US CELLULAR	927 BROOKLYN RD	SYRACUSE	Communication	\$130
73	CDFLT	Jackson Stuart L	4860 W 1250 N	MILFORD		\$130
74	CDFLT	Nappanee Conservation Club	13959 GRAVELTON RD	NAPPANEE		\$130
75	CDFLT	AT&T WIRELESS	4933 N 920 W	ETNA GREEN	Communication	\$130
76	CDFLT	US CELLULAR	7705 E 150 S	PIERCETON	Communication	\$130
78	CDFLT	AT&T WIRELESS	3408 E WOOSTER RD	PIERCETON	Communication	\$130
79	CDFLT	Global Signal Acquistitions LLC	3315 E WYLAND CREEK DR	WARSAW	Communication	\$130
80	CDFLT	SPRINT PCS	2100 W 350 S	WARSAW	Communication	\$130
81	CDFLT	Marcus Cable Associates LP	1075 S 400 W	WARSAW	Communication	\$130
82	CDFLT	State Of Indiana	6363 S SR 15	CLAYPOOL	Communication	\$130
83	CDFLT	Hiatt, Jan C	3616 W 700 S	CLAYPOOL		\$130
84	CDFLT	Walsh Brian Trust	9255 S 600 E	CLAYPOOL		\$130
85	CDFLT	Reiff Farm Trust	4219 E 300 N	WARSAW		\$130
86	CDFLT	SPRINT PCS	6736 N 650 E	NORTH WEBSTER	Communication	\$130
87	CDFLT	Miller, Paula J	7367 E 800 N	NORTH WEBSTER		\$130
88	CDFLT	Century Link	804 N HUNTINGTON ST	SYRACUSE		\$130
89	CDFLT	AT&T WIRELESS	6540 N 200 W	LEESBURG	Communication	\$130
90	CDFLT	AT&T WIRELESS	2397 N 500 W	WARSAW	Communication	\$130
91	CDFLT	AT&T WIRELESS	10980 N SR 15	MILFORD	Communication	\$130
92	CBO	Milford COOP	202 N Main St	Milford	Siren	\$13
93	CBO	Milford Fire Department	214 S Main St	Milford	Siren	\$13
94	CBO	Spinks Condo	12275 N Ogden Point Rd	Syracuse		\$13
95	CBO	Private Tool Shed	11585 N SR 13	Syracuse		\$13
96	CBO	Syracuse Maintenance Building	705 N Dolan Dr	Syracuse		\$13
97	CBO	Turkey Creek Fire Station 2	8138 McCintic Rd	Syracuse	Siren	\$13
98	CBO	Silver Lake Conservation Club	108 S Elm St	Silver Lake	Siren	\$13

99	CBO	Silver Lake Cemetary	10690 S Pleasant St	Silver Lake			\$13
100	CBO	Pierceton Senior Center	205 N First St	Pierceton			\$13
101	CBO	Pierceton Fire Dept	103 W Walnut St	Pierceton		Siren	\$13
102	CBO	Mentone Fire Dept	201 W Main St	Mentone		Siren	\$20
103	CBO	Warsaw City Hall	112 S Buffalo St	Warsaw		Siren	\$1,040
104	CBO	Zimmer Plant 4	1777 W Center Street	Warsaw		Siren	\$13
105	CBO	Warsaw Fire Station 2	1777 W Center St	Warsaw		Siren	\$26

#### Dams

ID	Class	Name	Near City	Distance To City	Owner	Purpose	Year Built	Normal Storage
1	HPDG	WEBSTER LAKE DAM - WEST	NORTH WEBSTER-	0	WEBSTER LAKE ASSOCIATION	R	1920	761
2	HPDG	WEBSTER LAKE DAM - EAST	OSWEGO	5	WEBSTER LAKE ASSOCIATION	R	1920	5389
3	HPDG	PALESTINE LAKE DAM	Palestine	7	IDNR--FISH AND WILDLIFE	R	1837	1170
4	HPDE	WEIMER-BLACK DAM	NORTH WEBSTER	2	IDNR--FISH AND WILDLIFE (	R	1963	164
5	HPDE	FLATBELLY LAKE DAM	BUTTERMILK POINT	1	IDNR--FISH AND WILDLIFE (	O	1962	480
6	HPDE	PAPAKEECHIE LAKE	BUTTERMILK POINT	1	PAPAKEECHIE PROTECTIVE AS	R	1913	890

