LOGAN COUNTY

Multi-Jurisdictional All Hazards Mitigation Plan







PARTICIPANTS

Atlanta, City of
Broadwell, Village of
Elkhart, Village of
Emden, Village of
Hartsburg, Village of
Lincoln, City of
Logan, County of
Logan, Mason & Menard Counties ROE
Mount Pulaski, City of
Mount Pulaski Rural Fire Protection District #2

November 2013

The five year update of this Plan must be completed on or before January 21, 2019.

ACKNOWLEDGEMENTS

Developing the first All Hazards Mitigation Plan for Logan County and the participating jurisdictions involved input from many people. All of these contributions have helped to make this Plan the definitive source of information on natural hazards, their impacts, and the various options to eliminate or reduce these impacts on current and future generations. Information from government sources has been supplemented by photographs and weather data from personal collections.

The Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee was organized to represent the various jurisdictions and interests throughout the County. The Planning Committee's efforts during the planning process helped to produce a Plan which is a valuable resource for all who use it in Logan County.

Identifying, verifying, and gathering related information about severe weather events involves research into various files and discussions with individuals. In many cases gaps exist in the data, especially with regards to information about property damages. Chris Miller, Warning Coordination Meteorologist at the National Weather Service Weather Forecast Office in Lincoln responded to numerous requests for information. He provided information, mostly accumulated through previous research, which improved this Plan.

Bret Aukamp, the County Highway Engineer, provided a narrative about the County's roadway system, damages caused by flooding and erosion and suggested remedies to resolve these roadway issues. Several of the committee members were also able to identify critical facilities and infrastructure damaged by natural hazard events and provide property damage amounts that were unavailable through conventional records. These efforts personalize the Plan and greatly enhance its value to future users.

Photographs depicting storms and storm damages are often difficult to find. Cheryl Hedrick and Terry Storer (Logan County EMA), Bret Aukamp (Logan County Highway Department), Chris Miller (National Weather Service) and Margaret Lee (Elkhart Village Trustee) provided photographs depicting the severity of natural hazard events in Logan County that are hard to capture with words.

As this Plan is updated, we hope that future generations will continue to build on this document with additional information and photographs.

LOGAN COUNTY MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN

LOGAN COUNTY, ILLINOIS

TABLE OF CONTENTS

1.0 INTRODUCTION
- 1.1 PARTICIPATING JURISDICTIONS 1-2
- 1.2 DEMOGRAPHICS 1-2
- 1.3 LAND USE AND DEVELOPMENT TRENDS 1-4

2.0 PLANNING PROCESS
- 2.1 PLANNING COMMITTEE 2-2
- 2.2 PUBLIC INVOLVEMENT 2-5
- 2.3 PARTICIPATION OPPORTUNITIES FOR INTERESTED PARTIES 2-8
- 2.4 INCORPORATING EXISTING PLANNING DOCUMENTS 2-9

3.0 RISK ASSESSMENT
- 3.1 SEVERE STORMS (THUNDERSTORMS, HAIL, LIGHTNING & HEAVY RAIN) 3-2
- 3.2 TORNADOES 3-54
- 3.3 SEVERE WINTER STORMS (SNOW, ICE & EXTREME COLD) 3-87
- 3.4 FLOODS 3-109
- 3.5 EXTREME HEAT 3-140
- 3.6 DROUGHT 3-148
- 3.7 EARTHQUAKES 3-157
- 3.8 DAMS 3-167
- 3.9 MAN-MADE HAZARDS 3-173
  - 3.9.1 Hazardous Substances 3-173
    - 3.9.1.1 Generation 3-174
    - 3.9.1.2 Transportation 3-174
  - 3.9.2 Waste Disposal 3-177
  - 3.9.3 Hazardous Material Incidents 3-178
  - 3.9.4 Waste Remediation 3-180
  - 3.9.5 Terrorism 3-180

4.0 MITIGATION STRATEGY
- 4.1 HAZARD MITIGATION GOALS 4-1
- 4.2 IDENTIFYING, ANALYZING & PRIORITIZING MITIGATION ACTIONS 4-2

4.2.1 Identification and Analysis 4-2
4.2.2 Prioritization 4-3
4.3 Implementing Mitigation Actions 4-4
4.4 Mitigation Strategy Results 4-4

5.0 Recommendations 5-1

6.0 Plan Maintenance
6.1 Monitoring, Evaluating & Updating the Plan 6-1
6.1.1 Monitoring and Evaluating the Plan 6-1
6.1.2 Updating the Plan 6-2
6.2 Incorporating the Mitigation Strategy into Existing Planning Mechanisms 6-2
6.3 Continued Public Involvement 6-3

7.0 Plan Adoption
7.1 Plan Adoption Process 7-1

8.0 References 8-1

Appendices

County Resolution Authorizing the Development of the Plan ..... Appendix A
Planning Committee Meeting Attendance Sheets ..... Appendix B
Planning Committee Meeting Minutes ..... Appendix C
Citizen Questionnaire ..... Appendix D
Frequently Asked Questions Fact Sheet ..... Appendix E
The Elkhart Echo Newsletter – September 2012 Edition ..... Appendix F
Media Outlets Serving Logan County and News Articles ..... Appendix G
Public Forum – Planning Process Handout ..... Appendix H
Public Forum – Plan Comment Sheet ..... Appendix I
Business Community Participation Packet ..... Appendix J
Hazard Mitigation Planning Letter Sent to Adjacent Counties ..... Appendix K
Hazard Event Photographs ..... Appendix L
Hazard Event New Articles ..... Appendix M
Floodplain Maps for NFIP-Participating Municipalities ..... Appendix N
Plan Adoption Resolutions ..... Appendix O

List of Figures

Figure 1 Federal Disaster Declarations for Logan County 1-1
Figure 2 Participating Jurisdictions Represented in the Plan 1-2
Figure 3 Location Map 1-3
Figure 4 Demographic Data by Participating Jurisdiction 1-4
Figure 5 Description of Planning Process 2-1

LIST OF FIGURES CONTINUED…

Figure 6 Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member Attendance Record 2-3
Figure 7 Existing Planning Documents by Participating Jurisdiction 2-10
Figure 8 Wind Speed Conversions 3-3
Figure 9 Hail Size Descriptions 3-4
Figure 10 TORRO Hailstorm Intensity Scale 3-5
Figure 11 Severe Storms – Thunderstorm with Damaging Winds Reported in Logan County 3-18
Figure 12 Severe Storms – Hail Events Reported in Logan County 3-38
Figure 13 Severe Storms – Lightning Events Reported in Logan County 3-42
Figure 14 Severe Storms – Heavy Rain Events Reported in Logan County 3-44
Figure 15 Thunderstorms with Damaging Winds by Month 3-7
Figure 16 Thunderstorms with Damaging Winds by Hour 3-7
Figure 17 Hail Events by Month 3-8
Figure 18 Hail Events by Hour 3-9
Figure 19 Heavy Rain Events by Month 3-9
Figure 20 Heavy Rain Events by Hour 3-10
Figure 21 Verified Severe Storm Events by Participating Municipality 3-11
Figure 22 Verified Severe Storm Events in Unincorporated Logan County 3-12
Figure 23 Severe Weather Crash Data for Logan County 3-15
Figure 24 Fujita & Enhanced Fujita Tornado Measurement Scales 3-55
Figure 25 Tornadoes Reported in Logan County 3-75
Figure 26 Tornadoes by Magnitude 3-56
Figure 27 Tornadoes by Month 3-57
Figure 28 Tornadoes by Hour 3-57
Figure 29 F0 & EF0 Tornado Touchdowns in Logan County: 1950 – 2012 3-59
Figure 30 F1 – F4 & EF1 – EF4 Tornado Touchdowns in Logan County: 1950 – 2012 3-60
Figure 31 Verified Tornado Touchdowns In or Near Participating Municipalities 3-61
Figure 32 Verified Tornado Touchdowns Near Unincorporated Areas of Logan County 3-61
Figure 33 Calculation of Average Housing Unit Density 3-64
Figure 34 Existing Housing Units by Township 3-65
Figure 35 Logan County Township Boundaries 3-66
Figure 36 Calculation of Potentially-Damaged Existing Housing Units 3-66
Figure 37 Estimated Number of Township Housing Units Potentially Damaged by a Tornado 3-67
Figure 38 Estimated Number of Housing Units by Municipality Potentially Damaged by a Tornado 3-70
Figure 39 Calculation of Averaged Assessed Value 3-71
Figure 40 Average Market Value of Housing Units 3-72
Figure 41 *Structure* – Potential Dollar Loss Calculations 3-72
Figure 42 *Content* – Potential Dollar Loss Calculations 3-73
Figure 43 Estimated Potential Dollar Losses to Potentially-Damaged Housing Units from a Tornado 3-73

LIST OF FIGURES CONTINUED…

Figure 44 Wind Chill Chart ... 3-88
Figure 45 Severe Winter Storms - Snow and Ice Events Reported in Logan County ... 3-99
Figure 46 Extreme Cold Events Reported in Logan County ... 3-108
Figure 47 Severe Winter Storms by Month ... 3-91
Figure 48 Severe Winter Storms by Hour ... 3-92
Figure 49 Severe Winter Weather Crash Data for Logan County ... 3-96
Figure 50 Floodplain Illustration ... 3-111
Figure 51 Example of a Flood Insurance Rate Map (FIRM) ... 3-112
Figure 52 General Flood Events Reported in Logan County ... 3-131
Figure 53 Flash Flood Events Reported in Logan County ... 3-135
Figure 54 Flood Events by Month ... 3-116
Figure 55 Flash Flood Events by Hour ... 3-117
Figure 56 Bodies of Water Subject to Flooding in Logan County ... 3-117
Figure 57 Floodplain Areas in Logan County ... 3-118
Figure 58 NFIP Participating Jurisdictions ... 3-119
Figure 59 Verified Flash Flood Events by Participating Jurisdiction ... 3-120
Figure 60 Repetitive Flood Loss Properties ... 3-123
Figure 61 Existing Residential Structures Vulnerable to Riverine Flooding ... 3-124
Figure 62 Calculation of Average Assessed Value ... 3-127
Figure 63 Average Market Value of Housing Units ... 3-128
Figure 64 *Structure* – Potential Dollar Loss Calculations ... 3-129
Figure 65 *Content* – Potential Dollar Loss Calculations ... 3-129
Figure 66 Estimated Potential Dollar Losses to Potentially-Damaged Housing Units from a Riverine Flood Event ... 3-129
Figure 67 Heat Index ... 3-141
Figure 68 Relationship between Heat Index and Heat Disorders ... 3-142
Figure 69 Extreme Heat Events Reported in Logan County ... 3-146
Figure 70 Palmer Classification System ... 3-149
Figure 71 Palmer Drought Severity Index Map ... 3-150
Figure 72 U.S. Drought Monitor – Drought Severity Classifications ... 3-151
Figure 73 U.S. Drought Monitor Map ... 3-152
Figure 74 Crop Yield Reductions Due to Drought in Logan County ... 3-155
Figure 75 Fault Illustration ... 3-158
Figure 76 Earthquake Magnitude Classes ... 3-159
Figure 77 Comparison of Richter Scale and Modified Mercalli Scale ... 3-160
Figure 78 Approximate Number of Earthquakes Recorded Annually ... 3-161
Figure 79 Potential Earthquake Impacts ... 3-165
Figure 80 Dam Hazard Classification System ... 3-168
Figure 81 Privately-Owned Classified Dams Located in Logan County ... 3-169
Figure 82 Locations of Classified Dams in Logan County ... 3-170
Figure 83 Generators of Solid & Liquid Hazardous Substances – 2010 ... 3-174
Figure 84 Railroad Accident Classification Categories ... 3-175
Figure 85 Railway Accidents/Incidents Involving Hazardous Substances: 2001 – 2011 ... 3-176

LIST OF FIGURES CONTINUED…

Figure 86 HazMat Incidents in Logan County: 2007 – 2011 3-179
Figure 87 Hazard Mitigation Goals 4-1
Figure 88 Mitigation Action Categorization 4-2
Figure 89 Mitigation Action Prioritization Methodology 4-3
Figure 90 Logan County Hazard Mitigation Actions 4-5
Figure 91 Atlanta Hazard Mitigation Actions 4-23
Figure 92 Broadwell Hazard Mitigation Actions 4-25
Figure 93 Elkhart Hazard Mitigation Actions 4-26
Figure 94 Emden Hazard Mitigation Actions 4-33
Figure 95 Hartsburg Hazard Mitigation Actions 4-34
Figure 96 Lincoln Hazard Mitigation Actions 4-35
Figure 97 Logan, Mason and Menard Counties Regional Office of Education Hazard Mitigation Actions 4-38
Figure 98 Mount Pulaski Hazard Mitigation Actions 4-39
Figure 99 Mount Pulaski Rural Fire Protection District #2 (Chestnut) 4-40
Figure 100 Plan Adoption Dates 7-1

Researched and written for the Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
by Greg R. Michaud and Andrea J. Bostwick
Johnson, Depp & Quisenberry

[this page is intentionally left blank]

1.0 INTRODUCTION

1.0 INTRODUCTION

Each year natural hazards (i.e., severe thunderstorms, tornadoes, severe winter storms, flooding, etc.) cause damage to property and threaten the lives and health of the residents of Logan County. Since 1965, Logan County has had 8 federally-declared disasters. **Figure 1** identifies each declaration including the year the disaster was declared and the type of natural hazard that triggered the declaration.

Figure 1
Federal Disaster Declarations for Logan County

Declaration #	Year	Type of Natural Hazard(s) Event
242	1968	flooding, severe storms and tornadoes
373	1973	flooding and severe storms
438	1974	flooding and severe storms
871	1990	severe winds, thunderstorms, torrential rains, flooding and tornadoes
1416	2002	severe storms, excessive rainfall, flooding and tornadoes
1633	2006	severe storms and tornadoes
1681	2007	severe winter storm
1960	2011	severe winter storm

In addition, in the past decade alone, there have been 95 thunderstorms with damaging winds, 31 severe hail storms, 26 tornadoes, 20 flood and flash flood events, 20 heavy rain events, 16 severe winter storms (snow and ice), 8 lightning strike events, 5 extreme heat events, 2 droughts, 1 extreme cold event and 1 earthquake felt by residents in the County.

While natural hazards cannot be avoided, their impacts can be reduced through effective hazard mitigation planning. This prevention-related concept of emergency management often receives the least amount of attention, yet it is one of the most important steps in creating a hazard-resistant community.

What is hazard mitigation planning?

Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and man-made hazards. This process helps the County and participating jurisdictions reduce their risk from natural and man-made hazards by identifying vulnerabilities and developing mitigation actions to lessen and sometimes even eliminate the effects of a hazard. The results of this process are documented in an all hazards mitigation plan.

Why prepare an all hazards mitigation plan?

By preparing and adopting an all hazards mitigation plan, participating jurisdictions become eligible to apply for and receive federal hazard mitigation funds to implement mitigation actions identified in the plan. These funds can help provide local government entities with the opportunity to complete mitigation projects that would not otherwise be financially possible.

The federal hazard mitigation funds are made available through the Disaster Mitigation Act of 2000, an amendment to the Robert T. Stafford Disaster Relief and Emergency Assistance Act, which provides federal aid for mitigation projects, but only if the local government entity has a Federal Emergency Management Agency-approved hazard mitigation plan.

How is this plan different from other emergency plans?

An all hazards mitigation plan is aimed at identifying projects and activities that can be conducted prior to a natural or man-made disaster, unlike other emergency plans which provide direction on how to respond to a disaster after it occurs. This is the first time that Logan County has prepared a plan that describes actions that can be taken to help reduce or eliminate damages caused by specific types of natural and man-made hazards.

1.1 PARTICIPATING JURISDICTIONS

Recognizing the benefits that could be gained from preparing an all hazards mitigation plan, the Logan County Board passed a resolution on March 17, 2009 authorizing the development of the Logan County Multi-Jurisdictional All Hazards Mitigation Plan (hereto referred to as the Plan). **Appendix A** contains a copy of the resolution. The County then invited all the local government entities within Logan County to participate. **Figure 2** identifies the participating jurisdictions that are represented in the Plan. The Logan County Emergency Management Agency administered the Plan.

Figure 2
Participating Jurisdictions Represented in the Plan

- Atlanta, City of
- Broadwell, Village of
- Elkhart, Village of
- Emden, Village of
- Hartsburg, Village of
- Lincoln, City of
- Logan, Mason and Menard Counties Regional Office of Education
- Mount Pulaski, City of
- Mount Pulaski Rural Fire Protection District #2 (Chestnut)

1.2 DEMOGRAPHICS

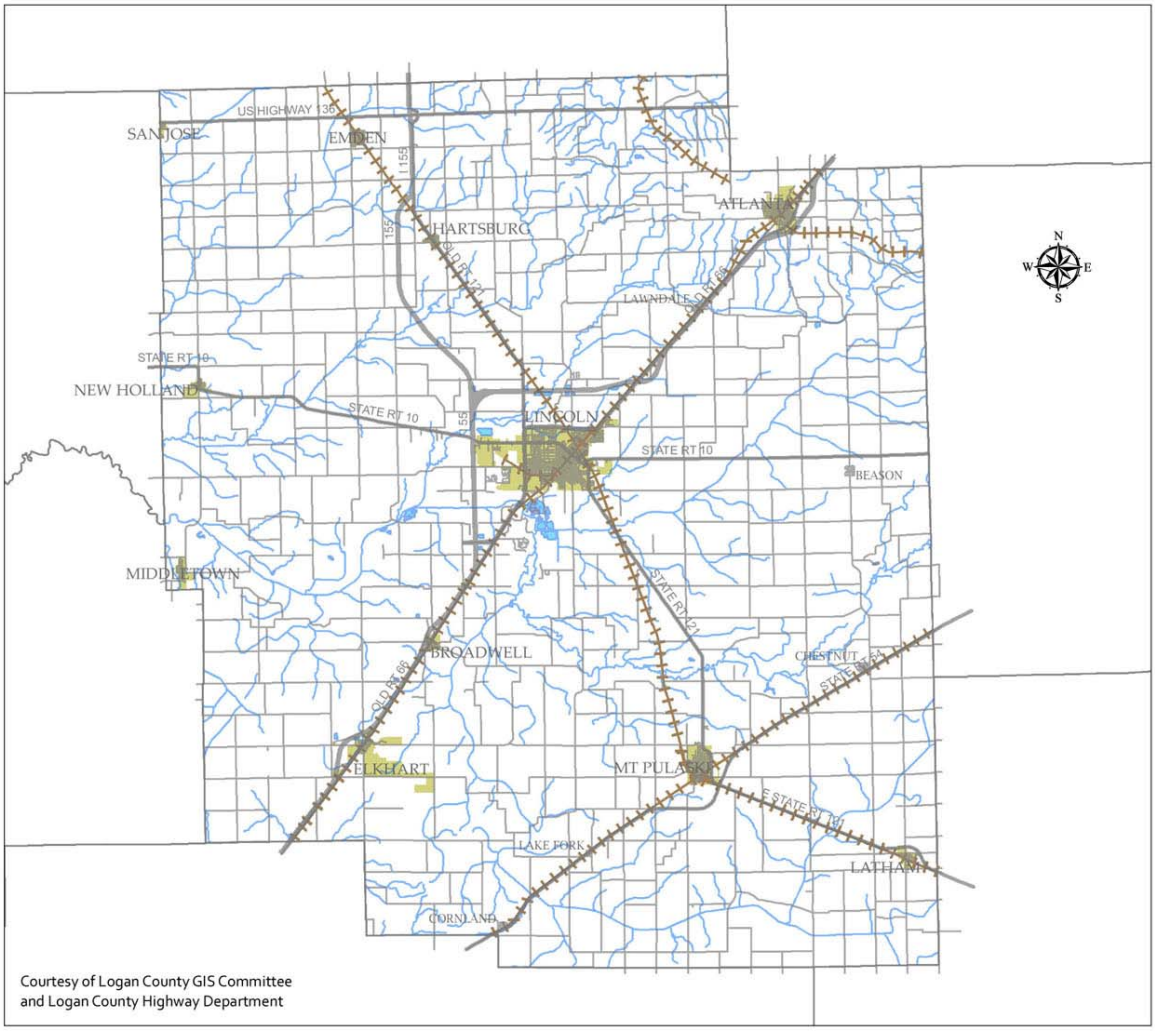
Logan County is located in central Illinois and covers approximately 619 square miles. **Figure 3** provides a location map of Logan County and the participating municipalities. The topography of the County is generally flat to gently sloping with the exception of several morainal remnants formed from glacial melting that resulted in a series of small knolls, hills and ridges at Elkhart and Mount Pulaski.

The County is bounded to the north by Tazewell and McLean Counties, to the south by Sangamon County, to the east by De Witt and Macon Counties and to the west by Menard and Mason Counties. The county seat is located in Lincoln.

Agriculture and agribusiness are the major industries in the County. According to the 2007 Census of Agriculture, there were 710 farms in Logan County occupying approximately 81%

(320,356 acres) of the total land acreage in the County. The major crops include corn and soybeans while the major livestock includes hogs, cattle and sheep. The County ranks 19th in the State for corn production and 25th for soybeans. In terms of livestock, the County ranks 16th in the State for hogs and pigs inventory and 22nd for sheep and lambs inventory. Logan County ranks in the top 20 Illinois counties for crop cash receipts and in the top 40 for livestock cash receipts.

Figure 3
Location Map



In terms of agribusiness, Logan County is home to four seed corn companies as well as several firms that produce animal feeds and process fertilizers. While agriculture is the major industry, a large number of farms in the county rely on income that is generated from jobs way from the farm. Many of the farmers and their spouses are employed outside the agricultural industry.

The largest industrial employer in Logan County produces circuit breaker panels and related devices. Other major industries in the County produce cardboard packaging, glass containers, store fixtures and lawn and garden equipment. The County is also home to the International Coal Group's Viper Mine preparation plant, just south of Elkhart and several gravel and limestone quarries near Lincoln. Other important industries located in the County include education, healthcare and corrections.

Figure 4 provides demographic data on the County and each of the participating municipalities along with information on housing units and assessed values. The assessed values are for all residential structures and associated buildings (including farm homes and buildings associated with the main residence.) The assessed value of a residence in Logan County is approximately one-third of the market value.

Figure 4
Demographic Data by Participating Jurisdiction

Participating Jurisdiction	Population (2010)	Projected Population (2030)	Land Area (Sq. Miles) (2010)	Number of Housing Units (2010)	Housing Unit Density (Units/Sq. Mile) (Rounded Up)	Total Assessed Value of Housing Units (2011)
Logan County (unincorporated)	11,194	12,084	607.256	3,558	6	$75,778,000
Atlanta	1,692	1,827	1.264	762	603	$20,738,900
Broadwell	145	157	0.181	78	---	$1,157,730
Elkhart	405	437	1.453	198	137	$6,050,340
Emden	485	524	0.234	230	---	$5,860,290
Hartsburg	314	339	0.138	140	---	$2,977,510
Lincoln	14,504	15,657	6.401	6,411	1,002	$126,779,860
Mount Pulaski	1,566	1,691	1.132	730	645	$17,582,580

Sources: Brosamer, Rosanne, Logan County Supervisor of Assessment.
Illinois Department of Commerce and Economic Opportunity, Census 2010 Data.
U. S. Census Bureau, 2010 Census U.S. Gazetteer Files.
U.S. Census Bureau, American FactFinder.

1.3 LAND USE AND DEVELOPMENT TRENDS

Population growth and economic development are two major factors that trigger changes in land use. Logan County is largely rural with a population that experienced a decrease of 2.8% between 2000 and 2010. Since 1960, the County's population has experienced modest decreases, except between 1990 and 2000 when the population increased by 1.3%. All of the participating municipalities except Atlanta experienced declines in their populations since 2000, with some experiencing sharp declines. Atlanta experienced a modest increase of 2.6% in its population between 2000 and 2010.

Land use in Logan County is primarily agricultural. As discussed in the previous section, approximately 81% of the land within the County is used as farmland. Agriculture is and will continue to be a major employment sector within the County for residents and a vital part of the County's economy.

There are no large-scale economic development initiatives underway in the County. Substantial changes in land use (from forested and agricultural land to residential, commercial and industrial) are not anticipated within the County in the immediate future. No sizeable increases in residential or commercial/industrial developments are expected within the next five years.

2.0 PLANNING PROCESS

2.0 PLANNING PROCESS

The Logan County Multi-Jurisdictional All Hazards Mitigation Plan (the Plan) was developed through the Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee (Planning Committee). The Plan was prepared to comply with the Disaster Mitigation Act of 2000 and incorporates the Federal Emergency Management Agency's (FEMA) planning process approach. **Figure 5** provides a brief description of the process utilized to prepare this Plan.

Figure 5
Description of Planning Process

Tasks	Description
Task One: Organize	The Planning Committee was formed with broad representation and specific expertise to assist the County and the Consultant in preparing the Plan.
Task Two: Public Involvement	Early and ongoing public involvement activities were conducted throughout the Plan's development to ensure the public was given every opportunity to participate and provide input.
Task Three: Coordination	Agencies and organizations were contacted to identify plans and activities currently being implemented that impact or might potentially impact hazard mitigation activities.
Task Four: Risk Assessment	The Consultant identified and profiled the natural hazards that have impacted the County and conducted a vulnerability assessment to evaluate the risk to each participating jurisdiction. In addition, the top five man-made hazards identified by the Committee were profiled.
Task Five: Goal Setting	After reviewing existing plans and completing the risk assessment, the Consultant assisted the Planning Committee in establishing goals and objectives for the Plan.
Task Six: Mitigation Activities	The participating jurisdictions were asked to identify mitigation actions based on the results of the risk assessment. These actions were then analyzed, categorized and prioritized.
Task Seven: Draft Plan	The draft Plan summarized the results of Tasks One through Six. In addition, a section was added that describes the responsibilities to monitor, evaluate and update the Plan. The draft Plan was reviewed by the participants and a public forum was held to give the public an additional opportunity to provide input. Comments received were incorporated into the draft Plan submitted to the Illinois Emergency Management Agency (IEMA) and FEMA for review and approval.
Task Eight: Final Plan	Comments received from IEMA and FEMA were incorporated in to the final Plan. The final Plan was then submitted to the County and participating jurisdictions for adoption. The Plan will be reviewed periodically and updated every five years.

Plan development was led at the staff level by Terry Storer, Deputy Director of the Logan County Emergency Management Agency. Johnson, Depp & Quisenberry, an environmental and engineering consulting firm, with experience in hazard mitigation, risk assessment and public involvement, was employed to guide the County and participating jurisdictions through the planning process.

Participation in the planning process, especially by the County and local government representatives, was crucial to the development of the Plan. To ensure that all participating jurisdictions took part in the planning process, participation requirements were established. Each participating jurisdiction agreed to satisfy the following requirements in order to be included in the Plan. All of the participating jurisdictions met the participation requirements.

- Attend at least two Planning Committee meetings.
- Submit a list of documents (i.e., plans, studies, reports, maps, etc.) relevant to the all hazard mitigation planning process.
- Identify and submit a list of critical infrastructure and facilities.
- Review the risk assessment and provide information on additional events and damages.
- Participate in the development of mitigation goals.
- Submit a list of mitigation actions.
- Review and comment on the draft Plan.
- Formally adopt the Plan.
- Where applicable, incorporate the Plan into existing planning efforts.
- Participate in the Plan maintenance.

2.1 PLANNING COMMITTEE

As previously mentioned, at the start of the planning process, the Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee was formed. The Planning Committee included representatives from each participating jurisdiction, as well as agriculture, education, emergency services (Red Cross, fire and law enforcement), healthcare, GIS and insurance.



Figure 6 details the entities represented on the Planning Committee and the individuals who attended on their behalf. The Planning Committee was chaired by the Logan County Emergency Management Agency (EMA).

Additional technical expertise was provided by the staff at the Illinois Emergency Management Agency Hazard Mitigation Unit, the Illinois Department of Natural Resources Office of Water Resources, the Illinois Environmental Protection Agency, the Illinois State Water Survey, the Illinois State Geological Survey, and the University of Illinois.

Mission Statement

Over the course of the first two meetings, the Planning Committee developed a mission statement they felt best described their objectives for the Plan.

"The mission of the Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee is to develop a mitigation plan that can reduce the negative impacts of natural and man-made hazards on citizens, infrastructure, private property and critical facilities."