#### Emergency Centers

ID	Class	Name	Address	City	Contact	Year Built	Cost
2	EDFLT	Kosciusko Emergency Operations	121 N Lake St	Warsaw	Edward Rock	2002	\$1,288

#### Fire Stations

ID	Class	Name	Address	City	Contact	Year Built	Cost
1	EFFS	Winona Lake Fire Dept	1000 Kings Hwy	Winona Lake	Fire Departments		\$618
2	EFFS	Silver Lake Fire Dept	702 E Main St	Silver Lake	Fire Departments		\$618
3	EFFS	Burket Firemans Training Ctr	105 E Walnut St	Burket	Fire Departments		\$618
4	EFFS	Warsaw-Wayne Fire Station 1	109 E Main St	Warsaw	Fire Departments		\$618
5	EFFS	North Webster Fire Dept	202 N Main St	North Webster	Fire Departments		\$618
6	EFFS	Turkey Creek Fire Station 1	402 N Huntington St	Syracuse	Fire Departments		\$618
7	EFFS	Claypool Fire Dept	103 N Main St	Claypool	Fire Departments		\$618
8	EFFS	Pierceton Fire Dept	South 1st St	Pierceton	Fire Departments		\$618
9	FDFLT	Atwood Fire Department	110 N Prairie St	Atwood	Fire Departments		\$773
10	FDFLT	Burket Fire Department	104 E Main St	Burket	Fire Departments		\$773
11	FDFLT	Etna Green Fire Dept	132 W Broadway St	Etna Green	Fire Departments		\$773

12	FDFLT	Leesburg Fire Dept	34 E Armstrong Rd	Leesburg	Fire Departments	\$773
13	FDFLT	Mentone Fire Dept	201 W. Main	Mentone	Fire Departments	\$773
14	FDFLT	Milford Fire Dept	214 S. Main	Milford	Fire Departments	\$773
15	FDFLT	Sidney Fire Dept	103 E Center St	Sidney	Fire Departments	\$773
16	FDFLT	Turkey Creek Fire Station 2	8138 E McClintic Rd	Syracuse	Fire Departments	\$773
17	FDFLT	Warsaw-Wayne Fire Station 2	2204 E Center St	Warsaw	Fire Departments	\$773

**Hazmat** (Only EHS listed)

ID	Class	Name	Address	City	Owner	Chemical	Year Built	Amount
1	HDFLT	TruHorizons LLC	Milford	13795 N CR 100 E	Milford	Anhydrous ammonia		
2	HDFLT	Louis Dreyfus Company Agricultural Industries	7344 SR 15 S	Claypool		Sulfuric Acid		
3	HDFLT	Louis Dreyfus Company Agricultural Industries	7344 SR 15 S	Claypool		Hydrochloric acid		
4	HDFLT	Kova Agricultural Products	37 E CR 900 N	Milford		Ammonia		
5	HDFLT	Kova Agricultural Products	37 E CR 900 N	Milford		Parazone 3SL		
6	HDFLT	Dalton Corporation Warsaw Manufacturing	1900 E Jefferson St	Warsaw		Ecocure I 352		
7	HDFLT	Dalton Corporation Warsaw Manufacturing	1900 E Jefferson St	Warsaw		Ferrophosphorus		
8	HDFLT	Dalton Corporation Warsaw Manufacturing	1900 E Jefferson St	Warsaw		Ferrophosphorus Brick		
9	HDFLT	Dalton Corporation Warsaw Manufacturing	1900 E Jefferson St	Warsaw		Sigma Set 6100		
10	HDFLT	Dalton Corporation Warsaw Manufacturing	1900 E Jefferson St	Warsaw		Sulfuric Acid		
11	HDFLT	North Central Co-op - Burket Agronomy	4640 S 900 W	Mentone		Ammonia		
12	HDFLT	Creighton Brothers Limited Partnership/Farm	4217 Old US Hwy 30 W	Mentone		Ammonia		
13	HDFLT	WINFIELD SOLUTIONS LLC	4574 S CR 900W	Mentone		AMMONIA		
14	HDFLT	WINFIELD SOLUTIONS LLC	4574 S CR 900W	Mentone		DIAMMONIUM SALT OF ZINC		
15	HDFLT	WINFIELD SOLUTIONS LLC	4574 S CR 900W	Mentone		DICHLORVOS		
16	HDFLT	WINFIELD SOLUTIONS LLC	4574 S CR 900W	Mentone		DIMETHOATE		

17	HDFLT	WINFIELD SOLUTIONS LLC	4574 S CR 900W	Mentone	PARAQUAT DICHLORIDE
18	HDFLT	WINFIELD SOLUTIONS LLC	4574 S CR 900W	Mentone	TERBUFOS
19	HDFLT	Danco Anodizing	2450 Deelyn Dr	Warsaw	Nitric Acid
20	HDFLT	Danco Anodizing	2450 Deelyn Dr	Warsaw	Sulfuric Acid
21	HDFLT	Warsaw Chemical	390 Argonne Rd	Warsaw	Hydrochloric acid
22	HDFLT	Warsaw Chemical	390 Argonne Rd	Warsaw	Hydrogen peroxide
23	HDFLT	Warsaw Chemical	390 Argonne Rd	Warsaw	Lead Battery Acid
24	HDFLT	Warsaw Chemical	390 Argonne Rd	Warsaw	Sulfuric Acid
25	HDFLT	Maple Leaf Farms Incorporated	9166 N CR 200 E	Milford	Ammonia
26	HDFLT	Maple Leaf Farms Incorporated	9166 N CR 200 E	Milford	Sulfuric Acid
27	HDFLT	United Telephone / CenturyLink Warsaw	122 E Center St	Warsaw	Lead Battery Acid
28	HDFLT	KGP Logistics	2000 W Winona Ave	Warsaw	Sulfuric Acid
29	HDFLT	KGP Logistics	2000 W Winona Ave	Warsaw	Lead
30	HDFLT	Chore-Time Brock, Inc.	611 N Higbee St	Milford	Sulfuric Acid
31	HDFLT	Chore-Time Brock, Inc.	611 N Higbee St,	Milford	Vanadium Pentoxide
32	HDFLT	Warsaw Black Oxide Incorporated	310 S Walnut St	Burket	Hydrochloric acid
33	HDFLT	Warsaw Black Oxide Incorporated	310 S Walnut St	Burket	Sulfuric Acid
34	HDFLT	Creighton Brothers Shell Egg Processing	6500 W Crystal Lake Rd	Warsaw	Ammonia
35	HDFLT	Creighton Brothers Shell Egg Processing	6500 W Crystal Lake Rd	Warsaw	Hydrogen peroxide
36	HDFLT	Creighton Brothers Shell Egg Processing	6500 W Crystal Lake Rd	Warsaw	Nitric Acid
37	HDFLT	LSC Communications-Warsaw	2801 W Old Rd 30	Warsaw	Sulfuric Acid
38	HDFLT	Warsaw Orthopedic, Inc. d.b.a. Medtronic Spinal and Biologics	2500 Silveus Crossing	Warsaw	Lead Battery Acid