Figure 6
Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member Attendance Record

Representing	Name	8/9/2012	11/1/2012	1/17/2013	6/13/2013	10/17/2013
Abraham Lincoln Memorial Hospital	Kline, Barb		X	X	X	X
Abraham Lincoln Memorial Hospital	Schmidt, Alyson					X
American Red Cross	Eden, Amy			X		
American Red Cross	Wright, Kaleena	X	X			
Atlanta, City of	Finchum, Fred	X		X	X	X
Atlanta, City of	Harrison, Mike	X			X	X
Broadwell, Village of	Kennett, William	X	X	X	X	X
Country Financial	Ryan, Joe	X	X	X		
Elkhart, Village of	Lee, Peggy	X	X	X		
Elkhart, Village of	Overmyer, Tom					X
Emden, Village of	Collier, Arnold			X	X	X
Emden, Village of	Rademaker, Ivan	X	X	X		
Hartsburg, Village of	Anderson, Tom	X	X	X		
Hartsburg, Village of	Leesman, Dean				X	X
Illinois Central Management Services	Hoots, Diane	X	X	X	X	
Johnson, Depp & Quisenberry	Bostwick, Andrea	X	X	X	X	X
Johnson, Depp & Quisenberry	Michaud, Greg	X	X	X	X	X
Lincoln, City of	Martinek, Vic					X
Lincoln, City of	Miller, Mark	X		X	X	X
Lincoln Daily News	Hurley, Derek			X		
Lincoln Daily News	Youngquist, Jan					X
Logan Co. - Board	Aylesworth, Rick			X		
Logan Co. - Board	Carlton, Terry					X
Logan Co. - Board	Rohlfs, Gene			X	X	X
Logan Co. - Clerk & Recorder	Litterly, Sally	X	X	X	X	
Logan Co. - Dept. of Public Health	Altman, Shana	X	X	X	X	X
Logan Co. - EMA	Fulscher, Dan	X	X		X	X
Logan Co. - EMA/911	Hedrick, Cheryl	X	X	X	X	X
Logan Co. - EMA/911	Sorrentino, Alana	X	X	X		X
Logan Co. - EMA	Storer, Terry	X	X	X	X	X
Logan Co. - EMA	Washam, Bucky	X		X	X	X
Logan Co. - Farm Bureau	Drew, James	X		X		X
Logan Co. - Highway Deptment	Aukamp, Bret	X		X	X	X
Logan Co. - Sheriff's Office	Bunner, John			X	X	X
Logan Co. - Supervisor of Assessments	Brosamer, Rosanne	X	X	X		X
Logan Co. - Supervisor of Assessments	Schaffenacker, Ed				X	
Logan Co. - Zoning & GIS	D'Andrea, Will	X		X	X	
Logan, Mason & Menard Counties Regional Office of Education	Anderson, Jean				X	
Logan County Herald	Blair, Marla			X		
Mount Pulaski, City of	Patridge, Mike		X	X		
Mount Pulaski Rural Fire Protection District #2	Goff, Reynold			X	X	X
Public Representative	Frizzell, Anita		X		X	
Public Representative	Rodgers, Kirby	X	X			X

Planning Committee Meetings

The Planning Committee met five times between August, 2012 and October, 2013. **Figure 6** identifies the representatives present at each meeting. **Appendices B** and **C** contain copies of the attendance sheets and meeting minutes for each meeting. The purpose of each meeting, including the topics discussed, is provided below.

First Planning Committee Meeting – August 9, 2012

The purpose of this meeting was to explain the planning process to the Planning Committee members and give them a brief overview on what an all hazard mitigation plan is and why one should be prepared. Drafts of the mission statement and mitigation goals were presented. Representatives for the County and the participating jurisdictions were asked to complete the forms entitled "List of Existing Planning Documents" and "Critical Facilities" and return them at the next meeting. Copies of a hazard events questionnaire and citizen questionnaire were also distributed.

Second Planning Committee Meeting – November 1, 2012

At the second Planning Committee meeting the natural and man-made hazard risk assessment sections were presented for review. Committee members were asked to think about whether any critical facilities have been damaged by a natural hazard event within their jurisdiction. The Planning Committee continued their discussions on the mission statement and mitigation goals and finalized both. Ideas for potential mitigation projects were presented. Representatives for the County and the participating jurisdictions were asked to complete the forms entitled "Critical Facilities Damaged by Natural Hazard Events" and "Hazard Mitigation Projects" and return them at the next meeting.



Third Planning Committee Meeting – January 17, 2013

The purpose of the third Planning Committee meeting was to review the mitigation actions identified by the participating jurisdictions and discuss the mitigation strategy. The mitigation strategy discussion focused on the project prioritization methodology and categories of mitigation actions. Sections of the Plan focusing on the vulnerability assessment were presented for review.

Fourth Planning Committee Meeting – June 13, 2013

At the fourth meeting the sections of the Plan focusing on the mitigation strategy and plan maintenance were presented for review. In addition, the mitigation action tables were completed for each participating jurisdiction and distributed for review. The tables listed all of the mitigations actions identified and prioritized them using the approved project prioritization methodology.

Fifth Planning Committee Meeting – October 17, 2013
The purpose of the fifth Planning Committee meeting was to provide the public an opportunity to provide comments on the draft Plan.

2.2 PUBLIC INVOLVEMENT

To engage the public in the planning process, a comprehensive public involvement strategy was developed. The strategy was structured to engage the public in a two-way dialogue, encouraging the exchange of information throughout the planning process. A mix of public involvement techniques and practices were utilized to:

- disseminate information;
- identify additional useful information about natural hazard occurrences and impacts;
- assure that interested residents would be involved throughout the Plan's development; and
- nurture ownership of the Plan, thus increasing the likelihood of adoption by the participating jurisdictions.

The dialogue with the public followed proven risk communication principles to help assure clarity and avoid overstating or understating the impacts posed by the natural and man-made hazards identified in the Plan. The following public involvement techniques and practices were applied to give the public an opportunity to access information and participate in the dialogue at their level of interest and availability.

Citizen Questionnaire
A citizen questionnaire was created to gather facts and gauge public perceptions about natural hazards. The questionnaire was made available at the offices of participating municipalities, included in the September 2012 edition of *The Elkhart Echo* newsletter distributed to Elkhart residents and at an information kiosk located at the Logan County Courthouse. A copy of the questionnaire is contained in **Appendix D**.

A total of 24 questionnaires were completed and returned to the Planning Committee. The questionnaires were filled out by residents of unincorporated Logan County as well as most of the participating municipalities. While fewer questionnaires were returned than has been experienced using similar techniques with virtually the same survey in other counties, the responses should provide useful information to decision makers as they deliberate how best to disseminate information about natural hazards and how residents can protect themselves and their property.

Additionally, these results provide an indication of countywide sentiment as to the types of projects that are most likely to receive public support. A review of the questionnaires revealed the following:

- Severe storms (thunderstorms, hail, lightning and heavy rain), tornadoes and severe winter storms have been the most frequently encountered natural hazards in Logan County. This response is consistent with the weather records compile for the County and as described in this Plan.

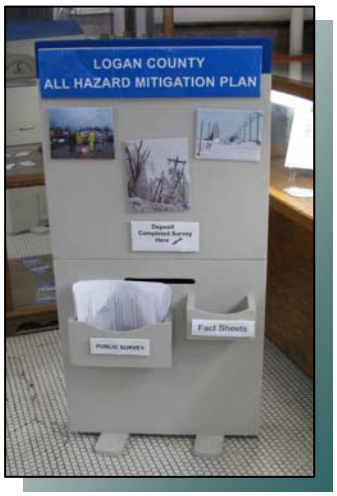
- Electronic media (internet and television) and mailings were identified as the most effective means of disseminating information about natural hazards. Of the electronic media choices, the internet was recognized as the most favored means of dissemination followed closely by television. Newspapers and fact sheets distributed via municipalities, the County and fire and law enforcement departments also received strong support among respondents.
- Five categories of mitigation projects and activities were felt to be most needed. The following identifies each category and provides the percentage of support received:
  - maintain power during storms by burying power lines, trimming trees and/or purchasing backup generators (73%);
  - maintain roadway passages during snow storms and heavy rains (73%);
  - provide sufficient water supplies during droughts (59%);
  - install sirens or other alert systems (50%); and
  - retrofit critical infrastructure (public water supplies, schools, sewage treatment facilities, bridges, hospitals and other important services) to reduce potential damages (46%).

FAQ Fact Sheet

A "Frequently Asked Questions" fact sheet was created to explain what an all hazard mitigation plan is and briefly explain the planning process. The fact sheet was made available at the government offices of participating jurisdictions. A copy of the fact sheet is contained in **Appendix E**.

Newsletter

As part of the public outreach, Margaret Lee, the Planning Committee member for Elkhart, was able to include the citizen questionnaire and FAQ fact sheet in the September 2012 edition of *The Elkhart Echo*, the Village newsletter distributed to all residents. A request was also made for residents to provide storm stories and photographs. A copy of the newsletter is contained in **Appendix F**.



Information Kiosk

An information kiosk was placed in the Logan County Courthouse to dispense the FAQ fact sheet and citizen questionnaire and serve as a depository for the public to submit comments, questions and completed questionnaires. The kiosk remained in the Courthouse throughout the planning process.

News Media

News releases were prepared and submitted to local print media prior to each Planning Committee meeting. The releases announced the purpose of the meetings and how the public could become involved in the Plan's development. **Appendix G** contains a list of the print media that received the new releases and copies of the news articles that were printed.

In addition to print media, electronic media coverage included television. WICS Channel 20, the local ABC affiliate, interviewed Dan Fulscher, Logan County EMA Director, Terry Storer, Logan County EMA Deputy Director and Planning Committee Chairman and Bret Aukamp, Logan County Highway Engineer for their nightly news broadcast prior to the October 17, 2013 public forum. **Appendix G** contains an abbreviated copy of the story that was aired.

Planning Committee Meetings

All of the meetings conducted by the Planning Committee were open to the public and publicized in advance to encourage public participation. At the end of each meeting, time was set aside for public comment. In addition, Committee members were available throughout the planning process to talk with residents and local government officials and were responsible for relaying any concerns and questions voiced by the public to the Planning Committee.

Public Forum

The final meeting of the Planning Committee, held on October 17, 2013, was conducted as an open-house public forum. The open-house format was chosen for this forum instead of a hearing to provide greater convenience for residents who wished to participate. Residents were able to come and go at any time during the forum, reducing conflicts with business, family, and social activities.

At the forum, residents could review the draft Plan; meet with representatives from the County, the participating local government entities and the Consultant to discuss the Plan; ask any questions; and provide comments on the Plan. Individuals attending the public forum were provided with a two-page handout summarizing the planning process and a comment sheet that could be used to provide feedback on the draft Plan. **Appendices H** and **I** contain copies of these materials.

Public Comment Period

After the public forum, the draft Plan was made available for public review and comment through October 31, 2013 at the Logan County EMA Office. Residents were encouraged to submit their comments electronically, by mail or through representatives of the Planning Committee.

Results of Public Involvement

The public involvement strategy implemented during the planning process created a dialogue among participants and interested residents which resulted in many benefits, a few of which are highlighted below.

- *Discovered previously unidentified documentation about natural hazards*. Verifiable hazard event and damage information was obtained from participants that presents a clearer assessment of the extent and magnitude of natural hazards that have impacted the County. This information included damage estimates for thunderstorms with damaging winds, hail, lightning strikes and severe winter storms.
- *Obtained critical facilities damage information*. Data collection surveys soliciting information about critical facilities damaged by severe storms and other natural hazards were used to supplement information obtained from government databases. This information was used in the preparation of the vulnerability assessment.

- *Increased awareness of the impacts associated with natural hazard events within the County*. Understanding how mitigation actions can reduce risk to life and property helped generate 170 potential mitigation projects and activities at the local level that had not been identified in any other planning process.

2.3 PARTICIPATION OPPORTUNITIES FOR INTERESTED PARTIES

Businesses, schools, not-for-profit organizations, neighboring counties, and other interested parties were provided multiple opportunities to participate in the planning process. Wide-reaching applications were combined with direct, person-to-person contacts to reach anyone who might have an interest or possess information which could be helpful in developing the Plan.

Business Community

Assertive outreach to the business community began early in the planning process. On July 16, 2012, Dan Fulscher and Terry Storer of the Logan County EMA gave a presentation to the Logan County Economic Development Commission on the development of the Plan and how the business community could participate in the planning process. An invitation was issued to the Commission to become a member of the Planning Committee.

Business outreach continued through contacts with the Lincoln & Logan County Chamber of Commerce. These contacts clearly described the value of mitigation planning for various kinds of business based on this message: "maintaining business operations after a natural hazard event strikes begins before the hazard hits with mitigation planning." How customers and employees are impacted can make the difference between staying in business and closing.

An Information packet was sent to the Chamber of Commerce and included a letter from Terry Store, Logan County EMA Deputy Director, a fact sheet describing the ease and various opportunities for businesses to have input, and an American Red Cross brochure designed specifically for businesses describing how employees, customers and the business facility can be protected from natural hazard events. **Appendix J** contains copies of these materials.

Representatives from those segments of the business community who had the most interest in natural hazard mitigation were invited to serve on the Planning Committee. Agriculture is the dominant business in Logan County. Virtually every aspect of life in the County is affected by agriculture. Consequently, input was sought from the agricultural community which responded positively to being involved.

Input from the insurance industry was also needed to provide balance and context for discussions on property damages, not only to agriculture, but also to residences. An experienced and well respected local insurance agent represented the insurance industry and his perspectives on storm damages were useful in the development of the Plan.

Schools

Jean Anderson, the Regional Superintendent of Schools for Logan, Mason and Menard Counties served on the Planning Committee. She coordinated with the school districts in the County and worked with them in considering what types of mitigation projects and activities would be most beneficial for each district.

Not-For-Profit Organizations
Representatives from the Illinois Capital Area Chapter of the American Red Cross served on the Planning Committee. The Volunteer Coordinator and the Emergency Services Manager both participated in the planning process and provided their input on the Plan.

The Director of Risk Management and Safety at Abraham Lincoln Memorial Hospital also served on the Planning Committee and provided input on the Plan. As the only hospital located in Logan County, Abraham Lincoln Memorial Hospital recognizes the importance of risk management and has a unit that is responsible for evaluating health and safety risks to the hospital, employees, patients and the community as a whole.

Emergency Responders
On January 14, 2013, Terry Storer, Deputy Director Logan County EMA, gave a presentation at the Logan County Fire Chiefs & Trustees Annual Meeting on the development of the Plan and how the fire departments could participate in the planning process. As a result of this presentation, the Mount Pulaski Rural Fire Protection District # 2 (Chestnut) joined the Planning Committee and participated in the development of mitigation projects needed for this unincorporated area of the County.

Neighboring Counties
An announcement was sent to EMA/ESDA offices in all of the neighboring counties inviting participation in the mitigation planning process. **Appendix K** contains a copy of the invitation memo.

2.4 INCORPORATING EXISTING PLANNING DOCUMENTS

As part of the planning process, each participating jurisdiction was asked to identify and provide existing documents (plans, studies, reports and technical information) relevant to the Plan. **Figure 7** summarizes the availability of existing planning documents by participating jurisdiction. These documents were reviewed and incorporated into the Plan whenever applicable.

Figure 7
Existing Planning Documents by Participating Jurisdiction

Existing Planning Documents	Participating Jurisdiction							
	Logan County	Atlanta	Broadwell	Elkhart	Emden	Hartsburg	Lincoln	Mount Pulaski
Plans								
Comprehensive Plan	X	X		X			X	X
Emergency Management Plan	X	X	X	X				
Land Use Plan	X	X		X		X	X	X
Codes & Ordinances								
Building Codes		X	X	X	X		X	X
Drainage Ordinances		X	X	X			X	X
Historic Preservation Ordinance		X						
Subdivision Ordinance(s)		X		X			X	X
Zoning Ordinances	X	X	X	X	X	X	X	X
Maps								
Existing Land Use Map	X	X	X	X		X	X	X
Infrastructure Map			X	X	X		X	X
Zoning Map	X	X	X	X	X	X	X	X
Flood-Related								
Flood Ordinance(s)	X	X	X	X			X	X
Flood Insurance Rate Maps	X	X	X	X			X	X
Repetitive Flood Loss List								
Elevation Certificates for Buildings								

[this page is intentionally left blank]

3.0 RISK ASSESSMENT

3.0 RISK ASSESSMENT

Risk assessment is the process of evaluating the vulnerability of people, buildings and infrastructure to natural and man-made hazards in order to estimate the potential loss of life, personal injury, economic injury and property damage resulting from natural and man-made hazards. This section summarizes the results of the risk assessment conducted on the natural and man-made hazards that pose a threat to Logan County. The information contained in this section was gathered by evaluating local, state and federal records from the last 60 years.

This risk assessment identifies the natural and man-made hazards that pose a threat to the County and includes a profile of each which identifies past occurrences, the severity or extent of the hazard, and the likelihood of future occurrences. It also provides a vulnerability assessment which identifies the impacts to public health and property, evaluates the assets of the participating jurisdictions (i.e., residential buildings, critical facilities and infrastructure) and estimates the potential impacts each natural and man-made hazard would have on the health and safety of the residents as well as the buildings, critical facilities and infrastructure located within the County. Where applicable, the differences in vulnerability between participating jurisdictions are described.

One of the responsibilities of the Planning Committee was to decide which natural and man-made hazards to include in the Plan. Over the course of the first two Planning Committee meetings, the Planning Committee members discussed their experiences with natural and man-made hazard events and reviewed information about various natural and man-made hazards. After much discussion, they chose to include the following natural and man-made hazards in this Plan:

- severe storms (thunderstorms, hail, lighting & heavy rain)
- tornadoes
- severe winter storms (snow, ice & extreme cold)
- floods
- extreme heat
- drought
- earthquakes
- dams
- man-made hazards including:
  - hazardous substances (generation & transportation)
  - waste disposal
  - hazardous materials incidents
  - waste remediation
  - terrorism

The subsequent sections provide detailed information on each of the selected natural hazards. The sections are color coded and ordered by the frequency with which the natural hazard has previously occurred within the County, starting with severe storms. Each natural hazard section contains three subsections: identifying the hazard, profiling the hazard and assessing vulnerability.

3.1 SEVERE STORMS (THUNDERSTORMS, HAIL, LIGHTNING & HEAVY RAIN)

IDENTIFYING THE HAZARD

What is the definition of a severe storm?

The National Oceanic and Atmospheric Administration's National Weather Service (NWS) defines a "severe storm" as any thunderstorm that produces one or more of the following:

- winds with gust of 50 knots (58 mph) or greater;
- hail that is at least one inch in diameter (quarter size) or larger; and/or
- a tornado.

While severe storms are capable of producing deadly lightning and excessive rainfall that may lead to flash flooding, the NWS does not use either to define a severe storm. However, a discussion of both lightning and heavy rain is included in this section because they both capable of causing extensive damage. For the purposes of this report, tornadoes and flooding are categorized as separate hazards and are not discussed under severe storms.

What is a thunderstorm?

A thunderstorm is a rain shower accompanied by lightning and thunder. An average thunderstorm is approximately 15 miles in diameter, affecting a relatively small area when compared to winter storms or hurricanes, and lasts an average of 30 minutes. Thunderstorms can bring heavy rain, damaging winds, hail, lightning and tornadoes.

There are four different types of thunderstorms: single cell storm, multicell cluster storm, multicell line storm (squall line) and supercell storm. The following provides a brief description of each.

Single Cell Storms

Single cell storms last 20-30 minutes and are not usually considered severe. A true single cell storm is actually quite rare because the leading edge of rain-cooled air (gust front) of one cell triggers the growth of another. Occasionally a single cell storm will become severe, but only briefly. When this happens, it is called a pulse severe storm. Pulse severe storms have the potential to produce small hail, brief damaging winds, heavy rainfall and weak tornadoes.

Multicell Cluster Storms

Multicell cluster storms are the most common type of thunderstorm. A multicell cluster storm consists of a group of cells, moving along as on unit. Each cell usually lasts about 20 minutes while the cluster itself may persist for several hours. This type of storm is usually more intense than a single cell storm, but is much weaker than a supercell storm. Multicell cluster storms can produce moderate size hail, flash floods and weak tornadoes.

Multicell Line Storms (Squall Line)

Multicell line storms, or squall lines, consist of a long line of storms with a continuous well-developed gust front. The line of storms can be solid or there can be gaps and breaks in the line. Multicell line storms are best known for producing strong damaging winds in the form of

downdrafts, but can also produce hail up to 1 ¾ inch in diameter, heavy rainfall, and weak tornadoes.

Supercell Storm

Supercell storms are highly organized thunderstorms that have one main current of rising air (updraft) which is extremely strong, reaching estimated speeds of 150 to 175 miles per hour. The main characteristic that sets a supercell storm apart from other thunderstorm types is the presence of rotation in the updraft. The rotating updraft of a supercell (called a mesocyclone when visible on radar) helps a supercell storm produce extreme weather events, such as giant hail (more than 2 inches in diameter) strong damaging winds in the form of downbursts (with speeds of 80 miles an hour or more) and strong to violent tornadoes. While supercell storms are rare, they pose a high threat to life and property.

Despite their size, all thunderstorms are dangerous and capable of threatening life and property. Of the estimated 100,000 thunderstorms that occur each year in the United States, roughly 10% are classified as severe.

What kinds of damaging winds are produced by a thunderstorm?

Aside from tornadoes, thunderstorms can produce straight-line winds. A straight-line wind is defined as any wind produced by a thunderstorm that is not associated with rotation. There are several types of straight-line winds including downdrafts, downbursts, microbursts, gust fronts, derechos and bow echoes.

Damage from straight-line winds is more common than damage from tornadoes and accounts for most thunderstorm wind damage. Straight-line wind speeds can exceed 87 knots (100 mph), produce a damage pathway extending for hundreds of miles and can cause damage equivalent to a strong tornado. These winds can also be extremely dangerous for aircrafts.

The NWS measures a storm's wind speed in knots or nautical miles. A wind speed of one knot is equal to approximately 1.15 miles per hour. **Figure 8** shows conversions from knots to miles per hour for various wind speeds.

Figure 8
Wind Speed Conversions

Knots (kts)	Miles Per Hour (mph)	Knots (kts)	Miles Per Hour (mph)
50 kts	58 mph	60 kts	69 mph
52 kts	60 mph	65 kts	75 mph
55 kts	63 mph	70 kts	81 mph
58 kts	67 mph	80 kts	92 mph

What is hail?

Hail is precipitation in the form of spherical or irregular-shaped pellets of ice that occur within a thunderstorm when strong rising currents of air (updrafts) carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. There are two ideas about how hail is formed. In the past, the prevailing thought was that hailstones grew by colliding with supercooled water drops. The supercooled water drops would freeze on contact with ice crystals,

frozen rain drops, dust, etc. Thunderstorms with strong updrafts would continue lifting the hailstones to the top of the cloud where it would encounter more supercooled water and continue to grow. Eventually the hail would become too heavy to be supported by the updraft and would fall to the ground.

Recent studies, however, suggest that supercooled water may accumulate on frozen particles near the back side of the storm as the particles are pushed forward, across and above the updrafts by the prevailing winds near the top of the storm. Eventually the hailstones encounter rapidly sinking columns of air (downdrafts) and fall to the ground.

In the United States, hail annually causes more than $1 billion in damages. Much of the damage done by hail is to crops, although it can damage buildings and homes as well as automobiles and landscaping. Hail has been know to cause injuries to individuals, but is very rarely fatal.

How is the severity of a hail event measured?

The severity or magnitude of a hail event is measured in terms of the size (diameter) of the hailstones. The hail size is estimated by comparing it to known objects. **Figure 9** provides descriptions for various hail sizes.

Figure 9
Hail Size Descriptions

Hail Diameter (inches)	Description	Hail Diameter (inches)	Description
0.25 in.	pea	1.75 in.	golf ball
0.50 in.	marble	2.50 in.	tennis ball
0.75 in.	penny	2.75 in.	baseball
0.88 in.	nickel	3.00 in.	tea cup
1.00 in.	quarter	4.00 in.	grapefruit
1.50 in.	ping pong ball	4.50 in.	softball

Source: NOAA, National Severe Storm Laboratory.

Hail size can vary widely. Hailstones may be as small as 0.25 inches in diameter (pea-sized) or, under extreme circumstances, as large as 4.50 inches in diameter (softball-sized). Typically hail that is 1 inch in diameter (quarter-sized) or larger is considered severe.

The severity of a hail event can also be measured or rated using the TORRO Hailstorm Intensity Scale. This scale was developed in 1986 by the Tornado and Storm Research Organisation of the United Kingdom. It measures the intensity or damage potential of a hail event based on several factors including: maximum hailstone size, distribution, shape and texture, numbers, fall speed and strength of the accompanying winds.

The Hailstorm Intensity Scale identifies ten different categories of hail intensity, H0 through H10. **Figure 10** gives a brief description of each category. This scale is unique because it recognizes that, while the maximum hailstone size is the most important parameter relating to structural damage, size alone is insufficient to accurately categorize the intensity and damage potential of a hail event.

Figure 10
TORRO Hailstorm Intensity Scale

Intensity Category		Typical Hail Diameter		Description	Typical Damage Impacts
		millimeters (approx.)*	inches (approx.)*		
H0	Hard Hail	5 mm	0.2"	pea	no damage
H1	Potentially Damaging	5-15 mm	0.2" – 0.6"	pea / marble	slight general damage to plants, crops
H2	Significant	10-20 mm	0.4" – 0.8"	dime / penny	significant damage to fruit, crops, vegetation
H3	Severe	20-30 mm	0.8" – 1.2"	nickel / quarter	severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40 mm	1.0" – 1.6"	half dollar / ping pong ball	widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50 mm	1.2" – 2.0"	golf ball	wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60 mm	1.6" – 2.4"	golf ball / egg	bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75 mm	2.0" – 3.0"	egg / tennis ball	severe roof damage, risk of serious injuries
H8	Destructive	60-90 mm	2.4" – 3.5"	tennis ball / tea cup	severe damage to aircraft bodywork
H9	Super Hailstorms	75-100 mm	3.0" – 4.0"	tea cup / grapefruit	extensive structural damage, risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	> 100 mm	> 4.0"	softball	extensive structural damage, risk of severe or even fatal injuries to persons caught in the open

* Approximate range since other factors (i.e., number and density of hailstones, hail fall speed and surface wind speed) affect severity.

Source: Tornado and Storm Research Organisation, TORRO Hailstorm Intensity Scale Table.

It should be noted that the typical damage impacts associated with each intensity category reflect the building materials predominately used in the United Kingdom. These descriptions may need to be modified for use in other countries to take into account the differences in building materials typically used (i.e., whether roofing materials are predominately shingle, slate or concrete, etc.).

What is lightning?

Lightning, a component of all thunderstorms, is a visible electrical discharge that results from the buildup of charged particles within storm clouds. It can occur from cloud-to-ground, cloud-to-cloud, within a cloud or cloud-to-air. The air near a lightning strike is heated to approximately 50,000°F (hotter than the surface of the sun). The rapid heating and cooling of the air near the lightning strike causes a shock wave that produces thunder.

Lightning on average causes 60 fatalities and 300 injuries annually in the United States. Most fatalities and injuries occur when people are caught outdoors in the summer months. In addition, lightning can cause structure and forest fires. Many of the wildfires in the western United States and Alaska are started by lightning. While it is difficult to quantify lightning-related losses, the

National Oceanic and Atmospheric Administration's (NOAA) National Severe Storms Laboratory estimates that lightning causes $4 to $5 billion in damages each year.

Are alerts issued for severe storms?

Yes. The National Weather Service Weather Forecast Office in Lincoln, Illinois is responsible for issuing ***severe thunderstorm watches*** and ***warnings*** for Logan County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Watch.** A severe thunderstorm watch is issued when conditions are favorable for the development of a severe thunderstorm in or close to the watch area. Watches are usually in effect for several hours and cover large areas of one or more states.
- **Warning.** A severe thunderstorm warning is issued when a thunderstorm is currently producing or is expected to produce severe weather (i.e., hail 1 inch in diameter or greater and/or damaging winds of 58 miles or greater). Warnings are generally in effect for around an hour and cover individual counties or portions of counties.

PROFILING THE HAZARD

When have severe storms occurred previously? What is the extent of these previous severe storms?

Figures 11, **12**, **13**, and **14**, located at the end of this section, summarize the previous occurrences as well as the extent or magnitude of severe storm events recorded in Logan County. The severe storm events are separated into four categories: thunderstorms with damaging winds, hail, lightning and heavy rain. Severe storms are the most frequently occurring natural hazard in Logan County.

Thunderstorms with Damaging Winds

NOAA's Storm Events Database has documented 171 reported occurrences of thunderstorms with damaging winds in Logan County between 1956 and 2012. Of the 171 occurrences, 124 had reported wind speeds of 50 knots or greater. There were 47 occurrences, however, where the wind speed was not recorded.

Severe Storms Fast Facts – Occurrences

Number of Thunderstorms with Damaging Winds (1956 – 2012): ***171***

Number of Severe Hail Events (1958 – 2012): ***53***

Number of Lightning Strike Events (1990 – 2012): ***10***

Number of Heavy Rain Events (1951 – 2012): ***55***

Highest Recorded Wind Speed: ***87 knots (100 mph)***

Largest Hail Recorded: ***3.75 inches in diameter***

Most Likely Month for Thunderstorms with Damaging Winds to Occur: ***June***

Most Likely Month for Severe Hail to Occur: ***April or May***

Most Likely Month for Heavy Rain to Occur: ***June***

Most Likely Time for Thunderstorms with Damaging Winds to Occur: ***Late Afternoon/Evening***

Most Likely Time for Severe Hail to Occur: ***Late Afternoon/Evening***

Most Likely Time for Heavy Rain to Occur: ***Late Afternoon***

The highest wind speed recorded in Logan County occurred in Lincoln on April 4, 2003 when winds reached 87 knots (100 mph) during a thunderstorm event. The second highest recorded wind speed occurred countywide on August 12, 1999 when wind speeds reached 74 knots (85 mph) during a thunderstorm event. Thunderstorms with damaging winds have occurred in every participating municipality within the County on multiple occasions.

Figure 15 charts the reported occurrences of thunderstorms with damaging winds in Logan County by month. Of the 171 events, 103 (60%) took place in May, June and July, making this the peak period for thunderstorms with damaging winds in Logan County.