39	HDFLT	Warsaw Orthopedic, Inc. d.b.a. Medtronic Spinal and Biologics	2500 Silveus Crossing	Warsaw	Sulfuric Acid
40	HDFLT	Whimet Inc.	2100 N Detroit St	Warsaw	Sulfuric Acid
41	HDFLT	Whimet Inc.	2100 N Detroit St	Warsaw	Nitric Acid
42	HDFLT	Whimet Inc.	2100 N Detroit St	Warsaw	Hydrogen Chloride
43	HDFLT	Depuy Orthopaedics Incorporated	700 Orthopaedic Dr	Warsaw	Nitric Acid
44	HDFLT	Depuy Orthopaedics Incorporated	700 Orthopaedic Dr	Warsaw	Sulfuric Acid
45	HDFLT	Worldcom Lkwain	675 E Rd,	Syracuse	Lead Battery Acid
46	HDFLT	Zimmer Biomet Incorporated - West Campus	1800 West Center Street,	Warsaw	Hydrofluoric Acid
47	HDFLT	Zimmer Biomet Incorporated - West Campus	1800 West Center Street	Warsaw	Nitric Acid
48	HDFLT	Zimmer Biomet Incorporated - West Campus	1800 West Center Street,	Warsaw	Sulfuric Acid
49	HDFLT	Home City Ice Company	7056 N SR 13,	North Webster	Ammonia
50	HDFLT	Da-Lite Screen Warsaw	3100 N Detroit St,	Warsaw	Sulfuric Acid
51	HDFLT	Poly-Wood, LLC	1001 W. Brooklyn Street,	Syracuse	Sulfuric Acid
52	HDFLT	Poly-Wood, LLC	1001 W. Brooklyn Street,	Syracuse	Nitric Acid
53	HDFLT	Warsaw Community Schools Transportation	918 E. Market St	Warsaw	Sulfuric Acid
54	HDFLT	United Telephone Company Indiana DBA CenturyLink Syracuse Company	804 N Huntington St	Syracuse	Lead Battery Acid
55	HDFLT	Bison Horse Trailers	802 N Old ST Rd 15	Milford	Sulfuric Acid
56	HDFLT	The Papers, Inc.	206 S. Main Street	Milford	Sulfuric Acid
57	HDFLT	Flint Group North America Corporation	3025 W Old US Hwy 30	Warsaw	Sulfuric Acid

58	HDFLT	United Telephone Company Indiana DBA CenturyLink Pierceton Central Office	201 W. Market St	Pierceton	Lead Battery Acid
59	HDFLT	Maple Leaf Farms Incorporated Feed Mill	2764 E CR 1300 N	Syracuse	<u>Formaldehyde</u>
60	HDFLT	Wawasee Transportation & Facility Center	12501 N. Kern Rd.	Syracuse	Sulfuric Acid
61	HDFLT	Shiloh Industries Pierceton	5 Arnolt Drive	Pierceton	Lead Battery Acid
62	HDFLT	United Telephone Company Indiana DBA CenturyLink North Webster Central Office	312 E South St	North Webster	Lead Battery Acid
63	HDFLT	Tecomet Warsaw - Building #1	486 W. 350 N.	Warsaw	Nitric Acid
64	HDFLT	Tecomet Warsaw - Building #1	486 W. 350 N.	Warsaw	Sulfuric Acid
65	HDFLT	AT&T - IN1009	1067 Mariners Dr	Warsaw	Sulfuric Acid
66	HDFLT	Zimmer Biomet Incorporated - North Campus	56 East Bell Drive	Warsaw	Nitric Acid
67	HDFLT	Parker Hannifin Engineered Seals Division	501 S Sycamore St	Syracuse	Sulfuric Acid
68	HDFLT	Warsaw Electropolishing	125 W CR 250 N	Warsaw	Nitric Acid
69	HDFLT	Warsaw Electropolishing	125 W CR 250 N	Warsaw	Sulfuric Acid
70	HDFLT	CUS - SYRACUSE - USID111243	10129 NORTH 800 EAST	Syracuse	Sulfuric Acid
71	HDFLT	AT&T - INF900	WHITEHOUSE-PALMER FT5W	Syracuse	Sulfuric Acid
72	HDFLT	Tecomet Warsaw - Building #2	111 N Clay St	Claypool	Nitric Acid
73	HDFLT	Frontier Communications-Sidney	199 W Arthur St	Sidney	Sulfuric Acid
74	HDFLT	Warsaw High School	1 Tiger Lane	Warsaw	Hydrochloric acid

79	HWB17	CR 650W	County Highway Agency	43	3	1974	\$624
105	HWB4	CR 1000N	County Highway Agency	10	1	1991	\$204
106	HWB3	COUNTRY CLUB ROAD	County Highway Agency	12	1	1978	\$218

#### Police Stations

ID	Class	Name	Address	City	Contact	Year Built	Cost
1	EFPS	Milford Police Dept	121 S Main St	Milford	Police Departments		\$1,442
2	EFPS	North Webster Police Dept	144 S Main St	North Webster	Police Departments		\$1,442
3	EFPS	Mentone Town Police Dept	121 W Main	Mentone	Police Departments		\$1,442
4	EFPS	Kosciusko County Sheriff's Ofc	221 W Main St	Warsaw	Sheriff		\$1,442
5	EFPS	Warsaw Police Dept	2191 E Fort Wayne St	Warsaw	Police Departments		\$1,442
6	EFPS	Syracuse Police Dept	310 N Huntington St	Syracuse	Police Departments		\$1,442
7	EFPS	Claypool Police Dept	408 S Graceland Ave	Claypool	Police Departments		\$1,442
8	EFPS	Silver Lake Police Dept	604 N Jefferson St	Silver Lake	Police Departments		\$1,442
9	EFPS	Winona Lake Police Dept	1310 Park Ave	Winona Lake	Police Departments		\$1,442
16	PDFLT	Peirceton Police Dept	205 N First St	Pierceton	Police Departments		\$1,803

#### Rail Facilities

ID	Class	Name	Address	City	Contact	Use	Year Built	Cost
1	RDF	CSXT Milford Jct Bulk TransFlo				Cargo		\$2,245
2	RDF	N&W	4640 S 900 W	Mentone		Cargo	2005	\$6,265

#### Schools

ID	Class	Name	Address	City	Contact	Num Students	Year Built	Cost
1	EFS1	SACRED HEART ELEMENTARY	125 N HARRISON STREET	WARSAW		123		\$515
2	EFS1	WARSAW CHRISTIAN SCHOOL	909 SOUTH BUFFALO	WARSAW		165		\$515
3	EFS1	LAKELAND CHRISTIAN ACADEMY	1093 S 250 E	WINONA LAKE		149		\$515
4	EFS1	SUNNY MEADOW	9664 W 1350 N	NAPPANEE		26		\$515
5	EFS1	MAPLE GROVE AMISH SCHOOL	4968 W 900 N	MILFORD		14		\$515
6	EFS1	GRAVELTON PAROCHIAL SCHOOL	13397 N 400 W	MILFORD		23		\$515
8	EFS1	PLEASANT VALLEY SCHOOL	9324 W 1050 N	NAPPANEE		34		\$515
9	EFS1	SOUTH MILLWOOD	8731 W 800 N	NAPPANEE		27		\$515
10	EFS1	WEST HASTINGS	5606 W 1100N	MILFORD		36		\$515

11	EFS1	HEPTON AMISH SCHOOL	9915 W HEPTON RD	NAPPANEE	34	\$515
14	EFS1	Milford Elementary	611 W EMELINE ST	MILFORD	604	\$515