Figure 15
Thunderstorms with Damaging Winds by Month
1956 – 2012

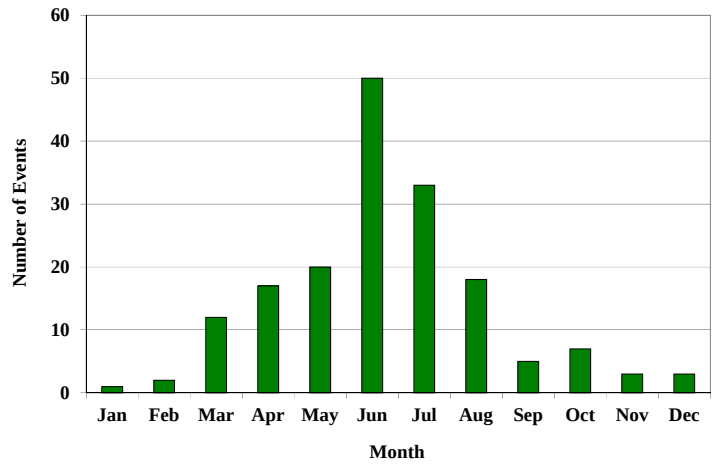
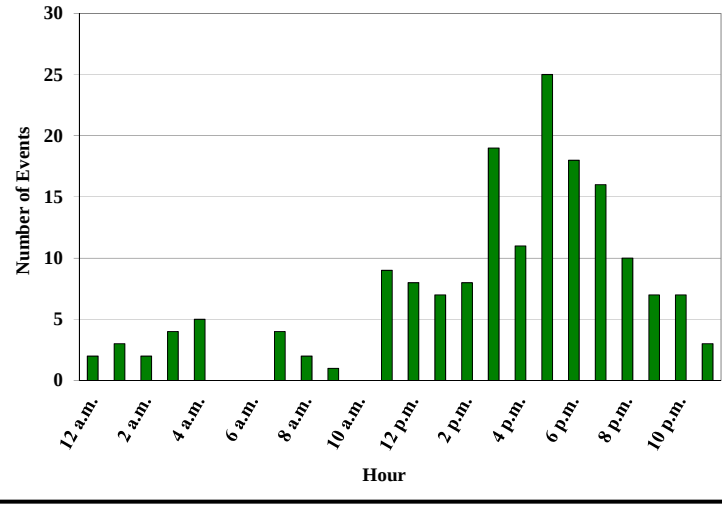


Figure 16 charts the reported occurrences of thunderstorms with damaging winds by hour. Approximately 81% of all thunderstorms with damaging winds occurred during the p.m. hours, with 89 of the events (52%) taking place between 3 p.m. and 8 p.m.

Figure 16
Thunderstorms with Damaging Winds by Hour
1956 – 2012



Hail

NOAA's Storm Events Database and Planning Committee member records have documented 53 reported occurrences of severe storms with hail 1 inch in diameter or greater in Logan County between 1958 and 2012. Of the 53 occurrences, 23 produced hailstones 1.50 inches or larger in diameter. The largest hail documented in Logan County measured 3.75 inches in diameter (larger than a tea cup) and fell on August 18, 2001 in the San Jose. Hail 1 inch in diameter or greater has occurred at least once in every participating municipality.

Figure 17 charts the reported occurrences of hail by month. Of the 53 events, 37 (70%) took place in March, April, May and June. Of the 37 hail events, 12 occurred in both April and May, making these the peak months for hail events in Logan County.

Figure 17
Hail Events by Month
1958 – 2012

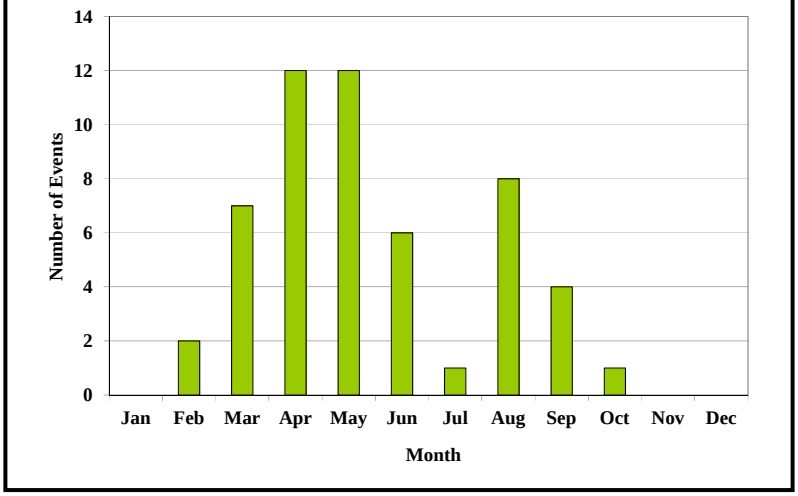


Figure 18 charts the reported occurrences of hail by hour. Approximately 91% of all severe hail events occurred during the p.m. hours, with 30 of the events (57%) taking place between 3 p.m. and 7 p.m.

Lightning

NOAA's Storm Events Database, COOP data records and Planning Committee member records have documented 10 reported occurrences of lightning strikes in Logan County between 1990 and 2012. Of the 10 occurrences, the dates (month) were unavailable for three of the events. Of the remaining seven strikes, five (71%) occurred in June, July and August. Start times were not available for a majority of the events.

Heavy Rain

Storm Events Database, COOP data records and information from the National Weather Service Central Illinois Weather Forecast Office in Lincoln have documented 53 reported occurrences of heavy rain in Logan County between 1951 and 2012. Of the 55 occurrences, magnitudes were

unavailable for two events. Of the remaining 53 heavy rain events with recorded rainfall totals, 23 events (44%) produced three inches or more of rain. Flooding and/or flash flooding resulted from 24 of the 53 heavy rain events.

Figure 18
Hail Events by Hour
1958 – 2012

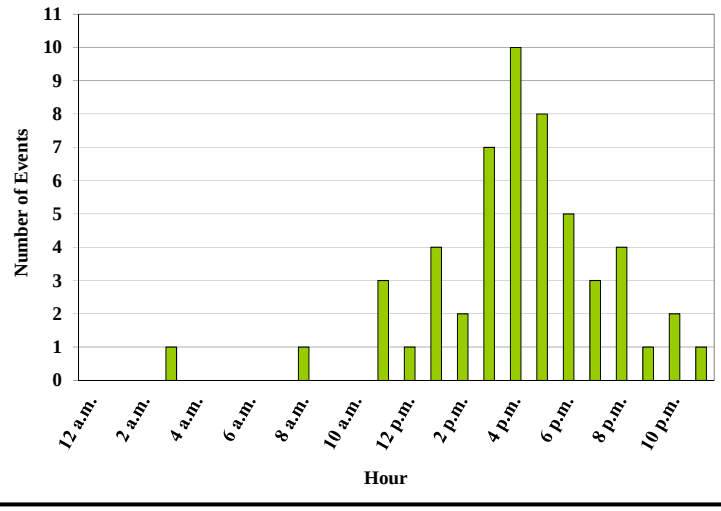


Figure 19 charts the reported occurrences of heavy rain by month. Of the 55 events, 35 (64%) took place in April, May and June. Of the 35 heavy rain events, 15 occurred during June, making this the peak month for heavy rain in Logan County.

Figure 19
Heavy Rain Events by Month
1951 – 2012

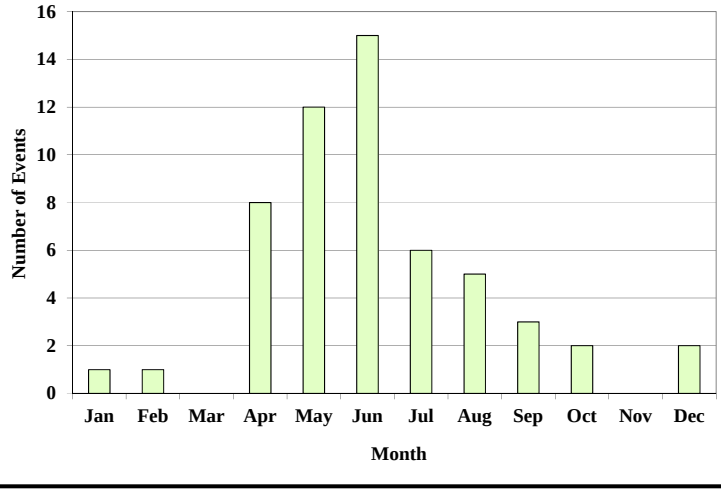
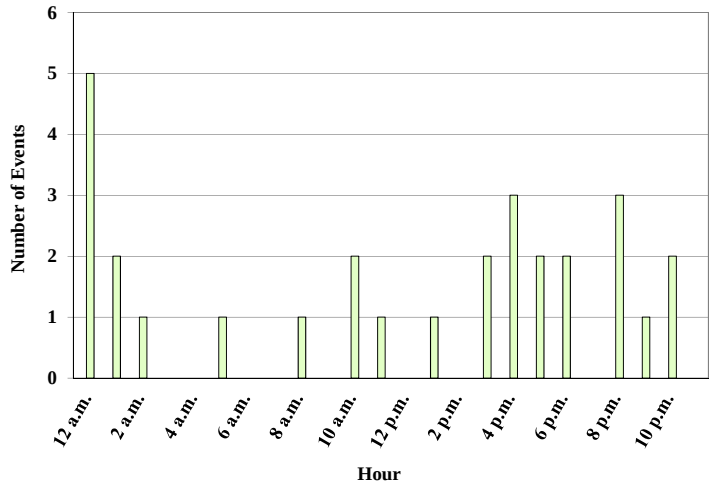


Figure 20 charts the reported occurrences of heavy rain by hour. Of the 55 occurrences, start times were unavailable for 26 events. Of the remaining 29 events with recorded times, approximately 55% occurred during the p.m. hours. Nine of the events (31%) took place between 3 p.m. and 7 p.m.

Figure 20
Heavy Rain Events by Hour
1951 – 2012



What locations are affected by severe storms?

Severe storms affect the entire County. A single severe storm event will generally extend across the entire County and affect multiple locations. The *2010 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency (IEMA) classifies Logan County's hazard rating for severe storms as "severe." (IEMA's hazard rating system has five levels: low, guarded, elevated, high and severe.)

What is the probability of future severe storm events occurring?

Logan County has had 171 verified occurrences of thunderstorms with damaging winds between 1956 and 2012. With 171 occurrences over the past 57 years, Logan County should expect to experience at least three thunderstorms with damaging winds each year. There were 22 years over the last 57 years where multiple (three or more) thunderstorms with damaging winds occurred. This indicates that the probability that multiple thunderstorms with damaging winds may occur during any given year within the County is 39%.

There have been 53 verified occurrences of hail one inch in diameter or greater between 1958 and 2012. With 53 occurrences over the past 55 years, the probability or likelihood of a severe hail event occurring in Logan County in any given year is 96%. There were 11 years over the last 55 years where two or more hail events occurred. This indicates that the probability that more than one severe storm with hail may occur during any given year within the County is 20%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to severe storms?

Yes. All of Logan County is vulnerable to the dangers presented by severe storms due to the topography of the region and its location in relation to the movement of weather fronts across central Illinois. Since 2002, Logan County has experienced 95 thunderstorm with damaging winds, 31 severe hail events, 20 heavy rain events and eight lightning strikes.



An August 4, 2009 thunderstorm with straight-line winds blew down numerous trees and tree limbs in Lincoln.

Photograph provided by Logan County EMA.

Of the participating municipalities, Lincoln and Mount Pulaski have had more recorded occurrences of hail and thunderstorms with damaging winds. The difference in the number of recorded events may be due to the fact that these two municipalities are among the largest in the County; thus, resulting in more storm reports. In addition, the National Weather Service's Central Illinois Weather Forecast Office is located in Lincoln. **Figure 21** details the number of severe storm events by category for each participating municipality.

Figure 21
Verified Severe Storm Events by Participating Municipality

Participating Municipality	Number of Events			
	Thunderstorm & High Wind	Severe Hail	Lightning	Heavy Rain
Atlanta	17	4	1	1
Broadwell	10	4	2	0*
Elkhart	16	3	1	1
Emden	7	2	0	0*
Hartsburg	7	2	0	0*
Lincoln	64	9	6	9
Mount Pulaski	20	8	0	7

* While no verified heavy rain events were recorded specifically for this municipality, there have been multiple verified heavy rain events that have impacted the entire County.

In terms of unincorporated areas vulnerable to severe storms, Chestnut and Beason have had the more recorded occurrences of thunderstorms with damaging winds while Cornland, Beason and Lawndale have had the highest recorded number of hail events. **Figure 22** details the number of thunderstorms with damaging winds and hail events for unincorporated areas of Logan County. No data was available on lightning strikes in the unincorporated area and area specific information was unavailable for most of the heavy rain events. However, the County as a whole has been impacted by multiple verified heavy rain events.

Figure 22
Verified Severe Storm Events in Unincorporated Logan County

Unincorporated Area	Number of Events	
	Thunderstorm & High Wind	Severe Hail
Beason	7	3
Burton View	2	2
Chestnut	12	2
Chestervale	1	0
Cornland	3	4
Lake Fork	0*	1
Lawndale	3	3
Union	0*	0

* While no verified thunderstorms with damaging winds were recorded for this specific area, there have been multiple verified events that have impacted the entire County.

What impacts resulted from the recorded severe storms?

Severe storms as a whole have caused an estimated $11,375,000 in crop damage and $17,438,305 in property damages and resulted in seven injuries. The following provides a breakdown of impacts by category.

While severe summer storms frequently occur in Logan County, the number of injuries and deaths is low. The hospital in Lincoln, as well as hospitals in Springfield (Sangamon County), Decatur (Macon County), Clinton (DeWitt County) Bloomington (McLean County), and the Peoria area (Tazewell and Peoria Counties) are equipped to provide care to persons injured during a severe storm. Consequently, the risk or vulnerability to public health and safety from severe storms is low.

Severe Storms Fast Facts – Impacts/Risk

Thunderstorms with Damaging Winds
- Total Property Damage: ***$4,474,000***
- Infrastructure/Critical Facilities Damage*: ***$42,500***
- Critical Facilities Damages not included in the Total Property Damage Amount: ***$175,000***
- Crop Damage: ***$10,875,000***
- Injuries: ***6***

Severe Hail Events
- Total Property Damage: ***$12,836,000***
- Infrastructure/Critical Facilities Damage*: ***$36,000***
- Crop Damage: ***$500,000***

Lightning Strike Events
- Total Property Damage: ***$128,305***
- Infrastructure/Critical Facilities Damage*: ***$128,305***
- Injuries: ***1***

Risk/Vulnerability to:
- Public Health & Safety: ***Low***
- Buildings/Infrastructure/Critical Facilities: ***Medium/High***

* Infrastructure/Critical Facilities Damage totals are included in the Total Property Damage amounts.

Located throughout this section and in **Appendix L** are select photographs provided by committee members that depict the impacts associated with severe storms.

Thunderstorms with Damaging Winds

The data provided by NOAA's Storm Events Database and committee member records indicates that between 1956 and 2012, 64 of the 171 thunderstorms with damaging winds caused

$4,474,000 in property damage and $10,875,000 in crop damage. Damage information was either unavailable or none was recorded for the remaining 107 reported occurrences.

Included in the property damage figures provided above is $42,500 in verified infrastructure and critical facilities damage sustained by three participating jurisdictions during three separate events. The following provides a brief description of the damages by jurisdiction.

Elkhart

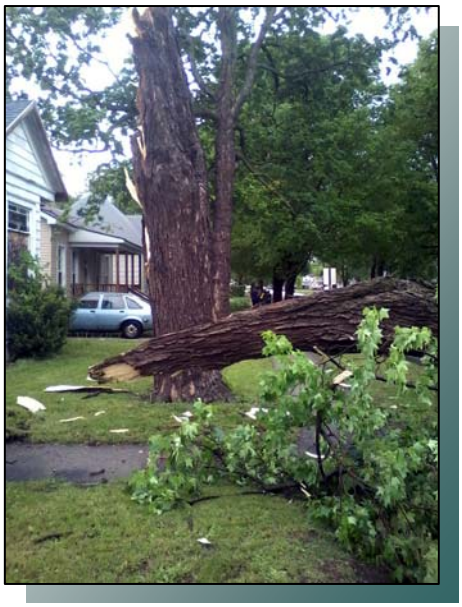
- A thunderstorm with damaging winds occurred on May 30, 2008 and caused $7,500 in property damage to the drinking water pump house. The transformer and fuse box servicing the pump house were damaged by high winds causing the pump motor to burn up.

Lincoln

- Damaging winds associated with a May 15, 2007 thunderstorm caused $25,000 in property damage to the Fire Department training building and warehouse.
- A city warehouse and the Fire Department training building sustained $25,000 in property damage during a thunderstorm event in 2011. (This information was not included in the total above or Figure 11 because a specific date for the event was unavailable.)

Logan County

- Between 2007 and 2008, the Logan County Courthouse sustained $150,000 in roof damage from several severe storm events that included thunderstorms with damaging winds, hail and lightning. (This information was not included in the total above or Figure 11 because specific date(s) for the event(s) were unavailable.)



A thunderstorm with high winds brought down tree limbs in Lincoln on April 25, 2012.
Photograph provided by Logan County EMA.

Mount Pulaski

- A July 19, 1994 thunderstorm with damaging winds caused $10,000 in roof damage to the water treatment plant.

NOAA's Storm Events Database also documented six injuries as a result of five separate thunderstorms events. The following provides a brief description of each event.

- On July 28, 1998 a woman was slightly injured when a fireworks tent she was working in blew down during a thunderstorm.
- A truck driver suffered a broken arm and bruises when downburst winds knocked him to the ground as he exited his truck to seek shelter from a storm in Lincoln on June 4, 1999.
- On April 20, 2000 the driver of a semi-truck received minor injuries when his truck was blown over on the off ramp of I-55 east of Emden during a thunderstorm.

- A semi-truck overturned on I-55 near mile marker 123 just south of Lincoln injuring two people on April 18, 2006.
- On May 15, 2007 a person was injured when a large metal building being demolished was blown down during a thunderstorm.

Hail

The data provided by NOAA's Storm Events Database and committee member records indicates that between 1958 and 2012, two of the 53 hail events caused $12,836,000 in property damage and $500,000 in crop damage. Damage information was either unavailable or none was recorded for the remaining 51 reported occurrences. No injuries or deaths were reported as a result of any of the hail events.

Included in the August 13, 2011 property damage figure is $36,000 in verified property damage sustained by infrastructure and critical facilities in Mount Pulaski. Hail caused roof damage to the City Hall ($12,000), a maintenance garage ($10,000), the salt storage facility ($6,000) and a sewage pump station ($8,000).

Lightning

The data provided by NOAA's Storm Events Database and committee member records indicates that between 1990 and 2012, nine of the 10 lightning strikes caused $128,305 in property damage. Damage information was either unavailable or none was recorded for the remaining reported occurrence.

The property damage figure provided above is composed entirely of infrastructure and critical facilities damage sustained by five of the participating jurisdictions. The following provides a brief description of the damages by jurisdiction.

Atlanta

- In 2011 a lightning strike caused $13,000 in damages to a sanitary sewer lift station.

Broadwell

- Lightning struck the water treatment facility on March 3, 2000 and July 5, 2010 causing $5,500 and $8,200 in damages, respectively.

Elkhart

- Lightning strikes on October 13, 2012 caused $8,000 in damages to the Fire Protection District's communication tower and $25,000 in damages to the drinking water pump house. Lightning struck the communication tower, knocking out the receiver units. At the pump house, lightning struck the transformer next to the unit, damaging the electrical system and pump motor.

Lincoln

- In 2010 a lightning strike caused $20,000 in damages to the Fire Department's generator system.



An August, 2006 lightning strike caused damage at the Logan County Safety Complex.

Photograph provided by Logan County EMA.

Logan County

- In 2007 a lightning strike caused $10,000 in damages to computers at the Logan County Courthouse.
- A lightning strike on July 8, 2008 caused $22,785 in damages to a communication tower at the Logan County Safety Complex.
- Less than a year later on June 18, 2009 the communication tower at the Safety Complex was hit again resulting in $5,935 in damages.
- On August 4, 2009 lightning struck the Logan County Courthouse causing $9,885 in damages.

In addition to the damages detailed above, committee member records indicate that the Lincoln Rural Command Center was struck by lightning nine times in an 18 month period in 1995 and 1996, sustaining approximately $100,000 in damages to equipment.

Committee member records documented one injury as a result of a lightning strike in Lincoln in August, 1990. A fireman was thrown across the room and injured when a lightning strike passed through the telephone line he was using.

Heavy Rain

Damage information was either unavailable or none was recorded for any of the reported occurrences. In addition, no injuries or deaths were reported as a result of these events.

What other impacts can result from severe storms?

In Logan County, the greatest risk to health and safety from severe storms is vehicle accidents. Hazardous driving conditions resulting from severe storms (i.e., wet pavement, poor visibility, high winds, etc.) can contribute to accidents that result in injury and death. Traffic accident data assembled by the Illinois Department of Transportation between 2006 and 2010 indicates that wet road surface conditions were present for 9.8% to 15.6% of all crashes recorded annually in the County.

While other circumstances cause wet road surface conditions (i.e., melting snow, condensation, light showers, etc.), law enforcement officials agree that hazardous driving conditions caused by severe storms add to the number of crashes. **Figure 23** provides a breakdown by year of the number of crashes and corresponding injuries and deaths that occurred when wet road surface conditions were present.

Figure 23
Severe Weather Crash Data for Logan County

Year	Total # of Crashes	Presence of Wet Road Surface Conditions		
		# of Crashes	# of Injuries	# of Deaths
2006	826	116	26	1
2007	875	93	23	0
2008	833	102	21	0
2009	691	108	41	0
2010	662	65	18	0
Total	**3,887**	**484**	**129**	**1**

Source: Illinois Department of Transportation

Are existing buildings, infrastructure and critical facilities vulnerable to severe storms?
Yes. All existing buildings, infrastructure and critical facilities located in Logan County and the participating municipalities are vulnerable to damage from severe storms. Structural damage to buildings is a relatively common occurrence with severe storms. Damage to roofs, siding, awnings and windows can occur from hail, flying and falling debris and high winds. Lightning strikes can damage electrical components and equipment (i.e., appliances, computers etc.) and can cause fires that consume buildings. If the roof is compromised or windows are broken, rain can cause additional damage to the structure and contents of a building.



A thunderstorm with downburst winds damaged multiple buildings on March 8, 2009.

Photograph provided by Logan County EMA.

Infrastructure and critical facilities tend to be just as vulnerable to severe storm damage as buildings. The infrastructure and critical facilities that are the most vulnerable to severe storms are related to power distribution and communications. High winds, lightning and flying and falling debris have the potential to cause damage to communication and power lines; power substations; transformers and poles; and communication antennas and towers.

The damage inflicted by severe storms often leads to disruptions in communication and creates power outages. Depending on the damage, it can take anywhere from several hours to several days to restore service. Power outages and disruptions in communications can impair vital services, particularly when backup power generators are not available. Most of the participating jurisdictions acknowledged the need for emergency backup generators to allow continued operation of critical facilities such as emergency shelters, drinking water facilities, lift stations and wastewater treatment facilities.

In addition to affecting power distribution and communications, debris and flooding from severe storms can block state and local roads hampering travel. When transportation is disrupted, emergency and medical services are delayed, rescue efforts are hindered and government services can be affected.

Based on the frequency with which severe storms occur in Logan County, the amount of property damage previously reported and the potential for disruptions to power distribution and communication; the risk or vulnerability to buildings, infrastructure and critical facilities from severe storms is medium to high.

Are future buildings, infrastructure and critical facilities vulnerable to severe storms?
Yes. While six of the participating municipalities have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from severe storms, the County and one other municipality do not. Infrastructure such as new communication and power lines also will continue to be vulnerable to severe storms as long as they are located above ground. High winds, lightning and flying and falling debris can disrupt

power and communication. Steps to bury all new lines would eliminate the vulnerability, but this action would be cost prohibitive in most areas.

What are the potential dollar losses to vulnerable structures from severe storms?

Unlike other hazards, such as flooding, there are no standard loss estimation models or methodologies for severe storms. With only 75 of the 289 recorded events listing property and crop damage numbers for all categories of severe storms, there is no way to accurately estimate future potential dollar losses. Since all existing structures within Logan County are vulnerable to damage, it is highly probable that there will be future dollar losses from severe storms.

Figure 11
(Sheet 1 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
5/29/1956	5:21 p.m.	Lincoln[^]	n/a	n/a	n/a	n/a	n/a	
8/29/1959	1:18 p.m.	Lincoln[^]	n/a	n/a	n/a	n/a	n/a	
3/4/1961	4:35 p.m.	New Holland[^]	n/a	n/a	n/a	n/a	n/a	
7/22/1962	8:00 p.m.	San Jose[^]	n/a	n/a	n/a	n/a	n/a	
7/22/1962	8:15 p.m.	Broadwell[^]	n/a	n/a	n/a	n/a	n/a	
7/22/1962	8:30 p.m.	Broadwell[^]	70 kts	n/a	n/a	n/a	n/a	
7/14/1964	6:00 p.m.	Atlanta[^]	n/a	n/a	n/a	n/a	n/a	
7/23/1973	8:00 p.m.	Lincoln[^]	52 kts	n/a	n/a	n/a	n/a	
3/4/1974	3:45 p.m.	Mount Pulaski	n/a	n/a	n/a	n/a	n/a	
6/19/1974	7:05 p.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	
4/30/1975	5:24 p.m.	Atlanta[^]	59 kts	n/a	n/a	n/a	n/a	
8/5/1975	3:50 p.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	
8/5/1975	4:45 p.m.	Mount Pulaski	n/a	n/a	n/a	n/a	n/a	
7/9/1978	3:00 a.m.	Atlanta	n/a	n/a	n/a	n/a	n/a	
7/30/1979	5:20 p.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	
6/2/1980	11:00 a.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	
7/5/1980	2:45 a.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	
8/10/1980	5:54 p.m.	Lincoln	52 kts	n/a	n/a	n/a	n/a	
9/2/1980	2:20 a.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	
6/14/1983	2:40 p.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$0**	**$0**	

[^] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 2 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
4/29/1984	8:18 p.m.	New Holland	n/a	n/a	n/a	n/a	n/a	
7/3/1984	5:08 p.m.	New Holland	n/a	n/a	n/a	n/a	n/a	
11/15/1988	10:00 p.m.	New Holland	n/a	n/a	n/a	n/a	n/a	
11/15/1988	10:00 p.m.	Elkhart	n/a	n/a	n/a	n/a	n/a	
5/15/1990	3:45 p.m.	Lincoln[^]	n/a	n/a	n/a	n/a	n/a	
6/19/1990	12:05 a.m.	Chestnut	n/a	n/a	n/a	n/a	n/a	
5/17/1991	9:45 p.m.	Elkhart	70 kts	n/a	n/a	n/a	n/a	
7/1/1991	4:10 p.m.	Atlanta	n/a	n/a	n/a	n/a	n/a	
10/4/1991	5:30p.m.	Emden	n/a	n/a	n/a	n/a	n/a	
6/13/1992	1:45 p.m.	Elkhart	n/a	n/a	n/a	n/a	n/a	
6/13/1992	1:45 p.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	
7/2/1992	2:58 p.m.	Broadwell[^]	52 kts	n/a	n/a	n/a	n/a	
7/29/1992	10:20 p.m.	Elkhart	n/a	n/a	n/a	n/a	n/a	
4/15/1994	3:30 a.m.	Middletown	n/a	n/a	n/a	n/a	n/a	winds damaged two barns, a grain bin and a chimney on a house; 4 trees were uprooted and numerous tree limbs were blown down
7/2/1994	11:25 a.m.	Middletown	n/a	n/a	n/a	n/a	n/a	winds blew down numerous power lines
Subtotal:				**0**	**0**	**$0**	**$0**	

[^] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 3 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
7/19/1994	7:30 a.m.	Lincoln	n/a	n/a	n/a	$50,000	n/a	winds blew down numerous trees, tree limbs and power lines; 2 homes were damages by falling trees in the Forest Hills Subdivision
7/19/1994	8:47 a.m.	Mount Pulaski Latham	n/a	n/a	n/a	$15,000	n/a	winds blew the roof off a shed and damaged the roof of the water treatment plant in Mount Pulaski; numerous power lines were blown down in Latham
5/18/1995	11:45 a.m.	Atlanta[^]	n/a	n/a	n/a	$5,000	n/a	winds damaged the roof of a home
6/20/1995	5:45 p.m.	Hartsburg	n/a	n/a	n/a	n/a	n/a	numerous power lines were blown down
6/21/1995	7:21 p.m.	Hartsburg	52 kts	n/a	n/a	n/a	n/a	winds blew down several large trees
6/21/1995	7:40 p.m.	Atlanta Lincoln New Holland[^]	52 kts	n/a	n/a	n/a	n/a	winds blew down several large trees; a tree fell onto a truck in Lincoln; another large tree fell blocking both lanes of IL Rte. 10 near New Holland
6/23/1995	12:35 p.m.	Lincoln	52 kts	n/a	n/a	n/a	n/a	
6/17/1996	2:06 p.m.	Lincoln	60 kts	n/a	n/a	n/a	n/a	
7/24/1996	1:07 p.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	winds blew down several large tree limbs in the Lincoln Lakes area
Subtotal:				**0**	**0**	**$70,000**	**$0**	

[^] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 4 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
10/29/1996	5:10 p.m.	Lincoln San Jose	52 kts	n/a	n/a	n/a	n/a	winds blew down several large trees on the west side of Lincoln; winds caused siding damage to the ambulance service garage at the Abraham Lincoln Memorial Hospital
4/5/1997	3:35 p.m.	Lincoln	50 kts	n/a	n/a	n/a	n/a	numerous trees, tree limbs and power lines were blown down throughout the area; some areas received more serious damage
6/25/1997	1:59 p.m.	Lincoln	51 kts	n/a	n/a	n/a	n/a	
8/15/1997	3:25 a.m.	Elkhart Lincoln Atlanta	n/a	n/a	n/a	n/a	n/a	winds blew down numerous tree limbs and power lines; a large tree was blown over in Lincoln which knocked out phone and electrical service in the immediate area
8/24/1997	3:37 p.m.	Latham	n/a	n/a	n/a	n/a	n/a	winds blew down a large tree onto some power lines
8/24/1997	6:50 p.m.	Chestnut	n/a	n/a	n/a	n/a	n/a	winds blew down a large tree
3/27/1998	6:47 p.m.	San Jose Mount Pulaski Chestnut	61 kts	n/a	n/a	n/a	n/a	in San Jose a greenhouse was damaged; in Mount Pulaski 2 buildings sustained roof damage, a storage shed was damaged and numerous large tree limbs were blown down; in Chestnut a 1-ton truck was blown over on IL Rte. 54
Subtotal:				**0**	**0**	**$0**	**$0**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 5 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
5/19/1998	6:06 p.m.	San Jose Atlanta	65 kts	n/a	n/a	n/a	n/a	winds blew some siding off a home on the north side of San Jose; on the northeast side of Atlanta winds blew down 6 power poles, caused roof and siding damage to one home and broke off a 4.5 diameter tree 3 feet above the ground
5/24/1998	1:20 a.m.	New Holland[A]	n/a	n/a	n/a	n/a	n/a	winds blew down several trees
6/14/1998	7:23 a.m.	Lincoln Mount Pulaski	55 kts	n/a	n/a	n/a	n/a	winds blew down numerous trees, tree limbs and power lines
6/28/1998	7:00 p.m.	countywide	69 kts	1	0	$1,000,000	n/a	winds blew down hundreds of trees, tree limbs, several homes sustained damage from fallen trees and/or tree limbs; power poles and power lines; an equipment shed was destroyed 1 mile north of Broadwell; a woman was slightly injured when a fireworks tent she was working in blew down
6/28/1998	10:20 p.m.	Lincoln	n/a	n/a	n/a	n/a	n/a	additional large tree limbs were blown down; a large tree limb pierced the roof of a house that had sustained damage during the storm that had occurred earlier the same day
Subtotal:				**1**	**0**	**$1,000,000**	**$0**	