16	EFS1	SYRACUSE ELEMENTARY SCHOOL	502 W BROOKLYN ST	SYRACUSE	528	\$515
17	EFS1	WAWASEE HIGH SCHOOL	1 WARRIOR PATH	SYRACUSE	1072	\$515
18	EFS1	WAWASEE MIDDLE SCHOOL	9850 N SR 13	SYRACUSE	515	\$515
19	EFS1	TIPPECANOE VALLEY MIDDLE SCH	11303 W 800 S	ARKON	495	\$515
20	EFS1	BURKET ELEMENTARY SCHOOL	5095 S 700 W	BURKET	143	\$515
21	EFS1	TIPPECANOE VALLEY HIGH SCHOOL	8345 S SR 19	AKRON	683	\$515
25	EFS1	CLAYPOOL ELEMENTARY SCHOOL	2024 W 700 S	CLAYPOOL	159	\$515
26	EFS1	JEFFERSON ELEMENTARY SCHOOL	100 SEMINARY DR	WINONA LAKE	342	\$515
27	EFS1	LEESBURG ELEMENTARY SCHOOL	6250 N Old SR 15	LEESBURG	550	\$515
28	EFS1	LINCOLN ELEMENTARY SCHOOL	203 N LINCOLN ST	WARSAW	500	\$515
29	EFS1	MADISON ELEMENTARY SCHOOL	1436 W 300 N	WARSAW	511	\$515
31	EFS1	WARSAW COMMUNITY HS	1 TIGER LN	WARSAW	1972	\$515
32	EFS1	EDGEWOOD MIDDLE SCHOOL	900 S UNION	WARSAW	553	\$515
33	EFS1	WASHINGTON ELEMENTARY	423 W KINCAIDE ST	WARSAW	589	\$515
34	EFS1	LAKEVIEW MIDDLE SCHOOL	848 E SMITH ST	WARSAW	566	\$515
35	EFS1	EISENHOWER ELEMENTARY	1900 S COUNTY FARM RD	WARSAW	610	\$515
36	EFS1	HARRISON ELEMENTARY SCHOOL	1300 HUSKY TRL	WARSAW	752	\$515
37	EFS1	PIERCETON ELEMENTARY SCHOOL	307 W SCHOOL ST	PIERCETON	481	\$515
38	SDFLT	Corner View	7022 W 1300 N	Nappanee	300	\$644
40	EFS2	Grace College and Seminary	200 Seminary Dr.	Winona Lake	300	\$644
41	EFS2	IPFW Warsaw Campus	2808 Frontage Rd.	Warsaw	300	\$644
43	EFS2	Ivy Tech Warsaw Campus	3755 Lake City Highway	Warsaw	300	\$644
46	SDFLT	Mentone	206 N Yale St.	Mentone	300	\$644
47	EFS1	Milford Junior High	611 W Emeline St.	Milford	300	\$644
49	SDFLT	Pleasant View (Amish)	8936 W 600 N	Etna Green	300	\$644
50	SDFLT	Gateway Educational Center	201 N Union	Warsaw	300	\$644
51	SDFLT	Pine Grove	9915 W Hepton Rd	Nappanee	300	\$644
52	SDFLT	North Webster Elementary	5745 N 750 E	North Webster	300	\$644
53	SDFLT	Indiana Tech	2928 Frontage Rd	Warsaw	300	\$644

57	SDFLT Harrison Christian School	12745 W 800S	Rochester	300	\$344
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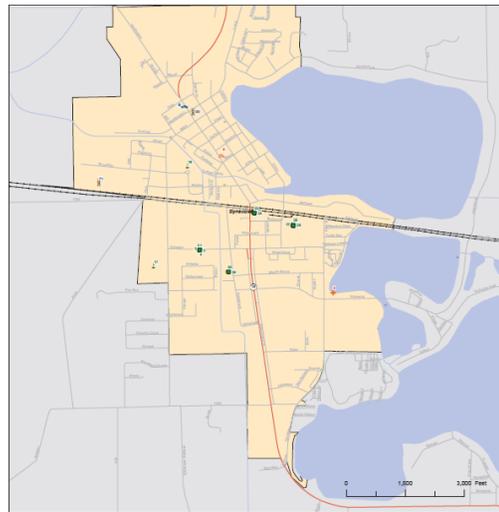
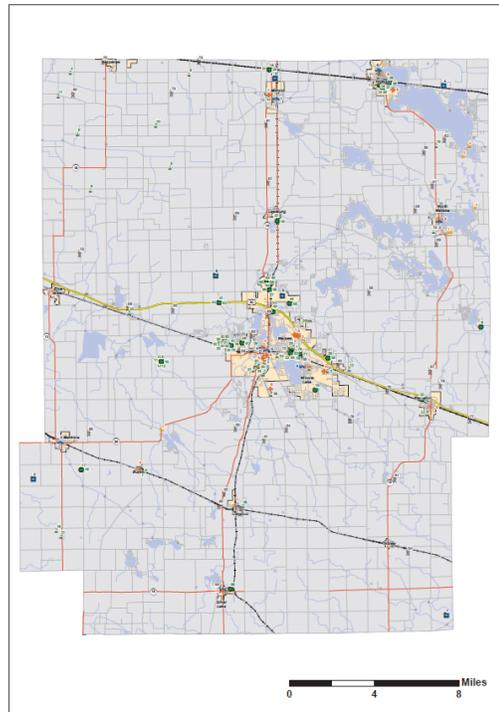
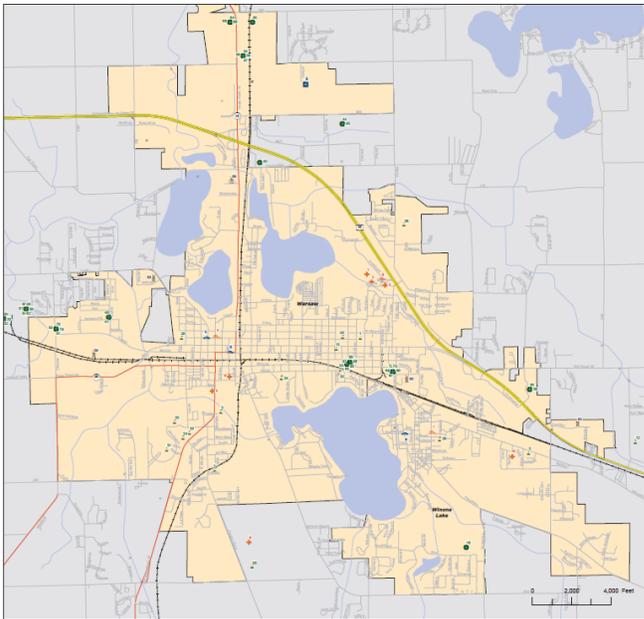
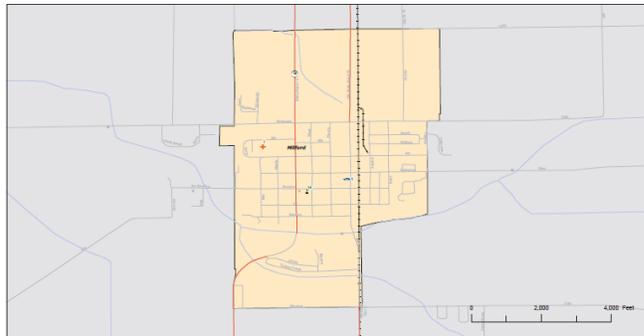
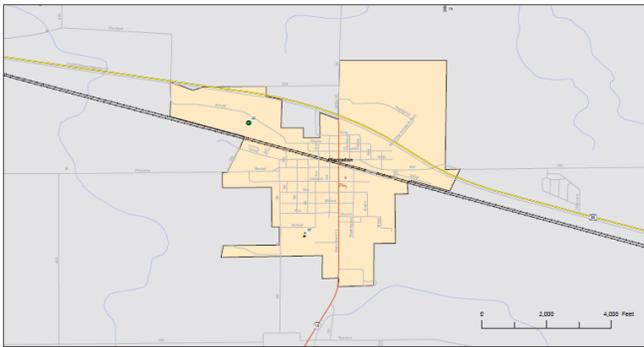
**User Defined Facilities**