[A] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 6 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
6/29/1998	3:50 p.m.	countywide	61 kts	n/a	n/a	$500,000	$2,500,000	winds blew down or uprooted trees, free limbs, power poles and power lines; trees fell onto structures causing damage ranging from town gutters to major roof and structural damage; vehicles sustained damage from fallen trees and numerous outbuildings, sheds and silos were either damaged or destroyed
7/22/1998	12:35 p.m.	Mount Pulaski Chestnut Beason	n/a	n/a	n/a	n/a	n/a	several trees, numerous tree limbs and power lines were blown down
11/10/1998	4:56 a.m.	Middletown Lincoln	54 kts	n/a	n/a	$35,000	$0	an empty grain bin was blown over and some windows were blown out of the grade school in Middletown; numerous trees were either blown over or snapped off and many power lines were blown down
6/1/1999	6:35 p.m.	Latham Chestnut	n/a	n/a	n/a	n/a	n/a	winds blew down several large trees and numerous power lines; a shed had its doors blown off and a tree fell onto a house causing minor damage in Latham
Subtotal:				**0**	**0**	**$535,000**	**$2,500,000**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 7 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
6/4/1999	3:50 p.m.	Lincoln	61 kts	1	0	n/a	n/a	numerous trees, tree limbs and power lines were blown down; several residences sustained damage from downed trees and limbs; Lincoln College sustained tree damage as well as minor damage to fencing and dugouts at the baseball field; a billboard was blown down at the intersection of IL Rte 10 and 121 and a grocery store suffered minor damage to the roof and exterior wall; a truck driver suffered a broken arm and bruises when downburst winds knocked him to the ground as he exited his truck seeking shelter
8/12/1999	6:55 p.m.	countywide	74 kts	n/a	n/a	$50,000	$8,300,000	numerous trees, tree limbs and power lines were blown down; thousands of acres of corn were flattened; in Mount Pulaski a tree was blown down onto a house causing minor damage
8/23/1999	6:26 p.m.	Lincoln	52 kts	n/a	n/a	n/a	n/a	
2/29/2000	10:59 p.m.	Broadwell Lincoln	51 kts	n/a	n/a	$40,000	n/a	winds blew portions of roofs off 2 mobile homes in Broadwell
Subtotal:				**1**	**0**	**$90,000**	**$8,300,000**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 8 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
4/20/2000	4:55 a.m.	San Jose Emden Atlanta	54 kts	1	0	$750,000	n/a	a mobile home was blown off its foundation in San Jose; in the Emden area 2 homes sustained major damage while 1 home sustained minor damage; numerous outbuildings and grain bins were either damaged or destroyed; the driver of a semi received minor injuries when the truck was blown over on the off ramp of I-155 east of Emden
5/8/2000	9:37 p.m.	Burton View	n/a	n/a	n/a	n/a	n/a	winds destroyed a large shed
5/18/2000	5:21 p.m.	Atlanta	n/a	n/a	n/a	n/a	n/a	a tree fell onto a home causing minor roof damage; several power lines were blown down
6/14/2000	11:45 a.m.	Mount Pulaski[^] Latham	n/a	n/a	n/a	n/a	n/a	a large tree and several large tree limbs were blown down
6/20/2000	5:52 p.m.	Broadwell[^] Lincoln	n/a	n/a	n/a	n/a	n/a	numerous large trees and tree limbs were blown down
6/20/2000	7:04 p.m.	Elkhart[^] Latham[^]	n/a	n/a	n/a	n/a	n/a	several trees and numerous tree limbs were blown down
Subtotal:				**1**	**0**	**$750,000**	**$0**	

[^] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 9 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
9/11/2000	10:20 p.m.	San Jose Lincoln	n/a	n/a	n/a	n/a	n/a	several tree limbs were blown down onto power lines in San Jose; in Lincoln a 12-inch diameter tree was blown down onto power lines; southeast of Lincoln an 18-inch diameter tree was blown onto a house
2/9/2001	8:32 a.m.	Lincoln Chestnut	55 kts	n/a	n/a	n/a	n/a	
4/11/2001	12:30 a.m.	San Jose[^] Emden[^]	55 kts	n/a	n/a	n/a	n/a	a semi was blown off US Rte. 136 near San Jose while another was blown over on I-155 between mile markers 7 & 8
5/22/2001	12:12 p.m.	Lincoln	50 kts	n/a	n/a	n/a	n/a	several large trees were blown down
8/18/2001	12:19 p.m.	Emden[^]	50 kts	n/a	n/a	n/a	n/a	a power pole was blown down onto US Rte. 136 two miles east of I-155
10/24/2001	11:49 a.m.	Lincoln	53 kts	n/a	n/a	n/a	n/a	
6/25/2002	5:18 p.m.	Burton View[^]	50 kts	n/a	n/a	n/a	n/a	a large tree was blown down across IL Rte. 10
7/22/2002	6:25 p.m.	Middletown	50 kts	n/a	n/a	n/a	n/a	3 large trees were blown down with one causing minor roof damage
Subtotal:				**0**	**0**	**$0**	**$0**	

[^] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 10 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
4/4/2003	3:12 p.m.	Lincoln	87 kts	n/a	n/a	$300,000	$0	numerous trees were blown down, 9 mobile homes were destroyed and 6 other sustained damage; minor roof and shingle damage occurred; one business lost a portion of its roof and numerous business signs were damaged; a hotel sustained roof and siding damage; a construction trailer was destroyed; a 150-foot communications tower was blown down; several garages were destroyed and 8 power poles were broken off along Lincoln Parkway
4/4/2003	3:23 p.m.	Lawndale[^] Atlanta	50 kts	n/a	n/a	n/a	n/a	winds blew down 8 large power poles along old Rte. 66 south of Lawndale and blew a semi over on I-55 at the Atlanta exit
5/6/2003	7:45 p.m.	Mount Pulaski[^] Beason[^]	60 kts	n/a	n/a	n/a	n/a	numerous trees, tree limbs, power lines and power poles were blown down; several barns, sheds and grain bins were destroyed
5/28/2003	2:56 p.m.	Atlanta	50 kts	n/a	n/a	n/a	n/a	winds blew down a tree on a golf course
Subtotal:				**0**	**0**	**$300,000**	**$0**	

[^] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 11 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
7/8/2003	3:13 p.m.	Atlanta	52 kts	n/a	n/a	n/a	n/a	a home sustained moderate roof damage while 2 other homes sustained minor siding damage
7/21/2003	1:20 a.m.	Emden Lincoln	55 kts	n/a	n/a	n/a	n/a	numerous trees, tree limbs and power lines were blown down
8/3/2003	6:35 p.m.	Emden[A]	55 kts	n/a	n/a	n/a	n/a	
9/26/2003	4:25 p.m.	Mount Pulaski Chestnut Latham[A]	60 kts	n/a	n/a	n/a	n/a	winds blew down numerous trees; in Mount Pulaski downed trees blocked several roads and damaged a garage; in Chester an unoccupied truck was damaged by a downed tree
5/24/2004	10:45 p.m.	Lincoln	52 kts	n/a	n/a	n/a	n/a	a large tree was blown down as well as numerous tree limbs
6/10/2004	5:23 p.m.	Lincoln	65 kts	n/a	n/a	n/a	n/a	winds blew down a couple of trees as well as numerous tree limbs and power lines; a scoreboard at a college was bent over and the roof was blown off a baseball dugout
7/22/2004	11:58 a.m.	Broadwell Beason[A]	50 kts	n/a	n/a	n/a	n/a	several trees and tree limbs were blown down; a power pole was blown over west of Beason
8/9/2004	5:49 p.m.	Lincoln	61 kts	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$0**	**$0**	

[A] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 12 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
10/29/2004	4:45 p.m.	Atlanta[^]	52 kts	n/a	n/a	n/a	n/a	winds downed a large tree onto a garage causing moderate roof damage, a tool shed was destroyed and a few shingles were blown off the roof of a house
3/30/2005	5:33 p.m.	Lawndale	63 kts	n/a	n/a	n/a	n/a	
3/30/2005	5:55 p.m.	Atlanta	55 kts	n/a	n/a	n/a	n/a	a few power poles were blown down
5/19/2005	7:00 p.m.	Elkhart	50 kts	n/a	n/a	n/a	n/a	winds blew down numerous tree limbs
6/13/2005	5:39 p.m.	Cornland Mount Pulaski Latham Chestnut	60 kts	n/a	n/a	$100,000	n/a	winds blew down many trees and power lines; in Latham several buildings, including an apartment building, had their roofs blown off; in Mount Pulaski a barn was destroyed; in Chestnut a machine shed was destroyed
7/26/2005	4:10 p.m.	San Jose[^]	50 kts	n/a	n/a	n/a	n/a	a tree was blown down across County Road 14
8/19/2005	9:08 p.m.	Elkhart	55 kts	n/a	n/a	n/a	n/a	several trees, tree limbs and power lines were blown down
Subtotal:				**0**	**0**	**$100,000**	**$0**	

[^] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 13 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
9/19/2005	3:11 p.m.	Lincoln[A]	50 kts	n/a	n/a	n/a	n/a	a van pulling a trailer was blown over on I-55 at mile marker 133
9/19/2005	3:16 p.m.	Lincoln	50 kts	n/a	n/a	n/a	n/a	winds blew down several power lines
11/5/2005	9:20 p.m.	Elkhart Lincoln Hartsburg Emden[A]	50 kts	n/a	n/a	n/a	n/a	near Emden aluminum hog sheds were destroyed; in Lincoln light poles were bent over
3/11/2006	6:55 p.m.	New Holland[A]	55 kts	n/a	n/a	n/a	n/a	winds blew a silo over west of Sugar Creek; this event was part of a federally-declared disaster (Declaration #1633)
3/11/2006	7:02 p.m.	Hartsburg[A]	50 kts	n/a	n/a	n/a	n/a	this event was part of a federally-declared disaster (Declaration #1633)
3/12/2006	9:00 p.m.	Latham	55 kts	n/a	n/a	n/a	n/a	a home was damaged; this event was part of a federally-declared disaster (Declaration #1633)
3/13/2006	3:08 a.m.	Lawndale	53 kts	n/a	n/a	n/a	n/a	this event was part of a federally-declared disaster (Declaration #1633)
4/2/2006	5:28 p.m.	San Jose	65 kts	n/a	n/a	n/a	n/a	significant tree and power line damage; a 50-foot antenna was blown down and a concrete silo was completely destroyed
Subtotal:				**0**	**0**	**$0**	**$0**	

[A] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 14 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
4/13/2006	11:24 p.m.	Lincoln Atlanta	58 kts	n/a	n/a	n/a	n/a	numerous trees, power poles and power lines were blown down; a semi was overturned on I-55; an airplane was damaged at the Logan County Airport
4/16/2006	1:08 p.m.	Cornland	52 kts	n/a	n/a	n/a	n/a	winds snapped 2 power poles and damaged 2 outbuildings
4/18/2006	11:19 p.m.	Lincoln	70 kts	2	0	$95,000	n/a	several trees were blown down; the roof at the State Prison was damaged; a pheasant hatchery at Madigan Wildlife Area was destroyed; 15 power poles and numerous trees were blown down along old Rte. 66 and the UPRR tracks for about a mile west of Lincoln; a semi overturned on I-55 near mile marker 123 injuring 2 people
5/24/2006	3:30 p.m.	Beason[^]	58 kts	n/a	n/a	n/a	n/a	
7/3/2006	6:40 p.m.	Lincoln	50 kts	n/a	n/a	n/a	n/a	winds blew down several 4 to 6-inch tree limbs
7/3/2006	8:07 p.m.	Broadwell[^] Lincoln	57 kts	n/a	n/a	n/a	n/a	winds blew down numerous tree limbs
Subtotal:				**2**	**0**	**$95,000**	**$0**	

[^] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 15 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
7/13/2006	7:45 p.m.	Elkhart	50 kts	n/a	n/a	n/a	n/a	
7/19/2006	3:35 p.m.	New Holland Broadwell	56 kts	n/a	n/a	n/a	n/a	winds blew down numerous trees and power lines
7/26/2006	9:15 p.m.	New Holland	52 kts	n/a	n/a	n/a	n/a	winds blew down several tree limbs and power lines
5/15/2007	12:15 p.m.	Elkhart[A] Lincoln	56 kts	1	0	$25,000	n/a	winds blew down several large trees; one person was injured when a large metal building being demolished was blown down; winds damaged the Lincoln Fire Department training building and warehouse
1/29/2008	1:40 p.m.	Chestervale	56 kts	n/a	n/a	$15,000	n/a	outbuildings were damaged by winds
5/30/2008	4:00 p.m.	Lincoln Elkhart	61 kts	n/a	n/a	$32,500	n/a	numerous large tree limbs and power lines were blown down; in Elkhart, high winds damaged the transformer and fuse box at the pump house, causing the pump motor to burn up
6/3/2008	9:40 a.m.	Cornland Mount Pulaski Chestnut	61 kts	n/a	n/a	$90,000	n/a	numerous trees and power lines were blown down; a grain bin and machine shed were destroyed; in Mount Pulaski a car wash lost part of its roof
6/15/2008	2:42 p.m.	Hartsburg	61 kts	n/a	n/a	$8,000	n/a	winds blew down a few large trees
6/15/2008	2:42 p.m.	Elkhart[A]	52 kts	n/a	n/a	n/a	n/a	
Subtotal:				**1**	**0**	**$170,500**	**$0**	

[A] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 16 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
7/8/2008	3:40 p.m.	Lincoln[A]	52 kts	n/a	n/a	$1,500	n/a	winds blew a tree down
7/21/2008	7:55 p.m.	Lincoln	52 kts	n/a	n/a	$50,000	n/a	numerous trees and tree limbs were blown down; the Logan County Fairgrounds sustained tree and tent damage from the winds
7/21/2008	8:30 p.m.	Mount Pulaski	61 kts	n/a	n/a	$200,000	n/a	nearly 300 trees and tree limbs were blown down
7/29/2008	5:37 p.m.	Beason[A]	52 kts	n/a	n/a	$2,000	n/a	a tree was blown down
12/27/2008	12:20 p.m.	New Holland	61 kts	n/a	n/a	$60,000	n/a	winds damaged 2 homes; 3 outbuildings were blown down; numerous trees were damaged
12/27/2008	12:25 p.m.	Lincoln	52 kts	n/a	n/a	$10,000	n/a	a semi was blown over near exit 126 on I-55
12/27/2008	12:30 p.m.	Lincoln	61 kts	n/a	n/a	$15,000	n/a	power poles and lines were blown down for at least ¼ mile along IL Rte. 10 outside of the NWS Office
3/8/2009	11:04 a.m.	Broadwell	52 kts	n/a	n/a	$8,000	n/a	several 8-inch diameter tree limbs were blown down
3/8/2009	11:15 a.m.	Lincoln[A]	52 kts	n/a	n/a	$30,000	n/a	a barn was destroyed at the intersection of IL Rte. 121 and County Road 1700
3/8/2009	11:20 a.m.	Beason[A]	52 kts	n/a	n/a	$60,000	n/a	several barns and outbuildings were damaged
Subtotal:				**0**	**0**	**$436,500**	**$0**	

[A] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 17 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
5/15/2009	5:00 p.m.	Beason[A]	52 kts	n/a	n/a	$20,000	n/a	winds damaged the roof and trusses of a machine shed
6/1/2009	6:35 p.m.	San Jose	52 kts	n/a	n/a	$10,000	n/a	power lines were blown down
6/1/2009	6:53 p.m.	Atlanta	52 kts	n/a	n/a	$2,000	n/a	a tree was blown down
6/2/2009	4:30 p.m.	Elkhart	52 kts	n/a	n/a	$5,000	n/a	several large tree limbs were blown down
6/18/2009	4:30 a.m.	Lincoln	61 kts	n/a	n/a	$50,000	n/a	numerous large trees and limbs were blown down; a power pole was snapped near Zion Lutheran School; a traffic signal was blown down at the intersection of Woodlawn and Madigan
6/18/2009	4:33 a.m.	Lincoln	52 kts	n/a	n/a	$0	n/a	four large tree branches were blown down
6/27/2009	7:35 p.m.	Hartsburg	52 kts	n/a	n/a	$12,000	n/a	power lines were blown down
6/27/2009	7:51 p.m.	Lincoln	52 kts	n/a	n/a	$20,000	n/a	power lines were blown down
6/27/2009	8:03 p.m.	Chestnut	52 kts	n/a	n/a	$12,000	n/a	power lines were blown down
6/27/2009	8:05 p.m.	Mount Pulaski	52kts	n/a	n/a	$15,000	n/a	power lines were blown down
6/27/2009	8:27 p.m.	Latham	52 kts	n/a	n/a	$10,000	n/a	power lines were blown down
7/24/2009	11:00 p.m.	Elkhart	52 kts	n/a	n/a	$12,000	n/a	numerous trees were blown down onto 700th St.
Subtotal:				**0**	**0**	**$168,000**	**$0**	

[A] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 18 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
8/4/2009	7:35 a.m.	Lincoln	61 kts	n/a	n/a	$35,000	n/a	numerous trees and power lines were blown down; a tree was blown onto an apartment complex; a storage shed was toppled; minor roof damage was reported
8/4/2009	7:45 a.m.	Mount Pulaski[1]	61 kts	n/a	n/a	$15,000	n/a	the roof was blown off a barn onto IL Rte. 121
8/17/2009	2:56 p.m.	New Holland	52 kts	n/a	n/a	$2,000	n/a	a power line was blown down
8/17/2009	3:20 p.m.	Lincoln	52 kts	n/a	n/a	$6,000	n/a	a 2-foot diameter tree was blown onto a house
6/5/2010	9:38 p.m.	Hartsburg	52 kts	n/a	n/a	$200,000	n/a	several power poles and antennas were blown down; numerous homes experienced roof damage
6/23/2010	7:15 p.m.	Lincoln	52 kts	n/a	n/a	$2,000	n/a	a large tree branch was broken off at the NWS office
6/23/2010	7:15 p.m.	Broadwell	52 kts	n/a	n/a	$0	n/a	winds toppled a large wooden swing set
6/23/2010	7:15 p.m.	Mount Pulaski	52 kts	n/a	n/a	$1,000	n/a	a large tree limb was blown down across Scott St.
6/23/2010	7:22 p.m.	Middletown[1]	52 kts	n/a	n/a	$4,000	n/a	3 trees were blown down along 1400th St.
8/13/2010	5:55 p.m.	Lincoln	52 kts	n/a	n/a	$3,000	n/a	power lines were blown down near Lincoln College
10/26/2010	4:12 a.m.	Elkhart[1]	52 kts	n/a	n/a	$20,000	n/a	2 semi trucks were blown off I-55 at mile post 113
Subtotal:				**0**	**0**	**$288,000**	**$0**	

[1] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 19 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
4/15/2011	5:46 p.m.	Middletown[A]	52 kts	n/a	n/a	$1,000	n/a	a tree was blown down onto the Greenview Blacktop
4/19/2011	5:40 p.m.	Mount Pulaski[A]	61 kts	n/a	n/a	$30,000	n/a	a communications tower was blown over
5/25/2011	4:25 p.m.	Mount Pulaski	52 kts	n/a	n/a	$0	n/a	winds blew down 2 large trees
5/25/2011	4:28 p.m.	Lincoln	52 kts	n/a	n/a	$0	n/a	a large tree was topped at the NWS office
6/4/2011	6:12 p.m.	New Holland	61 kts	n/a	n/a	$20,000	n/a	several power poles were blown down
6/4/2011	6:25 p.m.	Lincoln	52 kts	n/a	n/a	$4,000	n/a	winds blew 2 trees down onto power lines
6/4/2011	6:30 p.m.	Middletown[A]	61 kts	n/a	n/a	$2,000	n/a	winds blew a large tree down onto power lines
6/4/2011	6:42 p.m.	Chestnut	52 kts	n/a	n/a	$10,000	n/a	2 trees knocked down power lines
6/4/2011	6:48 p.m.	Cornland[A]	52 kts	n/a	n/a	$15,000	n/a	power lines were blown down across IL Rte. 54
6/15/2011	1:20 a.m.	Mount Pulaski[A]	61 kts	n/a	n/a	$85,000	n/a	a barn was severely damaged; a lean-to shed was destroyed; the roof was blown off a machine shed; 6 power poles were snapped
6/21/2011	5:05 p.m.	Latham	52 kts	n/a	n/a	$12,000	n/a	power lines were blown down
6/21/2011	5:10 p.m.	Mount Pulaski	52 kts	n/a	n/a	$4,000	n/a	winds blew a tree limb down onto power lines
Subtotal:				**0**	**0**	**$183,000**	**$0**	

[A] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 20 of 20)
Severe Storms – Thunderstorms with Damaging Winds Reported in Logan County
1956 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage	Description
7/7/2011	2:45 p.m.	Lincoln[^]	52 kts	n/a	n/a	$20,000	$75,000	an empty grain bin was shifted off its foundation; several corn fields were flattened
4/25/2012	3:00 p.m.	New Holland[^]	70 kts	n/a	n/a	$250,000	n/a	a large shed was destroyed with pieces blown across IL Rte. 10; most of the roof was torn off an agricultural supply building
4/25/2012	3:20 p.m.	Lincoln[^]	52 kts	n/a	n/a	$1,000	n/a	a tree was blown down across IL Rte. 121 and 2000th Ave.
4/25/2012	3:20 p.m.	Lincoln	52 kts	n/a	n/a	$1,000	n/a	winds blew a tree down
5/20/2012	4:40 p.m.	Elkhart	61 kts	n/a	n/a	$7,000	n/a	a power pole was blown down and two trees were damaged
10/17/2012	5:40 p.m.	Mount Pulaski[^] Chestnut[^]	61 kts	n/a	n/a	$9,000	n/a	several 5 to 8 inch diameter evergreen trees were snapped off at ground level and thrown into a field east of Mount Pulaski; a roof was partially blown off an old wooden barn south of Chestnut
Subtotals:				**0**	**0**	**$288,000**	**$75,000**	
GRAND TOTAL:				**6**	**0**	**$4,474,000**	**$10,875,000**	

[^] Thunderstorm with damaging winds verified in the vicinity of this location(s).

Sources: Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member responses to Logan County Critical Facilities Damaged by Natural Hazard Events Questionnaire.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

Figure 12
(Sheet 1 of 4)
Severe Storms – Hail Events Reported in Logan County
1958 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Diameter)	Injuries	Death	Property Damage	Crop Damage	Description
4/5/1958	3:00 p.m.	Mount Pulaski	1.00 in.	n/a	n/a	n/a	n/a	
5/15/1968	4:15 p.m.	Atlanta[A]	1.75 in.	n/a	n/a	n/a	n/a	
4/3/1974	11:05 a.m.	Hartsburg[A]	1.00 in.	n/a	n/a	n/a	n/a	
5/14/1991	11:08 a.m.	Latham	1.00 in.	n/a	n/a	n/a	n/a	
4/7/1995	10:11 p.m.	Atlanta	1.75 in.	n/a	n/a	n/a	n/a	
5/9/1995	5:16 p.m.	Lincoln	2.25 in.	n/a	n/a	$12,000,000	n/a	hail of various sizes fell for 40 minutes damaging thousands of cars and homes (mainly roof damage)
6/20/1995	5:05 p.m.	Lincoln	1.00 in.	n/a	n/a	n/a	n/a	
7/28/1996	4:58 p.m.	Lawndale	1.00 in.	n/a	n/a	n/a	n/a	
6/25/1997	1:59 p.m.	Lincoln	1.00 in.	n/a	n/a	n/a	n/a	hail caused some damage to cars and roofs
8/24/1997	3:07 p.m.	Burton View Lincoln Mount Pulaski[A]	1.75 in.	n/a	n/a	n/a	n/a	
4/7/1998	6:15 p.m.	Lincoln	1.00 in.	n/a	n/a	n/a	n/a	
4/29/1998	4:32 p.m.	Atlanta	1.00 in.	n/a	n/a	n/a	n/a	
5/2/1998	6:52 p.m.	Lawndale[A]	1.00 in.	n/a	n/a	n/a	n/a	
5/12/1998	8:27 p.m.	Elkhart	1.50 in.	n/a	n/a	n/a	n/a	
5/5/1999	7:00 p.m.	Elkhart[A] Broadwell[A]	1.25 in.	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$12,000,000**	**$0**	

[A] Hail event verified in the vicinity of this location(s).

Figure 12
(Sheet 2 of 4)
Severe Storms – Hail Events Reported in Logan County
1958 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Diameter)	Injuries	Death	Property Damage	Crop Damage	Description
2/29/2000	10:59 p.m.	Broadwell	1.75 in.	n/a	n/a	n/a	n/a	
4/20/2000	8:05 a.m.	Cornland Latham[^]	1.25 in.	n/a	n/a	n/a	n/a	
5/12/2000	3:08 p.m.	Broadwell Chestnut[^]	2.00 in.	n/a	n/a	n/a	n/a	
8/17/2000	6:00 p.m.	Latham	1.75 in.	n/a	n/a	n/a	n/a	
4/5/2001	2:12 p.m.	Mount Pulaski[^]	1.75 in.	n/a	n/a	n/a	n/a	
8/18/2001	11:39 a.m.	San Jose Hartsburg	3.75 in.	n/a	n/a	n/a	n/a	
8/18/2001	12:40 p.m.	New Holland	1.00 in.	n/a	n/a	n/a	n/a	
3/19/2003	7:45 p.m.	Lincoln[^]	1.00 in.	n/a	n/a	n/a	n/a	
4/4/2003	3:05 p.m.	New Holland Burton View	1.75 in.	n/a	n/a	n/a	n/a	
4/4/2003	4:18 p.m.	Cornland	1.00 in.	n/a	n/a	n/a	n/a	
4/4/2003	5:38 p.m.	Latham	1.00 in.	n/a	n/a	n/a	n/a	
5/30/2004	4:40 p.m.	San Jose	1.00 in.	n/a	n/a	n/a	n/a	
8/9/2004	5:49 p.m.	Lincoln Beason	1.75 in.	n/a	n/a	n/a	n/a	
10/29/2004	4:45 p.m.	Atlanta[^]	1.75 in.	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$0**	**$0**	

[^] Hail event verified in the vicinity of this location(s).

Figure 12
(Sheet 3 of 4)
Severe Storms – Hail Events Reported in Logan County
1958 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Diameter)	Injuries	Death	Property Damage	Crop Damage	Description
3/30/2005	4:21 p.m.	Lincoln[A]	1.75 in.	n/a	n/a	n/a	n/a	
3/30/2005	4:24 p.m.	Lawndale	1.50 in.	n/a	n/a	n/a	n/a	
3/30/2005	6:41 p.m.	Latham	1.00 in.	n/a	n/a	n/a	n/a	
9/19/2005	3:14 a.m.	Chestnut[A]	1.00 in.	n/a	n/a	n/a	n/a	
3/11/2006	7:09 p.m.	Lincoln	1.00 in.	n/a	n/a	n/a	n/a	
3/12/2006	8:55 p.m.	Mount Pulaski	1.50 in.	n/a	n/a	n/a	n/a	
3/12/2006	9:15 p.m.	Latham	1.75 in.	n/a	n/a	n/a	n/a	
4/16/2006	1:08 p.m.	Cornland	1.00 in.	n/a	n/a	n/a	n/a	
4/16/2006	1:13 p.m.	Lake Fork[A] Mount Pulaski	1.00 in.	n/a	n/a	n/a	n/a	
6/26/2006	3:30 p.m.	Mount Pulaski[A]	2.00 in.	n/a	n/a	n/a	n/a	
9/22/2006	5:35 p.m.	Broadwell	1.50 in.	n/a	n/a	n/a	n/a	
9/22/2006	5:53 p.m.	Beason	1.00 in.	n/a	n/a	n/a	n/a	
6/3/2008	8:07 p.m.	San Jose	1.00 in.	n/a	n/a	n/a	n/a	
5/15/2009	4:46 p.m.	Cornland[A]	1.00 in.	n/a	n/a	n/a	n/a	
5/15/2009	5:09 p.m.	Mount Pulaski	1.00 in.	n/a	n/a	n/a	n/a	
5/24/2010	5:50 p.m.	Beason[A]	1.00 in.	n/a	n/a	n/a	n/a	
2/27/2011	8:25 p.m.	Emden	1.25 in.	n/a	n/a	n/a	n/a	
5/22/2011	1:35 p.m.	Middletown[A]	1.00 in.	n/a	n/a	n/a	n/a	
6/4/2011	6:20 p.m.	New Holland[A]	1.00 in.	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$0**	**$0**	

[A] Hail event verified in the vicinity of this location(s).

Figure 12
(Sheet 4 of 4)
Severe Storms – Hail Events Reported in Logan County
1958 through 2012

Date(s)	Start Time	Location(s)	Magnitude (Diameter)	Injuries	Death	Property Damage	Crop Damage	Description
6/26/2011	11:05 p.m.	Latham	1.75 in.	n/a	n/a	n/a	n/a	
8/13/2011	3:34 p.m.	Mount Pulaski	2.50 in.	n/a	n/a	$836,000	$500,000	hail damaged roofs and numerous cars; a soybean field just southwest of the city was also destroyed
8/13/2011	3:40 p.m.	Elkhart	1.50 in.	n/a	n/a	n/a	n/a	
8/13/2011	4:00 p.m.	Latham	1.50 in.	n/a	n/a	n/a	n/a	
9/21/2012	2:01 p.m.	Emden	1.00 in.	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$836,000**	**$500,000**	
GRAND TOTAL:				**0**	**0**	**$12,836,000**	**$500,000**	

^ Hail event verified in the vicinity of this location(s).

Sources: Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member responses to Logan County Critical Facilities Damaged by Natural Hazard Events Questionnaire.
Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member responses to Logan County Natural Hazard Events Questionnaire.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

Figure 13
(Sheet 1 of 2)
Severe Storms – Lightning Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Injuries	Death	Property Damage	Crop Damage	Description
8/1990	n/a	Lincoln	1	n/a	n/a	n/a	lightning strike traveled through the phone lines injuring a fireman and damaging radio equipment and a tower
3/3/2000	n/a	Broadwell	n/a	n/a	$5,500	n/a	lightning strike damaged the water treatment facility
2007	n/a	Lincoln	n/a	n/a	$10,000	n/a	lightning strike damaged computers at the Logan County Courthouse
7/8/2008	n/a	Lincoln	n/a	n/a	$22,785	n/a	lightning strike damaged a communication tower at the Logan County Safety Complex
6/18/2009	n/a	Lincoln	n/a	n/a	$5,935	n/a	lightning strike damaged a communication tower at the Logan County Safety Complex
8/4/2009	n/a	Lincoln	n/a	n/a	$9,885	n/a	lightning strike damaged the Logan County Courthouse
2010	n/a	Lincoln	n/a	n/a	$20,000	n/a	lightning strike damaged the Lincoln Fire Department's generator system
7/5/2010	n/a	Broadwell	n/a	n/a	$8,200	n/a	lightning strike damaged the water treatment facility
Subtotal:			**1**	**0**	**$82,305**	**$0**	

^ Lightning event verified in the vicinity of this location(s).

Figure 13
(Sheet 2 of 2)
Severe Storms – Lightning Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Injuries	Death	Property Damage	Crop Damage	Description
2011	n/a	Atlanta	n/a	n/a	$13,000	n/a	lightning strike damaged a sanitary sewer lift station
10/13/2012	n/a	Elkhart	n/a	n/a	$33,000	n/a	lightning struck the Fire District's communication tower, knocking out the receiver units on the tower and hit the transformer next to the pump house damaging the electrical system and motor
Subtotal:			**0**	**0**	**$46,000**	**$0**	
GRAND TOTAL:			**1**	**0**	**$128,305**	**$0**	

^ Hail event verified in the vicinity of this location(s).

Sources: Logan County Emergency Management Agency, Terry Storer, Deputy Director.
Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee group discussion August 9, 2012.
Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member responses to Logan County Critical Facilities Damaged by Natural Hazard Events Questionnaire.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, COOP Data / Record of Climatological Observations.

Figure 14
(Sheet 1 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
6/27/1951 thru 6/29/1951	n/a	countywide	5.6 – 9.2	n/a	n/a	n/a	very heavy rain accompanied 2 tornadoes that struck Logan County during the evening of the 27th; the COOP observer in Lincoln measured 5.6 inches of rain while the observer in Mount Pulaski measured 9.2 inches of rain; the observer in Mount Pulaski measured a record 7.22 inches within a 24 hour period beginning at 9 p.m. on the 27th while the observer in Lincoln noted that many basements flooded in Lincoln and that a levee broke at Lake Fork during the morning of the 29th
2/9/1959 thru 2/10/1959	12:00 a.m.	- Lincoln - Mount Pulaski	1.9 – 2.7	n/a	n/a	n/a	COOP observer in Mount Pulaski measured 1.9 inches of rain while the observer in Lincoln measured 2.7 inches; the observer in Lincoln noted that those in the low lands could not get out for 2 days
5/5/1961 thru 5/8/1961	n/a	countywide	4.9 – 6	n/a	n/a	n/a	heavy rain fell over several days causing flooding within the county; the COOP observer in Mount Pulaski measured 4.9 inches of rain while the observer in Lincoln measured 6 inches
4/30/1962 thru 5/2/1962	n/a	countywide	2 – 2.5	n/a	n/a	n/a	COOP observer in Mount Pulaski measured 2 inches of rain while the observer in Lincoln measured 2.5 inches
5/10/1962	n/a	countywide	0.6 – 1.4	n/a	n/a	n/a	heavy rain fell on already saturated ground resulting in flooding within the county; the COOP observer in Lincoln measured 0.6 inches of rain while the observer in Mount Pulaski measured 1.4 inches
Subtotal:				**0**	**0**	**$0**	

^ Heavy rain event verified in the vicinity of this location(s).

Figure 14
(Sheet 2 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
9/15/1965 thru 9/16/1965	n/a	countywide	3.4 – 4.1	n/a	n/a	n/a	heavy rain led to flooding within the county; the COOP observer in Lincoln measured 3.4 inches of rain while the observer in Mount Pulaski measured 4.1 inches
9/20/1965 thru 9/22/1965	n/a	countywide	2.2 – 2.7	n/a	n/a	n/a	COOP observer in Mount Pulaski measured 2.2 inches of rain while the observer in Lincoln measured 2.7 inches
4/19/1966 thru 4/21/1966	n/a	countywide	2.4 – 2.5	n/a	n/a	n/a	COOP observer in Lincoln measured 2.4 inches of rain while the observer in Mount Pulaski measured 2.5 inches
4/23/1966	n/a	countywide	1.1 – 1.6	n/a	n/a	n/a	heavy rain fell on already saturated ground resulting in flooding within the county; the COOP observer in Lincoln measured 1.1 inches of rain while the observer in Mount Pulaski measured 1.6 inches
5/23/1968 thru 5/25/1968	n/a	countywide	2.6 – 3.7	n/a	n/a	n/a	COOP observer in Lincoln measured 2.6 inches of rain while the observer in Mount Pulaski measured 3.7 inches
6/30/1969 thru 7/1/1969	n/a	Lincoln	5.3	n/a	n/a	n/a	COOP observer in Lincoln measured 5.3 inches of rain
6/14/1970 thru 6/15/1970	n/a	countywide	4.4 – 5.5	n/a	n/a	n/a	COOP observer in Lincoln measured 4.4 inches of rain while the observer in Mount Pulaski measured 5.5 inches
Subtotal:				**0**	**0**	**$0**	

^ Heavy rain event verified in the vicinity of this location(s).

Figure 14
(Sheet 3 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
5/7/1972 thru 5/8/1972	n/a	countywide	3 – 5.4	n/a	n/a	n/a	COOP observer in Lincoln measured 5.4 inches of rain while the observer in Mount Pulaski measured 3 inches; the Lincoln observer indicated that 4.5 inches fell within 5 ½ hours during the evening of the 7th
6/21/1974 thru 6/22/1974	12:00 a.m.	- Lincoln - Mount Pulaski	4.1 – 4.5	n/a	n/a	n/a	COOP observer in Lincoln measured 4.1 inches of rain while the observer in Mount Pulaski measured 4.5 inches
5/31/1980 thru 6/5/1980	n/a	countywide	2.1 – 2.5	n/a	n/a	n/a	heavy rain fell over several days causing flooding within the county; the COOP observer in Mount Pulaski measured 2.1 inches of rain while the observer in Lincoln measured 2.5 inches
6/21/1981	n/a	countywide	2 – 2.2	n/a	n/a	n/a	COOP observer in Mount Pulaski measured 2 inches of rain while the observer in Lincoln measured 2.2 inches
7/4/1981 thru 7/5/1981	12:00 a.m.	Elkhart	5.3 – 7.3	n/a	n/a	n/a	very heavy rain caused flooding in over 20 homes and more than half of the basements in the village; there was over 6 feet of standing water and almost all of the streets were flooded and impassable except by boat; the COOP observer in Mount Pulaski measured 7.3 inches of rain while the COOP observer in Lincoln measured 5.3 inches
8/3/1981	n/a	countywide	2.5 – 3	n/a	n/a	n/a	COOP observer in Lincoln measured 2.5 inches of rain while the observer in Mount Pulaski measured 3 inches
Subtotal:				**0**	**0**	**$0**	

[A] Heavy rain event verified in the vicinity of this location(s).

Figure 14
(Sheet 4 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
12/2/1982 thru 12/6/1982	n/a	countywide	5.6 – 6.7	n/a	n/a	n/a	very heavy rain fell over several days causing flooding within the county; the COOP observer in Mount Pulaski measured 5.6 inches of rain while the observer in Lincoln measured 6.7 inches
12/24/1982	n/a	Mount Pulaski	2.1	n/a	n/a	n/a	COOP observer in Mount Pulaski measured 2.1 inches of rain with 1 inch falling between 7 p.m. and 8 p.m.
4/1/1983 thru 4/5/1983	n/a	countywide	1.6 – 1.9	n/a	n/a	n/a	heavy rain fell over several days causing flooding within the county; the COOP observer in Lincoln measured 1.6 inches of rain while the observer in Mount Pulaski measured 1.9 inches
5/1/1983 thru 5/2/1983	n/a	countywide	0.8 – 2.2	n/a	n/a	n/a	locally heavy rains led to flooding within the county; the COOP observer in Mount Pulaski measured 0.8 inches of rain while the observer in Lincoln measured 2.2 inches
6/29/1983	n/a	countywide	0.4 – 0.8	n/a	n/a	n/a	heavy rain fell on already saturated ground resulting in flooding within the county; the COOP observer in Mount Pulaski measured 0.4 inches of rain while the observer in Lincoln measured 0.8 inches
9/19/1986 thru 9/20/1986	n/a	countywide	2.8 – 3.7	n/a	n/a	n/a	very heavy rains resulted in flash flooding within the county; the COOP observer in Mount Pulaski measured 2.8 inches of rain while the observer in Lincoln measured 3.7 inches
Subtotal:				**0**	**0**	**$0**	

^ Heavy rain event verified in the vicinity of this location(s).

Figure 14
(Sheet 5 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
5/15/1990 thru 5/16/1990	n/a	countywide	1.8 – 2.1	n/a	n/a	n/a	thunderstorms, some severe, led to flooding within the county; the COOP observer in Lincoln measured 1.8 inches of rain while the observer in Mount Pulaski measured 2.1 inches
5/3/1991 thru 5/4/1991	12:00 a.m.	- Lincoln - Mount Pulaski	2.9 – 3.7	n/a	n/a	n/a	COOP observer in Lincoln measured 2.9 inches of rain while the observer in Mount Pulaski measured 3.7 inches
8/5/1991 thru 8/7/1991	n/a	- Lincoln - Mount Pulaski	3.5 – 5.2	n/a	n/a	n/a	COOP observer in Lincoln measured 3.5 inches of rain while the observer in Mount Pulaski measured 5.2 inches
10/3/1991 thru 10/4/1991	n/a	countywide	3.2 – 5.7	n/a	n/a	n/a	COOP observer in Mount Pulaski measured 3.2 inches of rain while the observer in Lincoln measured 5.7 inches
6/4/1993	n/a	Mount Pulaski	2.6	n/a	n/a	n/a	COOP observer in Mount Pulaski measured 2.6 inches of rain
7/13/1993	n/a	Lincoln	2.1	n/a	n/a	n/a	COOP observer in Lincoln measured 2.1 inches of rain
4/11/1994 thru 4/12/1994	12:00 a.m.	countywide	3.8 – 5.3	n/a	n/a	n/a	very heavy rains fell across the county resulted in river and creek flooding; the COOP observer in Mount Pulaski measured 5.3 inches of rain while the observer in Lincoln measured 3.8 inches
Subtotal:				**0**	**0**	**$0**	

^ Heavy rain event verified in the vicinity of this location(s).

Figure 14
(Sheet 6 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
4/29/1998 thru 4/30/1998	4:40 p.m.	- Lincoln - northeastern portion of the county	2 – 4	n/a	n/a	n/a	2 to 4 inches of rain resulted in flash flooding across northeastern Logan County; over 1,000 buildings sustained some kind of water damage; 15 businesses were extensively damaged; numerous roads were closed due to high water
8/12/1999 Thru 8/13/1999	6:55 p.m.	- Mount Pulaski - southern portion of the county	5	n/a	n/a	n/a	severe thunderstorms produced heavy rains across southern Logan County; the COOP observer in Mount Pulaski measured 5 inches of rain within a couple of hours which resulted in flash flooding; numerous roads in the area were closed
6/12/2000	8:40 p.m.	Lincoln	NA	n/a	n/a	n/a	locally heavy rainfall in the southern part of Lincoln led to flooding of numerous fields and township roads in the area
6/20/2000	5:52 p.m.	countywide	4 – 6	n/a	n/a	n/a	thunderstorms, some severe, produced 4 to 6 inches of heavy rain that resulted in flash flooding across the county; widespread flooding of roads, underpasses, viaducts and ditches was reported in Lincoln, Mount Pulaski and Broadwell; 40 homes had flooded basements
4/19/2002	9:27 p.m.	Mount Pulaski	1.5	n/a	n/a	n/a	very heavy rain over a short period of time resulted in flash flooding of a viaduct; the COOP observer in Mount Pulaski measured 1.50 inches of rain
4/27/2002	11:45 a.m.	Lincoln	2.1	n/a	n/a	n/a	very heavy rain resulted in flash flooding of an underpass on Old Rte. 66 on the north side of the city; the NWS staff in Lincoln measured 2.1 inches of rain
Subtotal:				**0**	**0**	**$0**	

[^] Heavy rain event verified in the vicinity of this location(s).

Figure 14
(Sheet 7 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
5/7/2002	2:00 a.m.	Cornland[^]	NA	n/a	n/a	n/a	heavy rains resulted in flash flooding of IL Rte. 54 just northeast of Cornland
7/27/2002	1:26 a.m.	New Holland[^]	2.4	n/a	n/a	n/a	very heavy rain resulted in flash flooding on IL Rte. 10 near New Holland as well as along numerous rural roads; the NWS staff in Lincoln measured 2.1 inches of rain
7/28/2002	4:25 p.m.	Atlanta	2	n/a	n/a	n/a	2 inches of rain fell in a short amount of time resulting in flash flooding of numerous roads, including I-55 for a short time
8/16/2002	5:15 a.m.	- Lincoln[^] - Mount Pulaski[^]	2.3 – 3.7	n/a	n/a	n/a	very heavy rain fell over a short period of time resulting in flash flooding of several roads, including IL Rte. 121 south of Chestervale; the COOP observer in Mount Pulaski measured 2.3 inches of rain while the NWS staff in Lincoln measured 3.7 inches
6/11/2003	6:15 p.m.	Latham[^]	1.4	n/a	n/a	n/a	very heavy rain fell in a short amount of time resulting in flash flooding of several rural roads; the COOP observer in Mount Pulaski measured 1.4 inches of rain
7/9/2003 thru 7/10/2003	8.30 p.m.	Lincoln	4.8	n/a	n/a	n/a	very heavy rain fell for several hours resulting in flash flooding of many streets; the NWS staff in Lincoln measured 4.8 inches of rain
7/21/2003	1:20 a.m.	Lincoln	2.1	n/a	n/a	n/a	thunderstorms, some severe, produced very heavy rain within a short amount of time resulting in flash flooding of numerous roads; the NWS staff in Lincoln measured 2.1 inches of rain
Subtotal:				**0**	**0**	**$0**	

[^] Heavy rain event verified in the vicinity of this location(s).

Figure 14
(Sheet 8 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
5/24/2004 thru 5/25/2004	10:45 p.m.	countywide	3	n/a	n/a	n/a	thunderstorms, some severe, produced 3 inches of rain in a short amount of time resulting in flash flooding of numerous rural and urban roads
6/15/2004	8:18 a.m.	Mount Pulaski	1.2	n/a	n/a	n/a	heavy rains resulted in flash flooding of city streets; 4 people had to be rescued from their cars on IL Rte. 121 under the Canadian National railroad bridge when the underpass became flooded; the COOP observer in Mount Pulaski measured 1.2 inches of rain
8/25/2004	4:46 p.m.	northwestern portion of the county	2.2	n/a	n/a	n/a	very heavy rain resulted in flash flooding of numerous roads between San Jose and Lincoln; US Rte. 136 was closed for a time due to standing water; the NWS staff in Lincoln measured 2.2 inches of rain
1/12/2005 thru 1/13/2005	10:20 p.m.	Lincoln	2.1	n/a	n/a	n/a	very heavy rain resulted in flash flooding of numerous streets in the city, including IL Rte. 10; the NWS staff in Lincoln measured 2.1 inches of rain
6/3/2008 thru 6/4/2008	9:40 a.m.	countywide	3.5 – 4.4	n/a	n/a	n/a	thunderstorms, some severe, produced very heavy rains that resulted in flash flooding of numerous roads across the County; the COOP observer in Mount Pulaski measured 3.5 inches of rain while the NWS staff in Lincoln measured 4.4 inches
Subtotal:				**0**	**0**	**$0**	

[^] Heavy rain event verified in the vicinity of this location(s).

Figure 14
(Sheet 9 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
5/15/2009	5:00 p.m.	- Latham - southern portion of the county	2.9	n/a	n/a	n/a	thunderstorms, some severe, produced heavy rains that fell on already saturated ground and resulted in flash flooding in southeastern Logan County; IL Rte. 121 between Mount Pulaski and Latham was impassible due to high water and an apartment complex in Latham was evacuated due to rapidly rising water; the COOP observer in Mount Pulaski measured 2.9 inches of rain
10/30/2009 thru 10/31/2009	1:00 p.m.	countywide	2 – 3	n/a	n/a	n/a	heavy rains of 2 to 3 inches fell on already saturated ground during a 30 hour period causing numerous creeks, streams, ditches and rural roads to flood
5/24/2010	8:00 p.m.	- Middletown - western portion of the county	4.5	n/a	n/a	n/a	4.5 inches of rain fell within 3 hours resulting in flash flooding in the western portion of the County; many rural roads were inundated by the flooding, particularly near Middletown
6/12/2010	3:00 p.m.	central portion of county	2.5	n/a	n/a	n/a	2.5 inches of rain resulted in flash flooding in central Logan County, including the city of Lincoln; numerous roads were inundated with more than 1 foot of flowing water
6/15/2010	3:30 p.m.	- Mount Pulaski - eastern portion of the county	1.5	n/a	n/a	n/a	1.5 inches of rain fell in an hour resulting in flash flooding along a narrow band in the eastern portion of the county; numerous streets were flooded in Mount Pulaski, along with most rural roads northeast of the city
Subtotal:				**0**	**0**	**$0**	

^ Heavy rain event verified in the vicinity of this location(s).

Figure 14
(Sheet 10 of 10)
Severe Storms – Heavy Rain Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Death	Property Damage	Description
6/22/2010	9:15 a.m.	countywide	1.5 – 2.3	n/a	n/a	n/a	1.5 to 2.3 inches of rain fell on top of already saturated ground and resulted in rapid flash flooding in most of the County; many city streets in Lincoln were flooded which stranded several cars and nearly 1 foot of water flowed from the parking lot into part of Lincoln Community High School; most rural roads west and south of Lincoln were impassable
Subtotal:				**0**	**0**	**$0**	
GRAND TOTAL:				**0**	**0**	**$0**	

^ Heavy rain event verified in the vicinity of this location(s).

Sources: National Weather Service, Weather Forecast Office – Central Illinois, Chris Miller, Warning Coordination Meteorologist.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, COOP Data / Record of Climatological Observations.

3.2 TORNADOES

IDENTIFYING THE HAZARD

What is the definition of a tornado?

A tornado is a violently rotating column of air, usually characterized by a twisting, funnel-shaped cloud, that extends from the cloud formation of a thunderstorm to the ground. The strongest tornadoes have rotating wind speeds of more than 250 miles per hour and can create damage paths in excess of one mile wide and 50 miles long.

Not all tornadoes have a visible funnel cloud. Some may appear nearly transparent until dust and debris are picked up or a cloud forms within the funnel. Generally, tornadoes move from southwest to northeast, but they have been known to travel in any direction, even backtracking. The average forward speed of a tornado is 30 mile per hour, but this may vary from nearly stationary to 70 miles per hour.

About 1,000 tornadoes hit the United States yearly. The destruction caused by a tornado may range from light to catastrophic depending on the intensity, size and duration of the storm. Tornadoes cause crop and property damage, power outages, environmental degradation, injury and death. Torndoes are known to blow off roofs, move cars and tractor trailers and demolish homes. Typically tornadoes cause the greatest damage to structures of light construction, such as residential homes. On average, tornadoes kill 60 people per year, mostly from flying or falling debris.

How are tornadoes rated?

Originally tornadoes were rated using the Fujita Scale (F-Scale), which related the degree of damage caused by a tornado to the intensity of the tornado's wind speed. The Scale identified six categories of damage, F0 through F5. **Figure 24** gives a brief description of each category.

Use of the original Fujita Scale was discontinued on February 1, 2007 in favor of the Enhanced Fujita Scale. The original scale had several flaws including basing a tornado's intensity and damages on wind speeds that were never scientifically tested and proven. It also did not take into consideration that a multitude of factors (i.e. structure construction, wind direction and duration, flying debris, etc.) affect the damage caused by a tornado. In addition, the process of rating the damage itself was based on the judgment of the damage assessor. In many cases, meteorologists and engineers highly experienced in damage survey techniques often came up with different F-scale ratings for the same damage.

The Enhanced Fujita Scale (EF-Scale) was created to remedy the flaws in the original scale. It continues to use the F0 through F5 categories, but it classifies the level of damage (one through eight) as calibrated by engineers and meteorologists to 28 different types of damage indicators (mainly various building types, towers/poles and trees.) The wind speeds assigned to each category are estimates, not measurements, based on the damage assessment. **Figure 24** identifies the Enhanced Fujita Scale.

Figure 24
Fujita & Enhanced Fujita Tornado Measurement Scales

F-Scale		EF-Scale		Description
Category	**Wind Speed (mph)**	**Category**	**Wind Speed (mph)**	
F0	40 – 72	EF0	65 – 85	Light damage – some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; damage to sign boards
F1	73 – 112	EF1	86 – 110	Moderate damage – peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads
F2	113 – 157	EF2	111 – 135	Considerable damage – roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground
F3	158 – 207	EF3	136 – 165	Severe damage – roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off ground and thrown
F4	208 – 260	EF4	166 – 200	Devastating damage – well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated
F5	261 – 318	EF5	Over 200	Incredible damage – strong frame houses lifted off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 yards; trees debarked; incredible phenomena will occur

Source: National Oceanic and Atmospheric Administration, Storm Prediction Center.

The idea behind the EF-Scale is that a tornado scale needs to take into account the typical strengths and weaknesses of different types of construction, instead of applying a "one size fits all" approach. This is due to the fact that the same wind speed can cause different degrees of damage to different kinds of structures. In a real life application, the degree of damage to each of the 28 indicators can be mapped together to create a comprehensive damage analysis. As with the original scale, the EF-Scale rates the tornado as a whole based on the most intense damage within the tornado's path.

While the EF-Scale is currently in use, ***the historical data presented in this report is based on the original F-Scale***. None of the tornadoes rated before February 1, 2007 will be re-evaluated using the EF-Scale.

Are alerts issued for tornadoes?

Yes. The National Weather Service Weather Forecast Office in Lincoln, Illinois is responsible for issuing ***tornado watches*** and ***warnings*** for Logan County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Watch.** A tornado watch is issued when conditions are favorable for the development of tornadoes in and close to the water area. Watches cover large areas of one or more states and are usually in effect for several hours. It does not mean that a tornado is imminent, just that individuals need to be alert and prepared.

- **Warning.** A tornado warning is issued when a tornado has been sighted or indicated by radar. Warnings are generally in effect for about 45 minutes or less, cover all or portions of specific counties and indicate imminent danger to life and property for those who are in the path of the tornado. Individuals should see shelter immediately.

PROFILING THE HAZARD

When have tornadoes occurred previously? What is the extent of these previous tornadoes?

Figure 25, located at the end of this section, summarizes the previous occurrences as well as the extent or magnitude of tornado events recorded in Logan County. NOAA's Storm Events Database and records from the National Weather Service Central Illinois Weather Forecast Office in Lincoln have documented 59 occurrences of tornadoes in Logan County between 1950 and 2012. In comparison, there have been 2,047 tornadoes statewide between 1950 and November 30, 2009.

Tornado Fast Facts – Occurrences

Number of Tornadoes Reported (1950 – 2012): ***59***
Highest F-Scale Rating Recorded: ***F4***
Most Likely Month for Tornadoes to Occur: ***April***
Most Likely Time for Tornadoes to Occur: ***Late Afternoon/Evening***
Average Length of a Tornado: ***3.26 miles***
Average Width of a Tornado: ***145 yards***
Average Damage Pathway of a Tornado: ***0.27 sq. mi.***
Longest Tornado: ***40 miles (approx. 27 miles in Logan Co.)***
Widest Tornado: ***1,000 yards***

Figure 26 charts the reported occurrences of tornadoes by magnitude. Of the 59 occurrences, one was classified as an F4 tornado, five were classified as F3 tornadoes, six were classified as F2 tornadoes, nine were classified as an F1 tornado, 35 were classified as F0 tornadoes, one was classified as an EF3 tornado and two were classified as EF0 tornadoes.

Figure 26
Tornadoes by Magnitude
1950 – 2012

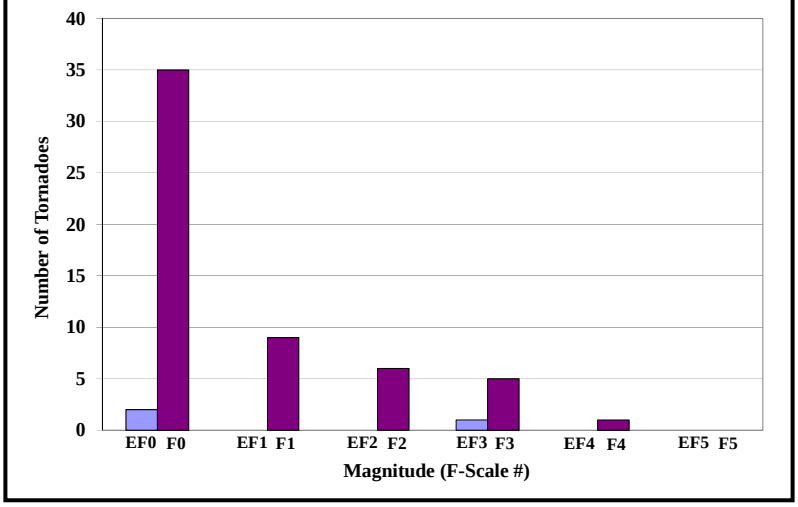


Figure 27 charts the reported tornadoes by month. Of the 59 events, 44 (75%) took place in April, May and June, making this the peak period for tornadoes in Logan County. In comparison, 1,355 of the 2,047 tornadoes (66%) recorded in Illinois since 1950 also took place in April, May and June.

Figure 27
Tornadoes by Month
1950 – 2012

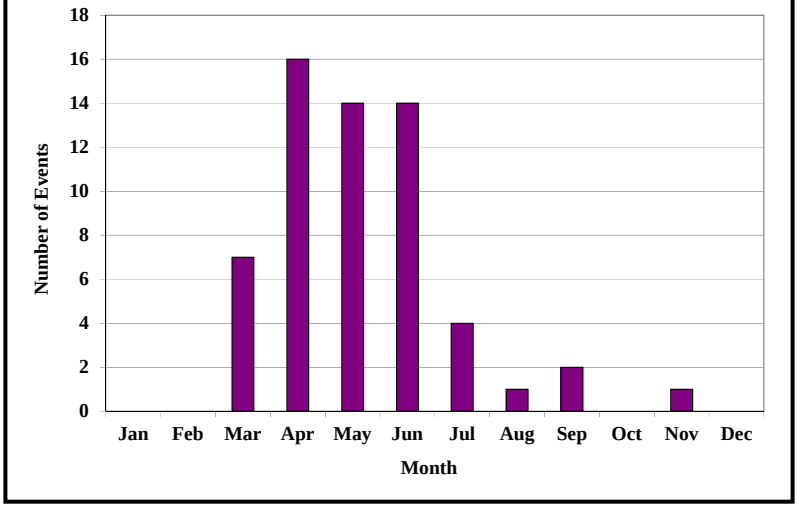
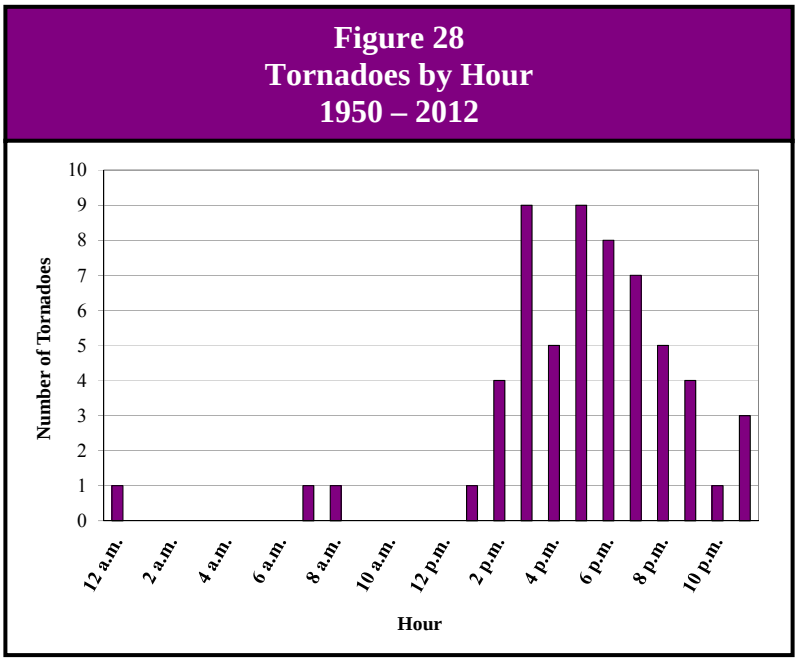


Figure 28 charts the reported tornadoes by hour. Approximately 95% of all tornadoes occurred during the p.m. hours, with 38 of the events (65%) taking place between 3 p.m. and 8 p.m. In comparison, more than half of all Illinois tornadoes occur between 3 p.m. and 7 p.m.