ID	Class	Name	Address	City	Use	Occupancy	Year Built	Cost
3	UDFLT	Mentone EMS	201 W Main St	Mentone	Unknown	RES1		1000
4	UDFLT	Lutheran EMS - Leesburg	34 E Armstrong Rd	Leesburg	Unknown	RES1		1000
5	UDFLT	Lutheran EMS- Milford	111 S Main St	Milford	Unknown	RES1		1000
6	UDFLT	Lutheran EMS- Silver Lake	702 E Main St	Silver Lake	Unknown	RES1		1000
8	UDFLT	Lutheran EMS- Warsaw	2304 E Center St	Warsaw	Unknown	RES1		1000
9	UDFLT	North Webster EMS	102 S Morton St	North Webster	Unknown	RES1		1000
10	UDFLT	Turkey Creek Township EMS	402 N Huntington St	Syracuse	Unknown	RES1		1000

**Waste Water Facilities**

ID	Class	Name	Address	City	Contact	Use	Year Built	Cost
1	WDFLT	Warsaw Wastewater	2056 N 150 W	Warsaw	<Add contact name>	W/W Treatment		\$85,750
2	WDFLT	Mentone Wastewater	3519 S State Road 19	Mentone	<Add contact name>	W/W Treatment		\$85,750
3	WDFLT	Milford Wastewater	1001 W 1250 N	Milford	<Add contact name>	W/W Treatment		\$85,750
4	WDFLT	Syracuse Wastewater	1 Conrad St	Syracuse	<Add contact name>	W/W Treatment		\$85,750
5	WDFLT	North Webster Wastewater	302 N Midlake Dr	North Webster	<Add contact name>	W/W Treatment		\$85,750
6	WDFLT	Warsaw Wastewater 2	2056 N 150 W	Warsaw	<Add contact name>	W/W Treatment		\$85,750
7	WDFLT	Etna Green Wastewater	10590 W Old Road 30	Etna Green	<Add contact name>	W/W Treatment		\$85,750
8	WDFLT	Silver Lake Wastewater	No Address	Silver Lake	<Add contact name>	W/W Treatment		\$85,750
9	WDFLT	Claypool Wastewater	No Address	Claypool	<Add contact name>	W/W Treatment		\$85,750
10	WDFLT	Pierceton Wastewater	508 S 700 E	Pierceton	<Add contact name>	W/W Treatment		\$85,750
11	WDFLT	Turkey Creek Regional Sewer	4852 N 1200 W	Cromwell	<Add contact name>	W/W Treatment		\$85,750

## **Appendix G: Maps of Critical Facilities**

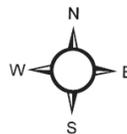


**Kosciusko County  
Pre-Disaster Mitigation Plan  
Critical Facilities Map**

**Legend**

- |                  |                          |                      |                 |          |
|------------------|--------------------------|----------------------|-----------------|----------|
| • Care Facility  | ■ Airport                | • Dams               | — US Highway    | — River  |
| • Fire Station   | • Bridge                 | • Hazardous Material | — State Highway | • Lake   |
| • Police Station | ■ Communication Facility | ■ Rail Facility      | — Local Road    | • City   |
| • School         |                          |                      | — Railroad      | • County |

Data Sources: HAZUS-S01, Indiana Department of Education, Indiana Department of Transportation, Indiana Department of Health, National Hydrologic Dataset, National Transportation Atlas Database, United States Census Bureau



**Kosciusko County Emergency Management Agency**

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## Sources

Sources: <http://www.kcgov.com/>

Sources: [http://www.city-data.com/county/Kosciusko\\_County-IN.html](http://www.city-data.com/county/Kosciusko_County-IN.html); <http://www.kcgov.com/>

Sources: <http://www.city-data.com/city/Warsaw-Indiana.html>

Source: STATS Indiana, 2015

Source: Kosciusko Economic Development Corp, 2017

Source: U.S. Department of Agriculture:

Source: [https://www.agcensus.usda.gov/Publications/2012/Online\\_Resources/County\\_Profiles/Indiana/cp18085.pdf](https://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Indiana/cp18085.pdf)

Source: U.S. Geological Survey HUC14 Watersheds, 2006 - Confirmed by Kosciusko County Surveyor 2017

Source: [http://www.in.gov/dnr/water/files/46\\_Kosciusko\\_County\\_UNC\\_AQSYS\\_text.pdf](http://www.in.gov/dnr/water/files/46_Kosciusko_County_UNC_AQSYS_text.pdf)  
Division of Water, Resource Assessment Section

Source: [http://www.in.gov/dnr/water/files/46\\_Kosciusko\\_County\\_UNC\\_AQSYS\\_text.pdf](http://www.in.gov/dnr/water/files/46_Kosciusko_County_UNC_AQSYS_text.pdf)  
Division of Water, Resource Assessment Section

Source: [http://maps.indiana.edu/previewMaps/Hydrology/Aquifer\\_Recharge\\_Near\\_Surface.html](http://maps.indiana.edu/previewMaps/Hydrology/Aquifer_Recharge_Near_Surface.html)

Source: NOAA Storm Prediction Center

Source: Indiana Department of Natural Resources

Source: FEMA

Source: NCDC

Source: National Inventory of Dams

Source: [http://earthquake.usgs.gov/learning/topics/mag\\_vs\\_int.php](http://earthquake.usgs.gov/learning/topics/mag_vs_int.php)

Source: <http://earthquake.usgs.gov/regional/states/indiana/history.php>

Source: ALOHA

Source: CAMEO

Source: FEMA State and Local Mitigation Planning How to Guide

Source: <https://www.in.gov/idem/permits/water/wastewater/wetwhr/storms/rule5.html>

Source: <https://www.fws.gov/midwest/endangered/savings/outreach.html>

Source: CDC: <https://www.cdc.gov/oid/index.html>