Figure 28
Tornadoes by Hour
1950 – 2012



The tornadoes that have impacted Logan County have varied from 0.1 miles to 40 miles in length (27 miles of which occurred in Logan County) and from 7 yards to 1,000 yards in width. The average length of a tornado in Logan County is 3.26 miles and the average width is 145 yards (0.08 miles).

Figures 29 and **30** show the pathway of each reported tornado. The numbers by each tornado correspond with the tornado description in **Figure 25**. Records indicate that most of these tornadoes generally moved from southwest to northeast across the County. Unlike other natural hazards (i.e., severe winter storms, drought and extreme heat), tornadoes impact a relatively small area. Typically the area impacted by a tornado is less than four square miles. In Logan County, the average damage pathway or area impacted for a tornado is 0.27 square miles.



Structure damage sustained during the August 19, 2009 EF3 tornado.

Photograph provided by Logan County EMA.

The longest tornado recorded in Logan County occurred on May 9, 1995. This F3 tornado measured 40 miles in length and touched down approximately 4 ½ miles southwest of Cantrell in Sangamon County and traveled northeast across Menard and Logan Counties before lifting off approximately 5 miles northeast of Beason in DeWitt County. The tornado was on the ground in Logan County for approximately 27 miles. The damage pathway of this tornado covered an estimated 20 square miles, with approximately 13.5 square miles occurring in Logan County.

The widest tornado recorded in Logan County occurred on May 5, 1977. This F4 tornado, measuring 1,000 yards wide, touched down approximately ½ mile southwest of Atlanta and traveled northeast paralleling I-55 for approximately 10 miles before dissipating in the vicinity of Funks Grove in McLean County. The tornado was on the ground in Logan County for approximately 5 miles. The damage pathway of this tornado covered an estimated 5.7 square miles, with approximately 2.8 square miles occurring in Logan County.

What locations are affected by tornadoes?

Tornadoes have the potential to affect the entire County. Five of the participating municipalities, Atlanta, Broadwell, Elkhart, Hartsburg and Lincoln have had reported occurrences of tornadoes within their corporate limits. The *2010 Illinois Natural Hazard Mitigation Plan* prepared by IEMA classifies Logan County's hazard rating for tornadoes as "high."

What is the probability of future tornadoes occurring?

Logan County has had 59 verified occurrences of tornadoes between 1950 and 2012. With 59 tornadoes over the past 63 years, the probability or likelihood that a tornado will touchdown somewhere in the County in any given year is 94%. There were 10 years over the last 63 years where more than one tornado occurred. This indicates that the probability that more than one tornado may occur during any given year within the County is 16%.

Figure 29
F0 & EF0 Tornado Touchdowns in Logan County: 1950 – 2012

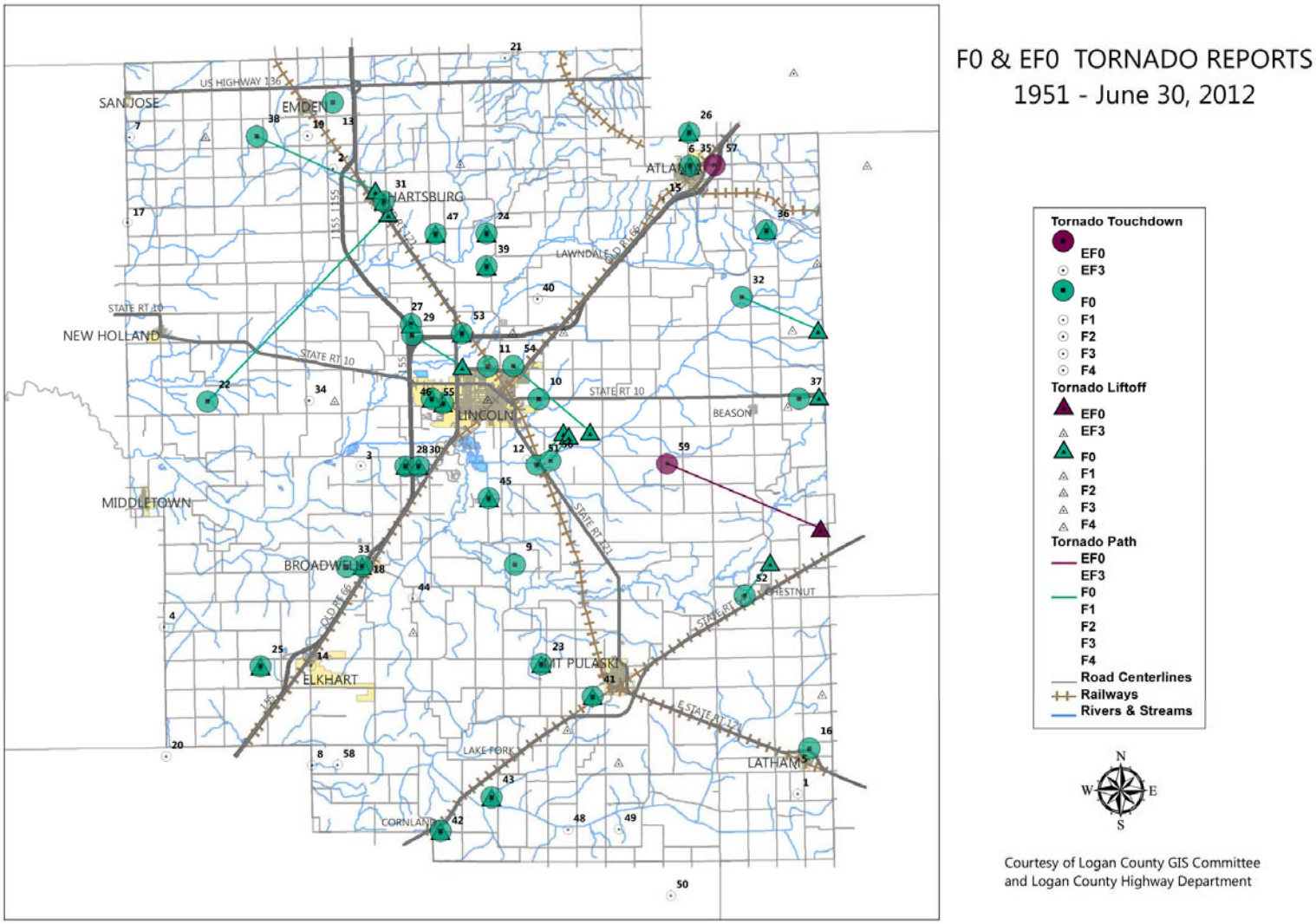
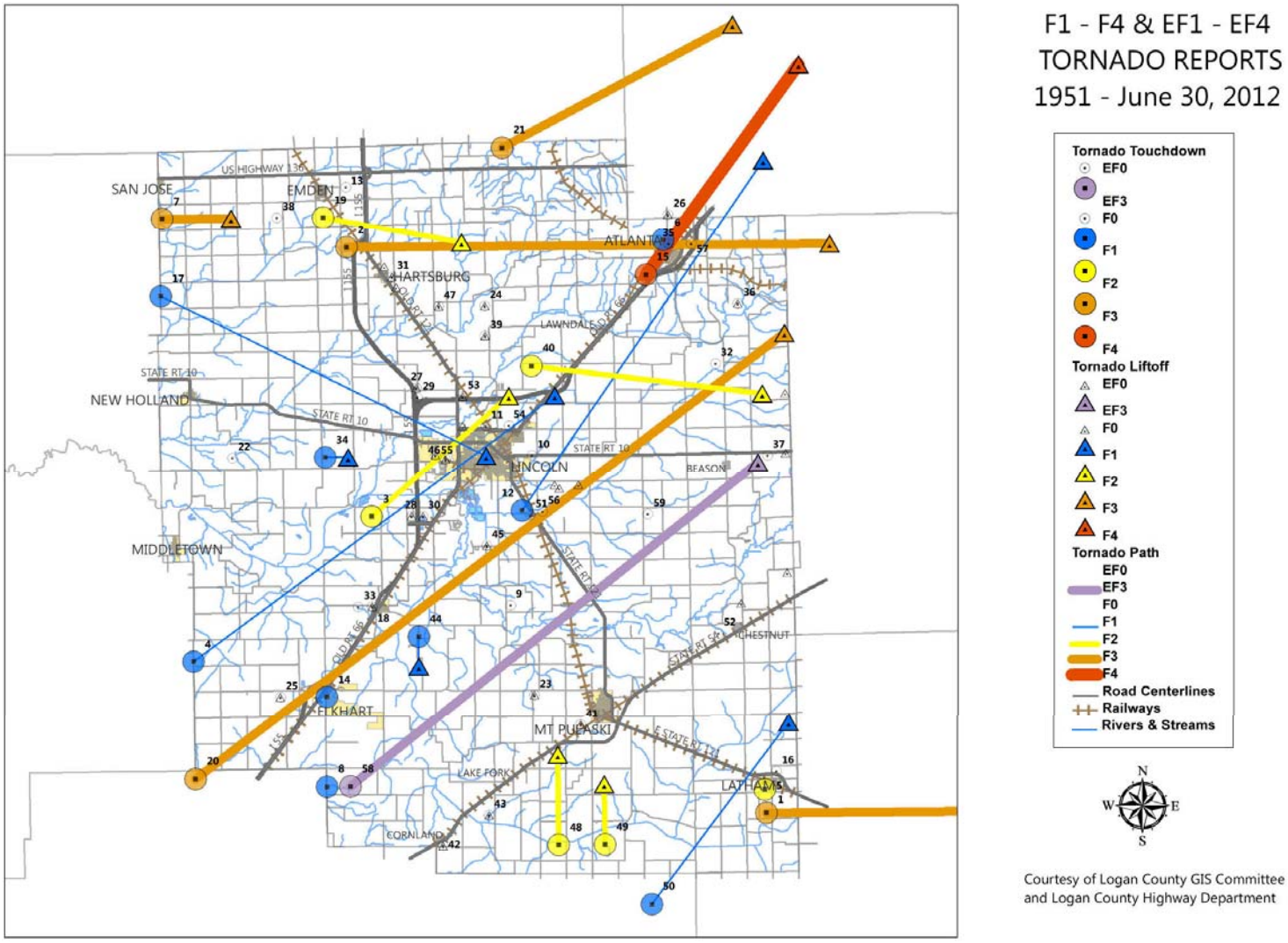


Figure 30
F1 – F4 & EF1 – EF4 Tornado Touchdowns in Logan County: 1950 – 2012



ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to tornadoes?

Yes. All of Logan County is vulnerable to the dangers presented by tornadoes. According to NOAA's Storm Events Database and records from the National Weather Service Central Illinois Weather Forecast Office in Lincoln, a majority of the tornadoes have touched down or passed through the central and eastern portions of the County. Emden and Mount Pulaski are the only communities that have not had a tornado touch down or pass through their municipal boundaries. **Figure 31** lists the verified tornadoes that have touched down in or near each participating municipality.

Figure 31
Verified Tornado Touchdowns In or Near Participating Municipalities

Participating Municipality	Number of Verified Tornadoes	Year Tornado Touchdown
Atlanta	8	1951*****, 1960*****, 1974*****, 1977*****, 1998, 2003, 2003, 2007
Broadwell	4	1954, 1982, 2000*****, 2003
Elkhart	6	1954, 1972, 1975*****, 1995*****, 1998, 2009
Emden	4	1951, 1975, 1985, 2003
Hartsburg	5	1985, 1996*****, 2000, 2003*****, 2004
Lincoln	23	1953, 1954, 1973, 1973*****, 1973, 1974, 1981*****, 1995, 1998, 1999, 1999, 1999, 2000, 2003, 2003, 2003, 2004, 2004, 2006, 2006, 2006*****, 2006*****, 2006
Mount Pulaski	5	1998, 2003, 2006, 2006, 2009

***** Tornado touched down or passed through the municipality.

A total of 23 tornadoes have occurred within the municipal boundaries or in the vicinity of Lincoln. This is almost triple the number of tornadoes that have affected any other participating municipality in the County. In addition to the higher tornado frequency, approximately half of all County residents reside in Lincoln. This combination of facts makes Lincoln highly vulnerable to tornado damage.

In terms of unincorporated areas vulnerable to tornadoes, Beason, Chestnut and Lake Fork have had more tornadoes touch down in their vicinity than any other area. **Figure 32** details the verified tornadoes touch downs near unincorporated areas of Logan County.

Figure 32
Verified Tornado Touchdowns Near Unincorporated Areas of Logan County

Unincorporated Area	Number of Verified Tornadoes	Year Tornado Touchdown
Beason	6	1995, 2000, 2003, 2003, 2009, 2010
Burton View	0	---
Chestnut	2	2006, 2010
Chestervale	0	---
Cornland	1	2003
Lake Fork	2	2003, 2006
Lawndale	1	2003
Union	1	1996

What impacts resulted from the recorded tornadoes?

According to the data provided by NOAA's Storm Events Database and committee member records, 29 of the 59 tornadoes caused $38,542,813 in property damage and $1,045,000 in crop damage between 1950 and 2012. There were 11 events where property damage totals were at least $2.5 million each; however the totals for six of these events ($15 million) represent losses sustained in two or more counties (including Logan County) and a breakdown by county was not available. Property damage information was either unavailable or none was recorded for the remaining 30 reported occurrences.

Tornado Fast Facts – Impacts/Risk

Tornado Events

- Total Property Damage: ***$38,542,813****
- Infrastructure/Critical Facilities Damage†: ***$21,063***
- Crop Damage: ***$1,045,000***
- Injuries: ***75***^
- Fatalities: ***1***^

Risk/Vulnerability to:

- Public Health & Safety – Rural Areas: ***Low/Medium***
- Public Health & Safety – Municipalities/Populated Unincorp. Areas: ***High***
- Buildings/Infrastructure/Critical Facilities – Rural Areas: ***Low/Medium***
- Buildings/Infrastructure/Critical Facilities – Municipalities/Populated Unincorp. Areas: ***High***

* Includes $15 million in property damages sustained as a result of six separate events and represents losses incurred in two or more counties

† Infrastructure/Critical Facilities Damage totals are included in the Total Property Damage amounts.

^ Includes 58 injuries and 1 fatality sustained as a result of four separate events and represents losses incurred in two or more counties.

Included in the property damage figures provided above is $21,063 in verified infrastructure and critical facilities damage sustained by Elkhart and unincorporated Logan County during separate tornado events. The following provides a brief description of the damages by jurisdiction.

Elkhart

- An F3 tornado on May 9, 1995 caused $15,000 in property damage to the Fire Protection District building. The roof, doors, gutters and windows were damaged or broken during the event.

Logan County

- On March 12, 2006, two F2 tornadoes and one F1 tornado touched down in Logan County downing numerous trees and power poles. The Logan County Highway Department and various township road districts spent $6,063 to assist in the cleanup for this federally-declared disaster.

NOAA's Storm Events Database documented a total of 75 injuries and one death as a result of 12 tornado events. Of the 75 injuries, 58 were sustained as a result of four separate events that each impacted two or more counties (including Logan County.) The one death was also sustained during an event that traversed two counties (Logan County and DeWitt County.) A breakdown by county for these injuries and death was not available. Of the remaining eight tornado events with injuries, detailed information was only available for two of the events. The following provides a brief description of each event.

- On June 4, 1999 an F0 tornado touched down near the intersection of I-55 and I-155 and blew over several semi-trucks, injuring two drivers.
- An F0 tornado on April 18, 2006 crossed I-55 near mile marker 126 (Illinois Route 121), overturning two semi-trucks and injuring two individuals.



An F0 tornado touched down in the Morningside Mobile Home Park just south of Lincoln on May 30, 2004 destroying 3 mobile homes and injuring 3 individuals.

Photograph provided by Logan County EMA.

Despite their relative frequency, a large majority of the tornadoes that have impacted Logan County have touched down in rural areas away from concentrated populations. This has contributed to the relatively low number of injuries and deaths. In comparison, Illinois averages four tornado fatalities annually; however, this number varies widely from year to year.

A County's vulnerability to injuries and fatalities is also influenced by access to adequate health care for those injured following an event. Assuming that the hospital in Lincoln is not directly impacted by a tornado, it is equipped to provide continuous care to those injured during an event. There are also nearby hospitals in the Springfield (Sangamon County), Decatur (Macon County), Clinton (DeWitt County), Bloomington (McLean County), and the Peoria area (Tazewell and Peoria Counties) which are equipped to provide care to any persons injured.

If the abovementioned factors (tornado touchdown locations and proximity of health care facilities) are taken into consideration, the risk to public health and safety from tornadoes is low to medium. However, if a tornado were to touchdown in any of the municipalities, the risk or vulnerability for that location would be elevated to high.

Words alone cannot fully convey the scope of the damages caused by tornadoes in Logan County. Select photographs provided by committee members are located throughout this section and in **Appendix L**. In addition, news articles with photographs detailing the damage caused by the August 19, 2009 tornado can be found in **Appendix M**.

What other impacts can result from tornadoes?

In addition to causing damage to buildings and properties, tornadoes can damage infrastructure and critical facilities such as roads, bridges, railroad tracks, drinking water treatment facilities, water towers, communication towers, antennae, power substations, transformers and poles. Depending on the damage done to the infrastructure and critical facilities, indirect impacts on individuals could range from inconvenient (i.e., adverse travel) to life-altering (i.e., loss of utilities for extended periods of time).



An F1 tornado on April 4, 2003 damaged the communication tower at the Logan County backup 911 center.

Photograph provided by Logan County EMA.

Are existing buildings, infrastructure and critical facilities vulnerable to tornadoes?

Yes. All existing buildings, infrastructure and critical facilities located within the County and the participating municipalities are vulnerable to damage from tornadoes. Buildings, infrastructure and critical facilities located in the path of a tornado usually suffer extensive damage, if not complete destruction.



An EF3 tornado on August 19, 2009 embedded a fence post in the side of a house.

Photograph provided by Logan County EMA.

While some buildings adjacent to a tornado's path may remain standing with little or no damage, all are vulnerable to damage from flying debris. It is common for flying debris to cause damage to roofs, siding and windows. In addition, mobile homes, homes on crawlspaces and buildings with large spans (i.e., schools, barns, airport hangers, factories, etc.) are more likely to suffer damage. Most workplaces and many residential units do not provide sufficient protection from tornadoes.

The damages sustained by infrastructure and critical facilities during a tornado are similar to those experienced during a severe storm. There is a high probability that power, communication and transportation will be disrupted in and around the affected area.

Assessing the Vulnerability of Existing Residential Structures

One way to assess the vulnerability of existing residential structures is to estimate the number of housing units that may be potentially damaged if a tornado were to touchdown or pass through the County. A quick and simple method for accomplishing this is to calculate the average housing unit density in the County. This can be done by dividing the number of housing units in the County by the land area in the County. **Figure 33** calculates the average housing unit density in Logan County. The result suggests that there is an average of 20 housing units per square mile.

Figure 33
Calculation of Average Housing Unit Density

Total Housing Units ÷ Land Area = Average Housing Unit Density
(Rounded Up to the Nearest Whole Number)

Logan County: 12,107 housing units ÷ 618 square miles = 20 housing units/square mile

While this method provides an adequate assessment of the number of housing units that may be potentially damaged in a densely populated county, it does not provide a realistic assessment for those counties with large, sparsely populated rural areas such as Logan County.

In Logan County, as well as many other central Illinois counties, differences in housing density must be considered when assessing the vulnerability of existing residential buildings to tornado damage. Approximately 75% of all housing units are located in four of the County's

17 townships (Atlanta, East Lincoln, Mount Pulaski and West Lincoln) while 63% of mobile homes are located in three of the 17 townships (Chester, East Lincoln and West Lincoln.) **Figure 34** provides a breakdown of housing units by township and **Figure 35** shows the township boundaries. Tornado damage to buildings (especially mobile homes), infrastructure and critical facilities in these more densely populated townships is likely to be greater than in the rest of the County.

Figure 34
Existing Housing Units by Township

Township	Total Housing Units (2010)	Mobile Homes (2000)*	Land Area (Sq. Miles) (2010)	Average Housing Unit Density (Units/Sq. Mile) Raw
Aetna	228	17	34.659	6.57838
Atlanta	856	51	24.182	35.39823
Broadwell	256	16	32.909	7.77903
Chester	298	93	38.293	7.78210
Corwin	302	44	33.563	8.99800
East Lincoln	3,678	95	36.054	102.01365
Elkhart	249	2	51.705	4.81578
Eminence	186	17	42.541	4.37225
Hurlbut	134	5	25.153	5.32740
Laenna	282	8	35.051	8.04542
Lake Fork	56	0	17.771	3.15120
Mount Pulaski	965	33	54.052	17.85318
Oran	162	8	34.275	4.72648
Orvil	483	18	41.924	11.52085
Prairie Creek	194	19	42.289	4.58748
Sheridan	220	6	35.548	6.18882
West Lincoln	3,558	228	38.088	93.41525
Logan County	12,107	660	618.057	19.58881

* At the time this Plan was submitted for approval, the U.S. Census Bureau had not released the 2010 Census DP-4 Selected Housing Characteristics data tables for geographic type: county subdivisions (i.e., townships.). It was decided that the 2000 census data would be used in its place instead of estimates.

Source: U. S. Census Bureau.

To more accurately assess the vulnerability to existing residential housing units in Logan County, the average housing unit density for each township was calculated. **Figure 34** illustrates the substantial differences in housing unit densities between the various townships. By comparing the average *county* housing unit density to the average *township* housing unit densities, the shortcomings of using a countywide average for counties such as Logan becomes apparent.

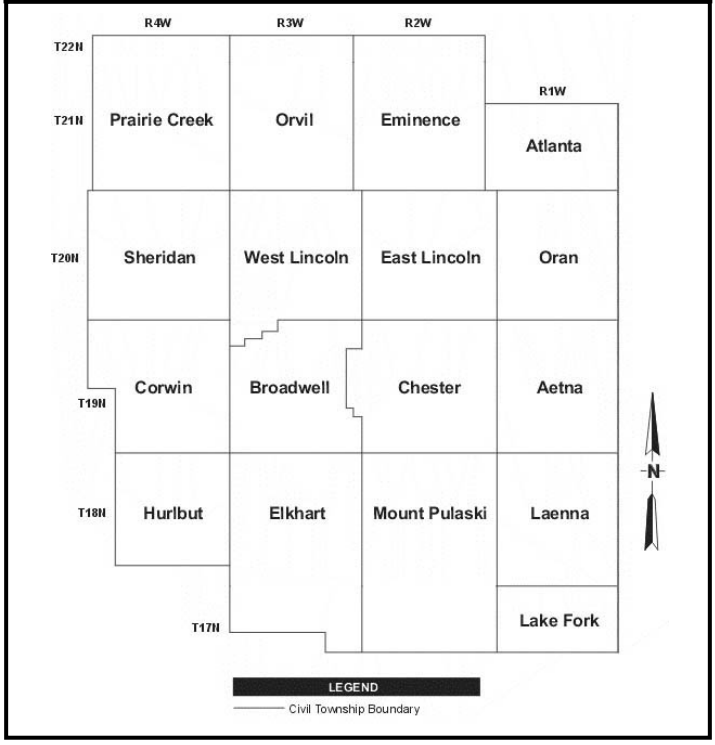


Numerous outbuildings and grain bins were destroyed as a result of the EF3 on tornado on August 19, 2009.

Photograph provided by Logan County EMA.

For 14 of the 17 townships, the average county housing unit density is greater (in some cases considerably greater) than the average township housing unit densities. In addition, the average county housing unit density is considerably less than the housing unit densities for three of the four most populated townships.

Figure 35
Logan County Township Boundaries



Source: Illinois Secretary of State.

With the housing unit density calculated, it is relatively simple to provide an estimate of the number of existing housing units that could be potentially damaged by a tornado in Logan County. This can be done by multiplying the average housing unit density by the average area impacted by a tornado. The average area impacted by a tornado in Logan County is 0.27 square miles. This average is based on 60 years of recorded tornado events in the County. **Figure 36** provides a sample calculation.

Figure 36
Calculation of Potentially-Damaged Existing Housing Units

Average Housing Unit Density x Average Area Impacted = Potentially-Damaged Housing Units (Rounded Up to the Nearest Whole Number)

Atlanta Township: 35.39823 housing units/sq. mile x 0.27 sq. miles = 9.55752 housing units (10 housing units)

Figure 37 provides a breakdown of the number of potentially-damaged housing units by township. It is important to note that for the four townships with the highest housing unit densities, the potential damage estimates would only be reached if a tornado's pathway included the major municipality within the township. If the tornado pathway remained in the rural portion of the township, then the number of potentially-damaged housing units would be considerably lower.

Figure 37
Estimated Number of Township Housing Units Potentially Damaged by a Tornado

Township	Average Housing Unit Density (Units/Sq. Mile) Raw	Potentially-Damaged Housing Units (Units/0.27 Sq. Mile) Raw	Potentially-Damaged Housing Units (Units/0.27 Sq. Mile) Rounded Up
Aetna	6.57838	1.77616	2
Atlanta	35.39823	9.55752	10
Broadwell	7.77903	2.10034	3
Chester	7.78210	2.10117	3
Corwin	8.99800	2.42946	3
East Lincoln	102.01365	27.54369	28
Elkhart	4.81578	1.30026	2
Eminence	4.37225	1.18051	2
Hurlbut	5.32740	1.43840	2
Laenna	8.04542	2.17226	3
Lake Fork	3.15120	0.85082	1
Mount Pulaski	17.85318	4.82036	5
Oran	4.72648	1.27615	2
Orvil	11.52085	3.11063	4
Prairie Creek	4.58748	1.23862	2
Sheridan	6.18882	1.67098	2
West Lincoln	93.41525	25.22212	26
Logan County	19.58881	5.28898	6

Logan County ranks among the top five counties in Illinois in terms of tornado frequency. This fact suggests that the overall risk posed by tornadoes is relatively high. While frequency is important, other factors must be examined when assessing vulnerability.

When such factors as population distribution, the absence of high risk living accommodations (such as high rise buildings, etc.), and the largely rural pathway of the previously recorded tornadoes are taken into consideration, the overall risk posed by tornadoes becomes medium to low. While the risk to the County is medium to low, if a tornado were to touchdown in any of the municipalities, the risk or vulnerability for that location would be elevated to high.

Are future buildings, infrastructure and critical facilities vulnerable to tornadoes?

Yes. While six of the participating jurisdictions (Atlanta, Broadwell, Elkhart, Emden, Lincoln and Mount Pulaski) have building codes in place that will likely lessen the vulnerability of new buildings and critical facilities to damage from tornadoes, the County and one other municipality do not.

Infrastructure such as new communication and power lines also will continue to be vulnerable to tornadoes as long as they are located above ground. Steps to bury all new lines would eliminate the vulnerability, but this action would be cost prohibitive in most areas. There is very little that can be done to reduce or eliminate the vulnerability of critical facilities constructed in the future other than enacting building codes where none exist and enforcing existing building codes.

What are the potential dollar losses to vulnerable structures from tornadoes?
Unlike other hazards, such as flooding, there are no standard loss estimation models or methodologies for tornadoes. However, a rough estimate of potential dollar losses to vulnerable *residential structures* located within the *participating municipalities* can be calculated if several assumptions are made. These assumptions represent a ***probable scenario*** based on the reported historical occurrences of tornadoes in Logan County.

The purpose of providing a rough estimate is to help residents and municipal officials make informed decisions to better protect themselves and their communities. These estimates are meant to provide a ***general idea*** of the magnitude of the potential damage that could occur from a tornado event in each of the municipalities.

To calculate the overall potential dollar losses to vulnerable residential structures from a tornado, a set of decisions/assumptions must be made regarding the:

- the size of area impacted;
- position of the area impacted;
- method used to estimate potentially-damaged housing units;
- value of the potentially-damaged housing units; and
- percent damage sustained by the potentially-damaged housing units (i.e., damage scenario).

The following provides a detailed discussion of each decision/assumption.

Size of the Area Impacted

Assumption #1

Size of Area Impacted = 0.27 sq. miles

The first step towards calculating the potential dollar losses to vulnerable residential structures is to determine the size of the area impacted by the tornado. While the largest or most destructive tornado recorded could be used for this scenario, it was decided that the area impacted would be based on the average length and width of the recorded tornadoes in the County. In Logan County, the average length is approximately 3.26 miles, the average width is approximately 0.08 miles (roughly 145 yards) and the average area is approximately 0.27 square miles. The average area offers a reasonable alternative to the worst case scenario and is more likely to recur.

Position of the Area Impacted
To estimate the number of vulnerable residential structures or potentially-damaged housing units, the average area impacted must be positioned within the boundaries of each municipality. There are two ways this can be done.

❖ *Method #1*. The first method involves creating an outline of the average area impacted and overlaying it on top of a map of each municipality. If any portion of the average area impacted falls outside of the corporate limits of the municipality due its size or shape, then additional calculations would be required.

Assumption #2

The entire area impacted by the tornado falls within the limits of each municipality.

This method is more precise; however, it requires future updates of the Plan to place the outline in the same position previously used in order for the results to be consistent and comparable since changing the placement of the overlay on the municipal maps may produce differences in the number of potentially-damaged housing units.

❖ *Method #2*. The second method requires no positioning of an impact area outline or calculations and just assumes that the entire average area impacted would fall within the municipal limits. As a result, the average area impact measurement previously identified in Assumption #1 is used for all the municipalities to estimate the number of potentially-damaged housing units.

This method is quicker, easier to duplicate and is more likely to produce consistent results when the Plan is updated. There is, however, a greater likelihood that the number of potentially-damaged housing units will be overestimated for those municipalities that have irregular shaped boundaries or occupy less than one square mile.

Both methods were applied to select municipalities within Logan County and the areas compared. While the two methods did produce different results, the differences were not significant. Therefore, it was decided that the second method would be used since it is quick and much easier to duplicate.

Estimate of Potentially-Damaged Housing Units

To estimate the number of potentially-damaged housing unit for this scenario, a decision must first be made on the method used to count the units. There are two ways this can be done.

Assumption #3

The average housing unit density for each municipality will be used to determine the number of potentially-damaged housing units.

❖ *Method #1*. The first method involves overlaying the average area impacted on top of a map of each municipality and then counting the number of housing units that are located within *both* the area impacted and the municipal limits. This approach has its drawbacks – it is time consuming and changes in the position of the overlay can and will produce different estimates.

❖ *Method #2*. The second method uses the average housing unit density for each municipality to estimate the number of potentially-damaged housing units. The average housing unit density can be calculated by taking the number of housing units within a municipality and dividing that number by the land area in the municipality. **Figure 32** provides a sample calculation.

This method is most useful for municipalities with housing unit densities that are relatively constant and do not substantially change between the edges and center of town. In large urban areas where there are substantial differences in housing unit densities (i.e., Chicago and the collar counties) this method has the potential to either over or under estimate the number of potentially-damaged housing units depending on the placement of the average impact area.

It was decided that the second method would be used to help estimate the number of potentially-damaged housing units because it is quick and much easier to duplicate. **Figure 38** provides the average housing unit density for each participating municipality. The average housing unit density was not calculated for those municipalities that cover less than one square mile.

Figure 38
Estimated Number of Housing Units by Municipality
Potentially Damaged by a Tornado

Participating Municipality	Total Housing Units (2010)	Land Area (Sq. Miles) (2010)	Average Housing Unit Density (Units/Sq. Mile) (Raw)	Potentially-Damaged Housing Units (Units/0.27 Sq. Miles) (Raw)	Potentially-Damaged Housing Units (Units/0.27 Sq. Miles) (Rounded Up)
Atlanta	762	1.264	602.84810	162.76899	163
Broadwell	78	0.181	---	78	78
Elkhart	198	1.453	136.26979	36.79284	37
Emden	230	0.234	---	230	230
Hartsburg	140	0.138	---	140	140
Lincoln	6,411	6.401	1,001.56226	270.42181	271
Mount Pulaski	730	1.132	644.87632	174.11661	175
Unincorporated County	3,303	606.756	5.44370	1.46980	2
County*	12,107	618.059	19.58874	5.28896	6
County†	3,050	465.681	6.54955	1.76838	2

* Uses the average county housing unit density
† Uses the average housing unit density for the 13 least populated townships
Source: U. S. Census Bureau, 2010 Census U.S. Gazetteer Files.

With the average housing unit density calculated, the number of potentially-damaged housing units can be estimated. As described in **Figure 36**, this is done by multiplying the average housing unit density for each municipality by the average area impacted (0.27 square miles). **Figure 38** provides a breakdown of the number of potentially-damaged housing units by municipality.

For those municipalities that cover less than one square mile, the average housing unit density cannot be used to calculate the number of potentially-damaged housing units. Since the land area in Broadwell, Emden, and Hartsburg is less than the average area impacted, it is assumed that all of the housing units within each of these municipalities will be potentially damaged.

Value of Potentially-Damaged Housing Units

Assumption #4

The average market value for a residential structure in each municipality will be used to determine the value of potentially-damaged housing units.

Now that the number of potentially-damaged housing units has been estimated, the monetary value of the units must be calculated. Typically when damage estimates are prepared after a natural disaster such as a tornado, they are based on the market value of the structure. Since it would be impractical to determine the individual market value of each potentially-damaged housing unit, the average market value for a residential structure in each municipality will be used to calculate the potential dollar losses.

To determine the average market value, the average assessed value must first be calculated. The average assessed value is determined by dividing the total assessed value of non-farm buildings within a municipality by the total number of housing units in the municipality. **Figure 39** provides a sample calculation of the average assessed value for housing units within a municipality. The total assessed value is based on 2011 tax assessment information provided by the Logan County Supervisor of Assessments.

Figure 39
Calculation of Average Assessed Value

Total Assessed Value of Non-Farm Buildings ÷ Total Housing Units = Average Assessed Value (Rounded to the Nearest Penny)

Atlanta: $20,738,900 ÷ 762 housing units = $27,216.40

To determine the average market value, the average assessed value is multiplied by three (the assessed value of a structure in Logan County is approximately one-third of the market value). **Figure 40** provides the average assessed value and average market value for each participating municipality. For comparison, the average assessed value and average market value for unincorporated Logan County as well as the entire County were also calculated.

Damage Scenario

Assumption #5

The tornado would completely destroy the potentially-damaged housing units.

Structural Damage = 100%
Content Damage = 100%

The final decision that must be made to calculate potential dollar losses is to determine the percent damage sustained by the structure and the structure's content during the tornado. For this scenario, the expected percent damage sustained by the structure and its contents is 100%; in other words, all of the potentially-damaged housing units would be completely destroyed. While it is highly unlikely that each and every housing unit would sustain the maximum percent damage, identifying and calculating different degrees of damage within the average area impacted gets complex and provides an additional complication when updating the Plan.

Figure 40
Average Market Value of Housing Units

Participating Jurisdiction	Total Assessed Value of Non Farm Buildings (2011)	Total Housing Units (2010)	Average Assessed Value (Raw)	Average Market Value (Raw)	Average Market Value (Rounded)
Atlanta	$20,738,900	762	$27,216.40420	$81,649.21260	$81,649
Broadwell	$1,157,730	78	$14,842.69231	$44,528.07693	$44,528
Elkhart	$6,050,340	198	$30,557.27273	$91,671.81819	$91,672
Emden	$5,860,290	230	$25,479.52174	$76,438.56522	$76,439
Hartsburg	$2,977,510	140	$21,267.92857	$63,803.78571	$63,804
Lincoln	$126,779,860	6,411	$19,775.36422	$59,326.09266	$59,326
Mount Pulaski	$17,582,580	730	$24,085.72603	$72,257.17809	$72,257
Unincorporated County	$75,778,000	3,303	$22,942.17378	$68,826.52134	$68,827
County	$256,925,210	12,107	$21,221.21170	$63,663.63510	$63,664

Source: Brosamer, Rosanne, Logan County Supervisor of Assessments.

Potential Dollar Losses

Now that all of the decisions/assumptions have been made, the potential dollar losses can be calculated. First, the potential dollar losses to the ***structure*** of the potentially-damaged housing units must be determined. This is done by multiplying the average market value for a residential structure by the percent damage (100%) to get the average structural damage per unit. The average structural damage per unit is then multiplied by the number of potentially-damaged housing units. **Figure 41** provides a sample calculation.

Figure 41
***Structure* – Potential Dollar Loss Calculations**

Average Market Value per Housing Unit x Percent Damage = Average Structural Damage
Atlanta: $81,649 x 100% = $81,649 per Unit

Average Structural Damage x Number of Potentially-Damaged Housing Units = Potential Dollar Losses – Structure
(Rounded to the Nearest Dollar)

Atlanta: $81,649 x 163 housing units = $13,308,787

Next, the potential dollar losses to the ***content*** of the potentially-damaged housing units must be determined. Based on FEMA guidance, the value of a residential housing unit's content is approximately 50% of its market value. Therefore, start by taking one-half the average market value for a residential structure and multiply by the percent damage (100%) to get the average content damage per unit. The average content damage per unit is then multiplied by the number of potentially-damaged housing units. **Figure 42** provides a sample calculation.

Figure 42
***Content* – Potential Dollar Loss Calculations**

½ (Average Market Value of a Housing Unit) x Percent Damage = Average Content Damage
Atlanta: ½ ($81,649) x 100% = $40,824.50 per Unit

Average Content Damage x Number of Potentially-Damaged Housing Units = Potential Dollar Losses – Content
(Rounded to the Nearest Dollar)
Atlanta: $40,824.50 x 163 housing units = $6,654,394

Finally the ***total potential dollar losses*** may be calculated by adding together the potential dollar losses to the structure and content. **Figure 43** gives a breakdown of the total potential dollar losses by municipality.

Figure 43
Estimated Potential Dollar Losses to Potentially-Damaged Housing Units from a Tornado

Participating Jurisdiction	Average Market Value (2011)	Potentially-Damaged Housing Units (Rounded Up)	Potential Dollar Losses		Total Potential Dollar Losses
			Structure	Content	
Atlanta	$81,649	163	$13,308,787	$6,654,394	$19,963,181
Broadwell	$44,528	78	$3,473,184	$1,736,592	$5,209,776
Elkhart	$91,672	37	$3,391,864	$1,695,932	$5,087,796
Emden	$76,439	230	$17,580,970	$8,790,485	$26,371,455
Hartsburg	$63,804	140	$8,932,560	$4,466,280	$13,398,840
Lincoln	$59,326	271	$16,077,346	$8,038,673	$24,116,019
Mount Pulaski	$72,257	175	$12,644,975	$6,322,488	$18,967,463
Unincorporated County	$68,827	2	$137,654	$68,827	$206,481
County*	$63,664	6	$381,984	$190,992	$572,976
County†	$63,664	2	$127,328	$63,664	$190,992

* Uses the average county housing unit density (20 housing units per square mile)
† Uses the average housing unit density for the 16 least populated townships (7 housing units per square mile)

For comparison, an estimate of the potential dollar losses from tornadoes within the entire County, unincorporated Logan County, and the 13 least populated townships was also calculated. If the average county housing unit density of 20 housing units per square mile is used, then the total number of housing units potentially-damaged would be 6. However, as discussed earlier, the average county housing unit density does not take into consideration the differences in housing density in the County. If an average housing unit density is calculated for the 13 least populated townships (3,050 housing units divided by 465.681 square miles equals approximately 7 housing units per square mile), then the total number of housing units damaged is reduced to 2. While the difference in the number of potentially-damaged housing units is not substantial, it still makes a difference in the total potential dollar losses estimated for the County.

This assessment illustrates why potential residential dollar losses should be considered when municipalities are deciding which mitigation projects to pursue. Potential dollar losses caused by an average tornado in Logan County would be expected to ***exceed at least $5 million*** in any of the participating municipalities.

Figure 25
(Sheet 1 of 12)
Tornadoes Reported in Logan County
1950 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
1	6/27/1951	7:30 p.m.	Latham^	F3	9.6	300	35†	0	$2,500,000†	n/a	touched down approx. 1 mile south of Latham and traveled east, lifting off approx. 1 ½ miles north-northwest of Forsyth in Macon County; 2 farms were completely destroyed near Heman in Macon County
2	6/27/1951	8:45 p.m.	Emden^ Atlanta	F3	18.2	200	15‡	1‡	$2,500,000‡	n/a	touched down approx. 1 ½ miles northwest of Hartsburg and traveled east, passing through Atlanta and lifting off approx. 1 ½ miles north-northeast of Waynesville in DeWitt County; destroyed several farms
3	4/9/1953	4:15 p.m.	Lincoln^	F2	6.5	30	3	0	$25,000	n/a	
Subtotal:							**53†‡**	**1†‡**	**$5,025,000†‡**	**$0**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

^ Tornado touchdown verified in the vicinity of this location(s).

† The first June 27, 1951 tornado touched down in Logan County and lifted off in Macon County. The 35 injuries and $2,500,000 in property damages sustained as a result of this tornado represents losses sustained in two counties. A detailed description and breakdown by county was not available.

‡ The second June 27, 1951 tornado touched down in Logan County and lifted off in DeWitt County. The 15 injuries, 1 fatality and $2,500,000 in property damages sustained as a result of this tornado represents losses sustained in two counties. A detailed description and breakdown by county was not available.

Figure 25
(Sheet 2 of 12)
Tornadoes Reported in Logan County
1950 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
4	3/12/1954	6:40 p.m.	Elkhart[^] Broadwell[^] Lincoln[^]	F1	18.9	33	3	0	$250,000	n/a	touched down near Pleasant Plains in Sangamon County and traveled northeast across Menard County and into southwest Logan County, lifting off near Lincoln; most of the damage was in rural areas southwest of Lincoln
5	3/14/1957	3:10 p.m.	Latham[^]	F2	0	33	n/a	n/a	$25,000	n/a	damaged 2 farms
6	4/30/1960	7:30 a.m.	Atlanta	F1	0.2	30	n/a	n/a	$2,500	n/a	
7	5/15/1968	3:09 p.m.	San Jose[^]	F3	2.7	600	n/a	n/a	$2,500,000[§]	n/a	touched down in Mason County and traveled east from Natrona lifting off approx. 3 miles southeast of San Jose; the worst of the damage was near Natrona in Mason County
Subtotal:							**3**	**0**	**$2,777,500[§]**	**$0**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

[^] Tornado touchdown verified in the vicinity of this location(s).

[§] The May 15, 1968 tornado touched down in Mason County and lifted off in Logan County. The $2,500,000 in property damages sustained as a result of this tornado represents losses sustained in two counties. A detailed description and breakdown by county was not available.

Figure 25
(Sheet 3 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
8	6/19/1972	7:00 p.m.	Elkhart↖	F1	0.1	7	1	0	$25,000	n/a	
9	6/16/1973	9:35 p.m.	Lincoln↖	F0	0	33	n/a	n/a	$0	n/a	
10	7/23/1973	8:00 p.m.	Lincoln	F0	0	33	n/a	n/a	$25,000	n/a	
11	7/23/1973	8:00 p.m.	Lincoln↖	F0	0	33	n/a	n/a	$25,000	n/a	
12	4/3/1974	1:08 p.m.	Lincoln↖ Atlanta	F1	16.7	177	n/a	n/a	$2,500,000*	n/a	touched down approx. 2 miles southeast of Lincoln and traveled northeast passing through Atlanta and lifting off approx. 1mile northwest of McLean in McLean County
13	6/1/1975	6:20 p.m.	Emden↖	F0	0	33	n/a	n/a	$250	n/a	
14	11/29/1975	11:16 p.m.	Elkhart	F1	0	33	1	0	$25,000	n/a	a trailer was destroyed
Subtotal:							**2**	**0**	**$2,600,250***	**$0**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

↖ Tornado touchdown verified in the vicinity of this location(s).

* The April 3 1974 tornado touched down in Logan County and lifted off in McLean County. The $2,500,000 in property damages sustained as a result of this tornado represents losses sustained in two counties. A detailed description and breakdown by county was not available.

Figure 25
(Sheet 4 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
15	5/5/1977	7:20 p.m.	Atlanta	F4	10	1,000	2†	0	$2,500,000†	n/a	touched down south of Atlanta and traveled northeast along I-55 before lifting off in the vicinity of Funks Grove in McLean County; 4 homes were completely destroyed and at least 12 additional homes were severely damaged; roofs were torn off buildings and homes; buildings were crushed by trees; shed and outbuildings were crushed; farm machine sheds were picked up and thrown long distances; trees were uprooted, maimed and left blocking streets and yards
16	9/16/1980	6:15 p.m.	Latham^	F0	0	33	n/a	n/a	$0	n/a	
17	4/13/1981	5:30 p.m.	New Holland^ Lincoln	F1	13.7	33	n/a	n/a	$2,500,000	n/a	
Subtotal:							**2†**	**0**	**$5,000,000†**	**$0**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

^ Tornado touchdown verified in the vicinity of this location(s).

† The May 5, 1977 tornado touched down in Logan County and lifted off in McLean County. The 2 injuries and $2,500,000 in property damages sustained as a result of this tornado represents losses sustained in two counties. A detailed description and breakdown by county was not available.

Figure 25
(Sheet 5 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
18	5/30/1982	4:30 p.m.	Broadwell^	F0	0	33	n/a	n/a	n/a	n/a	
19	3/28/1985	12:44 a.m.	Emden^ Hartsburg^	F2	4.5	800	n/a	n/a	$2,500,000	n/a	8 farm houses and many outbuildings were damaged or destroyed
20	5/9/1995	4:22 p.m.	Elkhart Lincoln^ Beason^	F3	40	880	6‡	0	$8,000,000	n/a	touched down approx. 4 ½ miles southwest of Cantrell in Sangamon County and traveled northeast across Menard County and into Logan County, lifting off approx. 5 miles northeast of Beason in DeWitt County; 50 to 75 homes, several businesses and the Fire Protection District building were damaged in Elkhart; all 23 homes were damaged in the Flamingo Heights subdivision south of Lincoln; numerous power lines, poles, trees and a 400-foot cellular tower were blown down
21	4/19/1996	5:58 p.m.	Union^	F3	0.2	220	n/a	n/a	$15,000	n/a	3 homes received minor damage
Subtotal:							**6‡**	**0**	**$10,515,000**	**$0**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

^ Tornado touchdown verified in the vicinity of this location(s).

‡ The May 9, 1995 tornado touched down in Sangamon County, passed through Menard and Logan Counties and lifted off in DeWitt County. The 6 injuries sustained as a result of this tornado represent losses sustained in four counties. A detailed description and breakdown by county was not available.

Figure 25
(Sheet 6 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
22	6/6/1996	6:59 p.m.	New Holland[^] Hartsburg	F0	8.5	50	n/a	n/a	n/a	n/a	1 home and several outbuildings received minor damage; 1 very old barn was destroyed when a tree was blown down on it; numerous trees in the area were blown down; a few tree tops were damaged and some power lines were knocked down in Hartsburg
23	4/7/1998	5:05 p.m.	Mount Pulaski[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
24	4/7/1998	6:23 p.m.	Lincoln[^]	F0	0.1	20	n/a	n/a	n/a	n/a	
25	5/12/1998	8:13 p.m.	Elkhart[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
26	5/19/1998	6:20 p.m.	Atlanta[^]	F0	0.2	30	n/a	n/a	$1,000	$0	farm sprayer tank was thrown ½ mile
27	6/4/1999	3:45 p.m.	Lincoln[^]	F0	0.1	20	n/a	n/a	n/a	n/a	
28	6/4/1999	3:50 p.m.	Lincoln[^]	F0	2.5	100	2	0	n/a	n/a	blew over several semis, injuring 2 drivers and damaged trees, grain bins and farm equipment
29	6/4/1999	3:53 p.m.	Lincoln[^]	F0	0.1	20	n/a	n/a	n/a	n/a	
30	4/20/2000	8:00 a.m.	Lincoln[^]	F0	0.2	10	n/a	n/a	n/a	n/a	
31	5/12/2000	3:00 p.m.	Hartsburg[^]	F0	0.3	20	n/a	n/a	n/a	n/a	
32	5/18/2000	6:12 p.m.	Beason[^]	F0	2.5	20	n/a	n/a	n/a	n/a	
Subtotal:							**2**	**0**	**$1,000**	**$0**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

[^] Tornado touchdown verified in the vicinity of this location(s).

Figure 25
(Sheet 7 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
33	6/20/2000	5:55 p.m.	Broadwell	F0	0.3	100	n/a	n/a	$23,000	n/a	the top of a grain leg on an elevator was torn off; several trees and tree limbs and a few power lines were blown down; a few homes sustained minor shingle and siding damage
34	4/4/2003	3:08 p.m.	Lincoln[^]	F1	1	30	n/a	n/a	$50,000	n/a	a garage and the roof of a home were damaged; several trees were blown down and a grain bin was blown into a barn
35	4/4/2003	3:11 p.m.	Atlanta[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
36	5/28/2003	2:56 p.m.	Atlanta[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
37	5/28/2003	2:59 p.m.	Beason[^]	F0	0.4	10	n/a	n/a	n/a	n/a	blew down several trees
38	5/30/2003	7:22 p.m.	Emden[^] Hartsburg	F0	5	50	n/a	n/a	n/a	n/a	several trees and limbs were blown down
39	5/30/2003	7:34 p.m.	Lincoln[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
Subtotal:							**0**	**0**	**$73,000**	**$0**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

[^] Tornado touchdown verified in the vicinity of this location(s).

Figure 25
(Sheet 8 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
40	5/30/2003	7:38 p.m.	Lincoln[^] Lawndale[^] Beason[^]	F2	14	880	n/a	n/a	$2,500,000[§]	n/a	touched down 5 miles north of Lincoln and traveled southeast, lifting off approx.. ¾ mile southwest of Hallsville in DeWitt County; numerous trees, tree limbs, power lines and power poles were blown down; a mobile home was destroyed, a two-story house was shoved 15 feet off its foundation and several shed and barns were destroyed; 6 to 7 other homes sustained minor to major damage
41	6/11/2003	5:25 p.m.	Mount Pulaski[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
42	6/11/2003	5:38 p.m.	Cornland[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
43	6/11/2003	5:38 p.m.	Lake Fork[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
44	9/26/2003	4:15 p.m.	Broadwell[^]	F1	0.8	50	n/a	n/a	$15,000	$30,000	an old outbuilding was destroyed, 2 trees were blown down, 5 windows were blown out of a house and the wooden cellar door on the house was torn off ; nearby crops were destroyed
Subtotal:							**0**	**0**	**$2,515,000[§]**	**$30,000**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

[^] Tornado touchdown verified in the vicinity of this location(s).

[§] The May 30, 2003 tornado touched down in Logan County and lifted off in DeWitt County. The $2,500,000 in property damages sustained as a result of this tornado represents losses sustained in two counties. A detailed description and breakdown by county was not available.

Figure 25
(Sheet 9 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
45	5/30/2004	4:57 p.m.	Lincoln[^]	F0	0.1	40	3	0	$250,000	n/a	touched down in a mobile home park destroying 3 mobile homes and causing minor damage to 28 others
46	7/3/2004	6:47 p.m.	Lincoln[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
47	7/3/2004	7:03 p.m.	Hartsburg[^]	F0	0.1	10	n/a	n/a	n/a	n/a	
48	3/12/2006	8:57 p.m.	Lake Fork[^] Mount Pulaski[^]	F2	2.5	400	n/a	n/a	$3,032	n/a	numerous trees and power poles were snapped and a 400-foot microwave tower was toppled; this event was part of a federally-declared disaster (Declaration #1633)
49	3/12/2006	9:00 p.m.	Mount Pulaski[^]	F2	3.5	200	n/a	n/a	$3,031	n/a	numerous trees and power poles were snapped and 3 to 4 large steel power poles were toppled; this event was part of a federally-declared disaster (Declaration #1633)
50	3/12/2006	9:03 p.m.	Latham[^]	F1	8.9	400	n/a	n/a	n/a	n/a	tornado touched down 6.5 miles southwest of Latham and traveled northeast, passing west of Latham before crossing into Macon County; this event was part of a federally-declared disaster (Declaration #1633)
Subtotal:							**3**	**0**	**$256,063**	**$0**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

[^] Tornado touchdown verified in the vicinity of this location(s).

Figure 25
(Sheet 10 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
51	4/2/2006	5:32 p.m.	Lincoln[^]	F0	1	80	n/a	n/a	n/a	n/a	a barn and grain storage bin were damaged and a large tree was blown down
52	4/2/2006	5:36 p.m.	Chestnut[^]	F0	2.5	50	n/a	n/a	n/a	n/a	caused roof damaged to several barns and damaged shingles on homes; blew down a few trees
53	4/13/2006	11:25 p.m.	Lincoln[^]	F0	0.1	100	n/a	n/a	n/a	n/a	destroyed a barn and blew down some trees
54	4/13/2006	11:27 p.m.	Lincoln	F0	3.8	125	n/a	n/a	$2,500,000	n/a	damaged roofs, siding and outbuildings in a subdivision; blew down numerous trees and power lines and damaged several barns in the rural area
55	4/18/2006	10:19 p.m.	Lincoln	F0	0.1	50	2	0	n/a	n/a	tornado developed in an open field and crossed I-55 near mile marker 126 (IL Route 121); overturned 2 semi trucks causing 2 injuries
Subtotal:							**2**	**0**	**$2,500,000**	**$0**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

[^] Tornado touchdown verified in the vicinity of this location(s).

Figure 25
(Sheet 11 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
56	4/30/2006	3:15 p.m.	Lincoln^	F0	0.7	50	n/a	n/a	n/a	n/a	
57	3/28/2007	2:05 p.m.	Atlanta^	EF0	0	10	n/a	n/a	n/a	n/a	
58	8/19/2009	2:26 p.m.	Elkhart^ Mount Pulaski^ Beason^	EF3	24.5	880	2	0	$7,200,000	$1,000,000	tornado touched down in Sangamon County and entered Logan County approximately 4 miles south of Elkhart and traveled northeast, dissipating just east of Beason; destroyed 7 houses and damage 15 other; destroyed numerous grain bins and outbuildings; crop losses were extensive along the tornado's path; a small pavilion shelter at Madigan Wildlife Area was destroyed; 2 people sustained injuries when the shed they sought shelter in was destroyed
Subtotal:							**2**	**0**	**$7,200,000**	**$1,000,000**	

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

^ Tornado touchdown verified in the vicinity of this location(s).

Figure 25
(Sheet 12 of 12)
Tornadoes Reported in Logan County
1951 through June 30, 2012

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Deaths	Property Damage	Crop Damage	Description
59	6/5/2010	9:57 p.m.	Beason^ Chestnut^	EF0	6	300	n/a	n/a	$80,000	$15,000	tornado touched down 3 miles west-southwest of Beason and traveled southeast, crossing into De Witt County approximately 2 ½ miles northeast of Chestnut; several trees and tree branches were blown down; a shed was blown over and the roof was torn off a barn; crops were flattened in a few locations
Subtotal:							**0**	**0**	**$80,000**	**$15,000**	

GRAND TOTAL:	**75^**	**1^**	**$38,542,813^**	**$1,045,000**

[1] The length provided is only for the portion of the tornado that occurred in Logan County.

^ Tornado touchdown verified in the vicinity of this location(s).

^ There were 7 events that occurred on June 27, 1951 (2), May 15, 1968, April 3, 1974, May 5, 1977, May 9, 1995 and May 30, 2003 where 58 injuries, 1 fatality and $15,000,000 in property damages were sustained as a result of these tornadoes and represent losses sustained in two or more counties. A detailed description and breakdown by county was not available.

Sources: Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member responses to Logan County Critical Facilities Damaged by Natural Hazard Events Questionnaire.
National Weather Service, Weather Forecast Office – Central Illinois, Chris Miller, Warning Coordination Meteorologist.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

3.3 SEVERE WINTER STORMS (SNOW, ICE & EXTREME COLD)

IDENTIFYING THE HAZARD

What is the definition of a severe winter storm?

A severe winter storm can range from moderate snow over a few hours to significant accumulations of sleet and/or ice to blizzard conditions with blinding wind-driven snow that last several days. The amount of snow or ice, air temperature, wind speed and event duration all influence the severity and type of severe winter storm that results. In general there are three types of severe winter storms: blizzards, heavy snow storms and ice storms. The following provides a brief description of each type.

- **Blizzards.** Blizzards are characterized by strong winds of at least 35 miles per hour and are accompanied by considerable falling and/or blowing snow that reduces visibility to ¼ mile or less for at least three hours. Blizzards are the most dangerous of all winter storms.
- **Heavy Snow Storms.** A heavy snow storm occurs when a winter storm produces snowfall accumulations of four inches or more in 12 hours or less or six inches or more in 24 hours or less.
- **Ice Storms.** An ice storm occurs when substantial accumulations of ice, generally ¼ inch or more, build up on the ground, trees and utility lines as a result of freezing rain.

While extreme cold (i.e., dangerously low temperatures and wind chill values) often accompanies or is left in the wake of a severe winter storm, the National Weather Service (NWS) does not use it to define a severe winter storm. However, a discussion of extreme cold is included in this section since it has the ability to cause property damage, injuries and even death (whether or not it is accompanied by freezing rain, ice or snow).

What is snow?

Snow is precipitation in the form of ice crystals. These ice crystals are formed directly from the freezing of water vapor in wintertime clouds. As the ice crystals fall toward the ground, they cling to each other creating snowflakes. Snow will only fall if the temperature remains at or below 32°F from the cloud base to the ground.

What is sleet?

Sleet is precipitation in the form of ice pellets. These ice pellets are composed of frozen or partially frozen rain drops or refrozen partially melted snowflakes. Sleet typically forms in winter storms when snowflakes partially melt while falling through a thin layer of warm air. The partially melted snowflakes then refreeze and form ice pellets as they fall through the colder air mass closer to the ground. Sleet usually bounces after hitting the ground or other hard surfaces and does not stick to objects.

What is freezing rain?

Freezing rain is precipitation that falls in the form of a liquid (i.e., rain drops), but freezes into a glaze of ice upon contact with the ground or other hard surfaces. This occurs when snowflakes

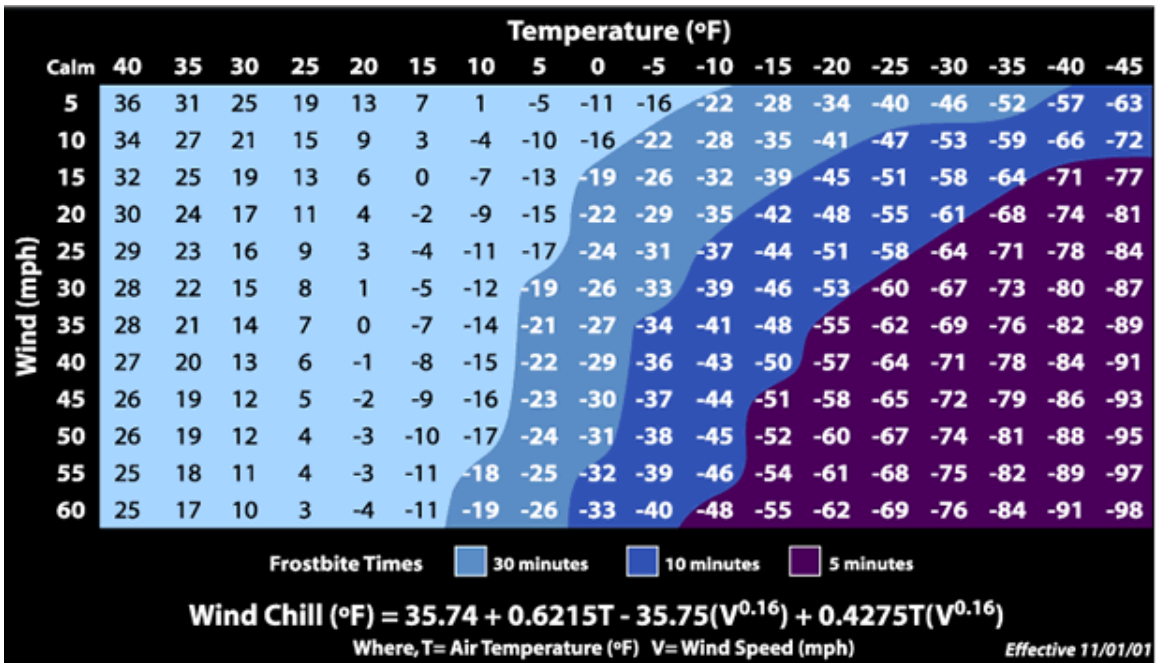
descend into a warmer layer of air and melt completely. When the rain drops that result from this melting fall through another thin layer of freezing air just above the surface they become "supercooled", but they do not have time to refreeze before reaching the ground. However, because the rain drops are "supercooled", they instantly refreeze upon contact with anything that is at or below 32°F (i.e., the ground, trees, utility lines, etc.).

What is the wind chill?

The wind chill, or wind chill factor, is a measure of the rate of heat loss from exposed skin resulting from the combined effects of wind and temperature. As the wind increases, heat is carried away from the body at a faster rate, driving down both the skin temperature and eventually the internal body temperature.

The unit of measurement used to describe the wind chill factor is known as the wind chill temperature. The wind chill temperature is calculated using a formula. **Figure 44** identifies the formula and calculates the wind chill temperatures for certain air temperatures and wind speeds.

Figure 44
Wind Chill Chart



Source: NOAA, National Weather Service.

As an example, if the air temperature is 5°F and the wind speed is 20 miles per hour, then the wind chill temperature would be -15°F. The wind chill temperature is only defined for air temperatures at or below 50°F and wind speeds above three miles per hour. In addition, the wind chill temperature does not take into consideration the effects of bright sunlight which may increase the wind chill temperature by 10°F to 18°F.

Use of the current Wind Chill Temperature (WCT) index was implemented by the NWS on November 1, 2001. The new WCT index was designed to more accurately calculate how cold air feels on human skin. The new index uses advances in science, technology and computer modeling to provide an accurate, understandable and useful formula for calculating the dangers from winter winds and freezing temperatures. The former index was based on research done in 1945 by Antarctic researchers Siple and Passel.

Exposure to extreme wind chills can be life threatening. As wind chills edge toward -19°F and below, there is an increased likelihood that exposure will lead to individuals developing cold-related illnesses.

What cold-related illnesses are associated with severe winter storms?

Frostbite and hypothermia are both cold-related illnesses that can result when individuals are exposed to dangerously low temperatures and wind chills during severe winter storms. The following provides a brief description of the symptoms associated with each.

- **Frostbite.** During exposure to extremely cold weather the body reduces circulation to the extremities (i.e., feet, hands, nose, cheeks, ears, etc.) in order to maintain its core temperature. If the extremities are exposed, then this reduction in circulation coupled with the cold temperatures can cause the tissue to freeze.

  Frostbite is characterized by a loss of feeling and a white or pale appearance. At a wind chill of -19°F, exposed skin can freeze in as little as 30 minutes. Seek medical attention immediately if frostbite is suspected. It can permanently damage tissue and in severe cases can lead to amputation.

- **Hypothermia.** Hypothermia occurs when the body's temperature begins to fall because it is losing heat faster than it can produce it. If an individual's body temperature falls below 95°F, then hypothermia has set in and immediate medical attention should be sought.

  Hypothermia is characterized by uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness and exhaustion. Left untreated, hypothermia will lead to death. Hypothermia occurs most commonly at very cold temperatures, but can occur at cool temperatures (above 40°F) if an individual isn't properly clothed or becomes chilled.

Are alerts issued for severe winter storms?

Yes. The National Weather Service Weather Forecast Office in Lincoln, Illinois is responsible for issuing ***winter storm watches*** and ***warnings*** for Logan County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Watch.** Winter watches are issued when severe winter weather is possible in the next 1 to 2 days. A watch will often be issued when there is still uncertainty about the path and strength of a developing winter storm. Winter watches are issued for blizzards, winter storms with heavy snow, sleet or a combination of heavy snow, sleet and icing and extreme wind chill values.

- **Advisories.** Winter advisories are issued for lesser winter weather events that will most likely cause significant inconvenience especially to motorist, but should not be life-threatening if caution is exercised. The following advisories will be issued when an event is occurring, is imminent or has a high probability of occurring.
  - **Freezing Rain Advisory.** A freezing rain advisory is issued when freezing rain will produce light icing with accumulations less than ¼ inch.
  - **Winter Weather Advisory.** A winter weather advisory is issued for:
    - three to six inches of snow;
    - sleet resulting in less than ½ inch of accumulation; or
    - blowing and/or drifting snow or a combination of winter weather.
  - **Wind Chill Advisory.** A wind chill advisory is issued when the wind chill values are expected to be between -15°F and -24°F.
- **Warnings.** Winter weather warnings are issued for severe winter weather events that can be life threatening. Individuals are advised to avoid travel and stay indoors. The following warnings will be issued when an event is imminent within the next 12 to 24 hours.
  - **Blizzard Warning.** A blizzard warning is issued when sustained winds or frequent gusts of 35 mph or more are accompanied by falling/blowing/drifting snow that frequently reduces visibility to less than ¼ mile for three hours or more.
  - **Ice Storm Warning.** An ice storm warning is issued when freezing rain will result in ¼ inch or more of ice accumulation.
  - **Winter Storm Warning.** A winter storm warning is issued for:
    - six inches or more of snow;
    - ½ inch or more of sleet accumulation; or
    - A combination of heavy snow, sleet, icing and/or blowing snow.
  - **Wind Chill Warning.** A wind chill warning is issued when wind chill values are expected to be -25°F or below.

PROFILING THE HAZARD

When have severe winter storms occurred previously? What is the extent of these previous severe winter storms?

Figures 45 and **46**, located at the end of this section, summarize the previous occurrences as well as the extent or magnitude of severe winter storms and extreme cold events recorded in Logan County.

Severe Winter Storms

NOAA's Storm Events Database, National Weather Service COOP Data records, the Illinois State Water Survey, records from the National Weather Service Central Illinois Weather Forecast Office in Lincoln and Planning Committee member records were used to document 47 reported occurrences of severe winter storms (snow, ice and/or a combination of both) in Logan County between 1951 and 2012. Of the 47 occurrences, 33 were heavy snow storms or blizzards, 11 were ice storms and three were a combination of freezing rain, sleet, ice and snow.

Since 1997, at least one severe winter storm has occurred each year in Logan County with the exception of 2000, 2001, and 2002. Anecdotal information shared by long-time residents suggests that severe winter storms have occurred with similar frequency between 1950 and 1997.

Severe Winter Storm Fast Facts – Occurrences

Number of Snow & Ice Events Reported (1951 – 2012): ***47***
Number of Extreme Cold Events Reported (1995 – 2012): ***7***
Maximum One-Day Snow Accumulation: ***13 inches***
Coldest Temperature Recorded in the County: ***-29°F***
Most Likely Month for Snow & Ice Events to Occur: ***January***
Most Likely Month for Extreme Cold Events to Occur: ***January***

Figure 47 charts the reported occurrences of severe winter storms by month. Of the 47 events, 28 (60%) took place in January and February. There were three events that spanned two months; two took place between November and December while the other took place between January and February; however, for illustration purposes only the month the event started in is graphed.

Figure 47
Severe Winter Storms by Month
1951 – 2012

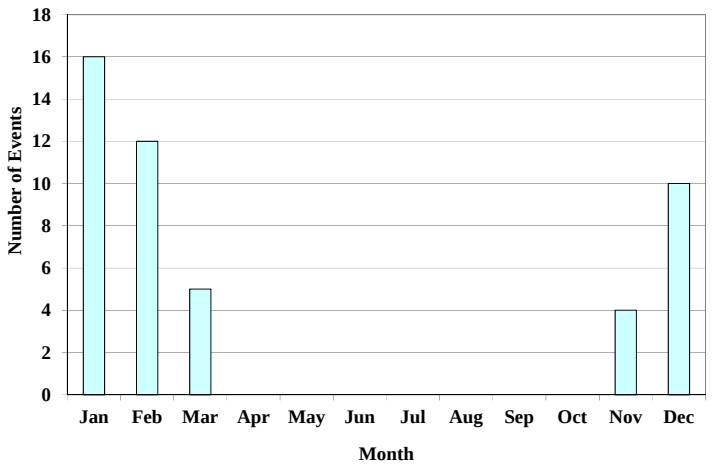
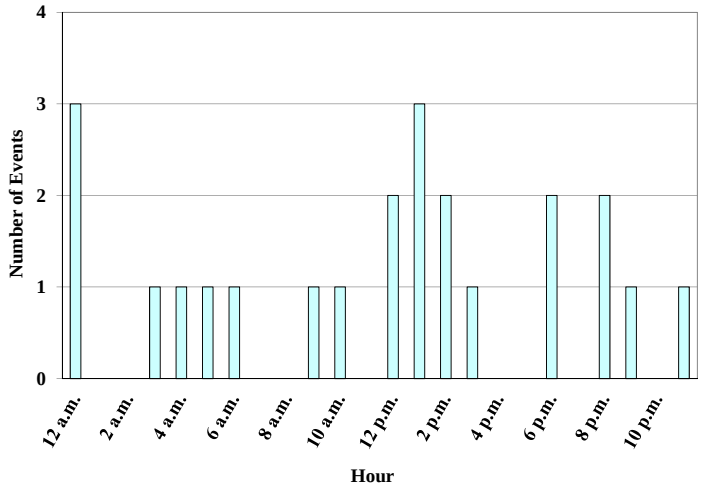


Figure 48 charts the reported occurrences of severe winter storms by hour. Of the 47 occurrences, start times were unavailable for 24 events. Of the remaining 23 severe winter storm events with recorded times, approximately 61% began during the p.m. hours, with 8 (35%) beginning between 12 p.m. and 4 p.m.

According to the National Weather Service Central Illinois Weather Forecast Office in Lincoln, the maximum one-day snow accumulation total recorded over the 100 years in Logan County was 13 inches which occurred on February 23, 1914 in Lincoln and again on December 19, 1973 in Mount Pulaski. The heaviest seasonal snowfall on record for Logan County is 45.0 inches

which occurred during the winter of 1913-1914, the second heaviest seasonal snowfall on record is 42.4 inches which occurred during the winter of 1981-1982.

Figure 48
Severe Winter Storms by Hour
1951 – 2012



Extreme Cold

NOAA's Storm Events Database was used to document seven occurrences of extreme cold (dangerously low temperatures and wind chill values) in Logan County between 1995 and 2012. Of the seven occurrences, one corresponded with and two followed recorded severe winter storms. Five (72%) of the seven events took place in January, one took place in December and one took place in February. Approximately 86% of all events began during the a.m. hours.

The coldest temperature recorded in Logan County was -29°F in Lincoln on December 26, 1914, according to records from the Midwestern Regional Climate Center. The second coldest temperature recorded was -25°F in Lincoln on January 5, 1999.

What locations are affected by severe winter storms?

Severe winter storms affect the entire County. All communities in Logan County have been affected by severe winter storms. Severe winter storms generally extend across the entire County and affect multiple locations. The *2010 Illinois Natural Hazard Mitigation Plan* prepared by IEMA classifies the Logan County's hazard rating for severe winter storms as "severe."

What is the probability of future severe winter storms occurring?

Severe Winter Storms

Logan County has had 47 verified occurrences of severe winter storms between 1951 and 2012. With 47 occurrences over the past 62 years, the probability or likelihood that a severe winter storm will occur in the County in any given year is 76%. There were 11 years over the past 62 years where two or more severe winter storms occurred. This indicates that the probability

that more than one severe winter storm may occur during any given year within the County is 18%. However the gaps in data, especially between 1951-1961, cause a distortion in both these probabilities.

If only the events recorded by NOAA's Storm Events Database are analyzed, then there have been 20 verified occurrences of severe winter storms between 1997 and 2012. With 20 events in 16 years, Logan County should expect to experience at least one severe winter storm each year. There were 6 years over the past 16 years where two or more severe winter storms occurred. This indicates that the probability that more than one severe winter storm may occur during any given year within the County is 38%. A probability based on 16 years of data may not be as accurate as a probability based on 62 years of data. However, a probability based on the 1997 through 2012 data may provide a more reliable representation of the threat the County faces from severe winter storms than a probability calculated from a longer time frame with gaps.



A November 30, 2006 winter storm coated the County with 1 to 2 inches of ice causing substantial damage to trees and power lines.

Photograph provided by Logan County EMA.

Extreme Cold

The County has had seven verified occurrences of extreme cold between 1995 and 2012. With seven occurrences over the past 18 years, the probability or likelihood of an extreme cold event occurring in Logan County in any given year is 39%. There were two years over the past 18 years where two or more extreme cold events occurred. This indicates that the probability that two or more extreme cold events may occur during any given year with the County is 11%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to severe winter storms?



Heavy snow falls have led to near record snow totals on more than one occasion in recent years.

Photograph provided by Logan County EMA.

Yes. All of Logan County, including the participating municipalities, is vulnerable to the dangers presented by severe winter storms. Severe winter storms are among the most frequently occurring natural hazards in Illinois. Logan County is served by one state-designated warming center located at the Illinois Department of Human Services office in Lincoln.

Since 2002, Logan County has experienced 16 snow and ice events and one extreme cold event. The County has experienced at least one severe winter storm event each year with the exception of 2002. Severe winter storms have immobilized

portions of the County, blocking roads, downing power lines, trees and branches, causing power outages and property damage and contributing to vehicle accidents. In addition, the County and municipalities must budget for snow removal and de-icing of roads and bridges as well as for roadway repairs.

What impacts resulted from the recorded severe winter storms?

Data provided by committee member records indicates that between 1951 and 2012, three of the 47 severe winter storms caused $674,758 in property damage. Property damage information was either unavailable or none was recorded for the remaining 43 reported occurrences. In comparison, the State of Illinois has averaged an estimated $102 million annually in property damage losses from severe winter storms since 1950, ranking severe winter storms second only to flooding in terms of economic loss. While behind floods in terms of the amount of property damage caused, severe winter storms have a greater ability to immobilize larger areas, with rural areas being particularly vulnerable.

Severe Winter Storm Fast Facts – Impacts/Risk

Snow & Ice Events
- Total Property Damage: ***$674,758***
- Infrastructure/Critical Facilities Damage*: ***$674,758***
- Injuries: ***4***[^]
- Fatalities: ***4***[^]

Risk/Vulnerability to:
- Public Health & Safety: ***Low***
- Buildings/Infrastructure/Critical Facilities: ***Medium/High***

* Infrastructure/Critical Facilities Damage totals are included in the Total Property Damage amounts.

^ All the injuries and fatalities were related to hazardous driving conditions.

The property damage figure provided above is composed entirely of infrastructure and critical facilities damage sustained by four of the participating jurisdictions. The following provides a brief description of the damages by jurisdiction.

Emden
- The Village spent at least $6,000 on emergency protective measures, including snow removal, as a result of the February 2011 blizzard. This event was part of a federally-declared disaster.

Lincoln
- Lincoln High School sustained $500,000 in property damage during the February 2011 blizzard. The heavy snow damaged the roof and led to flooding in the school. This event was part of a federally-declared disaster.



A plane slid off the runway at the Logan County Airport following an ice storm on January 5, 2005.

Photograph provided by Logan County EMA.

Logan County
- The Logan County Highway Department and various township road districts expended a total of $133,758 to provide emergency protective measures, including snow removal, as a result of three separate events. A breakdown by event is provided below.
  - $47,952 was spent to clear roads during a heavy snow event that began on January 1, 1999.

- $25,595 was expended to clear roads and cleanup debris during the winter storm that began on November 30, 2006. This event was part of a federally-declared disaster.
- $60,211 was spent to clear roads during the February 2011 blizzard. This event was part of a federally-declared disaster.

Mount Pulaski

❖ The City sustained $35,000 in property damage during the winter storm that began on November 30, 2006. Heavy ice accumulations led to a loss in power to the entire City and destroyed numerous trees. This event was part of a federally-declared disaster.

NOAA's Storm Events Database documented four injuries and four deaths as a result of five severe winter storm events. All of these injuries and deaths were related to hazardous driving conditions caused by severe winter weather. These injuries and deaths represent a small number of the total injuries and deaths that result from vehicular accidents caused by hazardous winter driving conditions every year in Logan County. The following provides a brief description of each event. In comparison, the State of Illinois averages six deaths per year as a result of severe winter storms.



A November 30, 2006 winter storm left a thick coating of ice on area roads resulting in numerous accidents.

Photograph provided by Logan County EMA.

❖ During an ice storm that began on December 8, 2007 a 35 year-old woman was killed when her car slid off the road and she was ejected from it.

❖ A person was killed in a car accident 11 miles north of Lincoln during a winter storm that began on November 30, 2008.

❖ On January 14, 2009 a woman was killed during a winter storm when she lost control of her car on Illinois Route 121 near Mount Pulaski and slid into the path of an oncoming semi-truck.

❖ One person was killed and another injured when two vehicles collided on Illinois Route 154 one mile east of Chestnut in the early morning hours of January 28, 2009 as a result of a winter storm.

❖ During a blizzard that began on December 12, 2010 three people were injured as a result of a 20 vehicle pile-up on I-55 near Elkhart.

While severe winter storms occur regularly in Logan County, the number of injuries and deaths is low. The combination of treacherous road conditions and a temporary loss of power can make individuals who are not able to reach emergency shelters more vulnerable to hypothermia and other common winter-related injuries. However, even taking into consideration the increased impacts from power outages, the risk to public health and safety from severe winter storms is relatively low.

Located throughout this section and in **Appendix J** are select photographs provided by committee members that depict the impacts associated with severe winter storms.

What other impacts can result from severe winter storms?

In Logan County, vehicle accidents are the largest risk to health and safety from severe winter storms. Hazardous driving conditions (i.e., reduced visibility, icing road conditions, strong winds, etc.) contribute to the increase in accidents that result in injury and death. A majority of all severe winter storm injuries result from vehicle accidents.

Traffic accident data assembled by the Illinois Department of Transportation between 2006 and 2010 indicates that treacherous road conditions caused by snow and ice were present for 7.4% to 21.8% of all crashes recorded annually in the County. **Figure 49** provides a breakdown by year of the number of crashes and corresponding injuries and deaths that occurred when treacherous road conditions caused by snow and ice were present. Some of the injuries and deaths reported in 2007, 2008, 2009 and 2010 are also captured in **Figure 45**.

Figure 49
Severe Winter Weather Crash Data for Logan County

Year	Total # of Crashes	Presence of Treacherous Road Conditions caused by Snow and Ice		
		# of Crashes	# of Injuries	# of Deaths
2006	826	61	14	2
2007	875	142	32	2
2008	833	182	38	1
2009	691	107	32	4
2010	662	132	25	0
Total:			**141**	**9**

Source: Illinois Department of Transportation.

Persons who are outdoors during and immediately following severe winter storms can experience other health and safety problems. Frostbite to hands, feet, ears and nose and hypothermia are common injuries. Treacherous walking conditions also lead to falls which can result in serious injuries, including fractures and broken bones, especially in the elderly. Over exertion from shoveling driveways and walks can lead to life-threatening conditions such as heart attacks in middle-aged and older adults who are susceptible.

Are existing buildings, infrastructure and critical facilities vulnerable to severe winter storms?

Yes. All existing buildings, infrastructure and critical facilities located in Logan County and the participating municipalities are vulnerable to damage from severe winter storms. Structural damage to buildings caused by severe winter storms is very rare, but can occur particularly to flat rooftops.

Information gathered from Logan County residents indicates that snow and ice accumulations on communication and power lines as well as key roads presents the greatest vulnerability to infrastructure and critical facilities within the County. Snow and ice accumulations on lines often lead to disruptions in communications and create power outages. Depending on the damage, it can take anywhere from several hours to several days to restore service.

In addition to affecting communication and power lines, snow and ice accumulations on state and local roads hampers travel and can cause dangerous driving conditions. Blowing and drifting snow can lead to road closures and increases the risk of automobile accidents. Even small accumulations of ice can be extremely dangerous to motorists since bridges and overpasses freeze before other surfaces.



An ice storm that began on December 18, 2008 caused widespread tree damage and power outages.

Photograph provided by Logan County EMA.

When transportation is disrupted, schools close, emergency and medical services are delayed, some businesses close and government services can be affected. When a severe winter storm hits there is also an increase in cost to the County and municipalities for snow removal and de-icing. Road resurfacing and pothole repairs are additional costs incurred each year as a result of severe winter storms.



Heavy snow combined with high winds can lead to large drifts that disrupt travel and leave residents homebound.

Photograph provided by Logan County EMA.

Extreme cold events can also have a detrimental impact on buildings, infrastructure and critical facilities. Pipes and water mains are especially susceptible to freezing during extreme cold events. This freezing can lead to cracks or ruptures in the pipes in buildings as well as in buried service lines and mains. As a result, flooding can occur as well as disruptions in service. Since most buried service lines and water mains are located under local streets and roads, fixing a break requires portions of the street or road to be blocked off, excavated and eventually repaired. These activities can be costly and must be carried out under less than ideal working conditions.

Based on the frequency with which severe winter storms occur in Logan County, the amount of property damage previously reported and the potential for disruptions to power distribution and communication; the risk or vulnerability to buildings, infrastructure and critical facilities from severe winter storms is medium to high.

Are future buildings, infrastructure and critical facilities vulnerable to severe winter storms?

Yes. While six of the participating jurisdictions, including the County, have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from severe winter storms, the County and one other municipality do not.

Infrastructure such as new communication and power lines also will continue to be vulnerable to severe winter storms. Ice accumulations on power lines can disrupt power service. Rural areas of Logan County have experienced extended periods without power due to severe winter storms. Steps to bury all new lines would eliminate the vulnerability, but this action would be cost prohibitive in most areas. There is very little that can be done to reduce or eliminate the vulnerability of new critical facilities such as roads and bridges to severe winter storms.



Ice accumulations of ¼ to ¾ inch were experienced across the County as a result of an ice storm that began on December 18, 2008.

Photograph provided by Logan County EMA.

What are the potential dollar losses to vulnerable structures from severe winter storms?

Unlike other hazards, such as flooding, there are no standard loss estimation models or methodologies for severe winter storms. Since there were limited recorded events listing property damage numbers for severe winter storms, there is no way to accurately estimate future potential dollar losses. However, since all structures within Logan County are vulnerable to damage it is likely that there will be future dollar losses from severe winter storms.

Figure 45
(Sheet 1 of 9)
Severe Winter Storms – Snow and Ice Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death	Property Damages
11/6/1951 thru 11/7/1951	n/a	Heavy Snow	COOP observer in Lincoln measured 8 inches of snow while the observer in Mount Pulaski measured 9 inches; the observer in Lincoln indicated that there were strong east winds on the 6th switching to strong northwest winds on the 7th that caused roads to drift shut and some schools were closed until the 9th	n/a	n/a	n/a
2/2/1961 thru 2/3/1961	n/a	Blizzard	COOP observer in Mount Pulaski measured 7 inches of snow; strong winds caused extensive drifting and blizzard conditions across the county	n/a	n/a	n/a
3/18/1961	n/a	Ice Storm	COOP observer in Mount Pulaski indicated that there was sleet and glaze	n/a	n/a	n/a
2/23/1963 thru 2/25/1963	6:00 p.m.	Heavy Snow	COOP observer in Lincoln measured 10.7 inches of snow while the observer in Mount Pulaski measured 13 inches	n/a	n/a	n/a
1/26/1967 thru 1/27/1967	n/a	Winter Storm	COOP observer in Mount Pulaski measured 7 inches of snow while the observer in Lincoln measured 7.7 inches; the observer in Lincoln noted that winds caused drifting and that the power was out from 4:45 a.m. through 12:30 p.m. on the 27th paralyzing the city of Lincoln; the observer in Mount Pulaski indicated that power was out for 18 hours	n/a	n/a	n/a
1/13/1968 thru 1/14/1968	n/a	Heavy Snow	COOP observer in Lincoln measured 6 inches of snow while the observer in Mount Pulaski measured 10 inches of snow	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 45
(Sheet 2 of 9)
Severe Winter Storms – Snow and Ice Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death	Property Damages
12/19/1973 thru 12/20/1973	n/a	Heavy Snow	COOP observer in Lincoln measured 10 inches of snow while the observer in Mount Pulaski measured 14 inches	n/a	n/a	n/a
3/27/1975	5:00 a.m.	Ice Storm	COOP observer in Lincoln noted that there was sleet and freezing rain while the observer in Mount Pulaski indicated that there was ice pellets and thunder	n/a	n/a	n/a
2/4/1976 thru 2/5/1976	n/a	Ice Storm	COOP observer in Mount Pulaski noted that there was 1 inch of sleet and 3 inches of snow with some glaze	n/a	n/a	n/a
1/27/1977 thru 1/30/1977	n/a	Blizzard	strong winds caused the 6 inches of snow on the ground to blow around creating a blizzard	n/a	n/a	n/a
3/7/1978 thru 3/8/1978	n/a	Heavy Snow	COOP observer in Mount Pulaski measured 7 inches of snow	n/a	n/a	n/a
3/24/1978 thru 3/27/1978	4:00 a.m.	Ice Storm	COOP observer in Lincoln noted that there was freezing rain and that the power was out from 3 p.m. on the 24th through 2 a.m. on the 25th and then again from 1:30 p.m. to 7:30 p.m. on the 25th; the observer in Mount Pulaski indicated that there was light snow and rain on the 24th and an ice storm and rain on the 25th; prolonged power outages, in some cases over a week, were experienced in Elkhart and other areas of the county; Mount Pulaski and Elkhart schools were closed for extended periods of time; in Elkhart utility poles and trees toppled over because of the ice accumulations	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 45
(Sheet 3 of 9)
Severe Winter Storms – Snow and Ice Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death	Property Damages
1/13/1979 thru 1/14/1979	n/a	Heavy Snow	COOP observer in Lincoln measured 6 inches of snow	n/a	n/a	n/a
12/17/1981	n/a	Heavy Snow	COOP observers in Lincoln and Mount Pulaski measured 7 and 7.5 inches of snow respectively	n/a	n/a	n/a
12/23/1981	n/a	Heavy Snow	COOP observers in Lincoln and Mount Pulaski both measured 8 inches of snow	n/a	n/a	n/a
12/28/1981 thru 12/29/1981	n/a	Heavy Snow	COOP observer in Lincoln measured 4 inches of snow while the observer in Mount Pulaski measured 6 inches	n/a	n/a	n/a
2/14/1986	n/a	Heavy Snow	COOP observer in Lincoln measured 6 inches of snow while the observer in Mount Pulaski measured 8 inches	n/a	n/a	n/a
2/23/1986	n/a	Heavy Snow	COOP observer in Lincoln measured 6.2 inches of snow while the observer in Mount Pulaski measured 8 inches	n/a	n/a	n/a
1/9/1987 thru 1/10/1987	n/a	Heavy Snow	COOP observer in Mount Pulaski measured 3 inches of snow while the observer in Lincoln measured 8.5 inches	n/a	n/a	n/a
1/18/1987 thru 1/19/1987	n/a	Heavy Snow	COOP observers in Lincoln and Mount Pulaski both measured 9 inches of snow	n/a	n/a	n/a
1/29/1987	n/a	Ice Storm	no description available	n/a	n/a	n/a
2/16/1987	n/a	Ice Storm	no description available	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 45
(Sheet 4 of 9)
Severe Winter Storms – Snow and Ice Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death	Property Damages
12/14/1987 thru 12/15/1987	n/a	Blizzard	6 inches of snow combined with high winds in excess of 50 mph created blizzard conditions across the county	n/a	n/a	n/a
2/10/1988	n/a	Heavy Snow	COOP observer in Mount Pulaski measured 8 inches of snow	n/a	n/a	n/a
2/14/1990 thru 2/15/1990	n/a	Ice Storm	COOP observer in Mount Pulaski noted glaze, no other description is available	n/a	n/a	n/a
2/25/1993 thru 2/26/1993	n/a	Heavy Snow	COOP observer in Mount Pulaski measured 5 inches of snow while the observer in Lincoln measured between 11.5 inches	n/a	n/a	n/a
1/8/1997 thru 1/9/1997	9:00 p.m.	Heavy Snow	COOP observer in Mount Pulaski measured 5.5 inches of snow while the observer in Lincoln measured 6.5 inches	n/a	n/a	n/a
1/14/1998	6:00 a.m.	Winter Storm	mix of freezing rain, sleet and snow with the COOP observer in Mount Pulaski indicating that there was ⅛ to ¼ inch glaze and ice pellets	n/a	n/a	n/a
12/30/1998 thru 12/31/1998	2:30 p.m.	Heavy Snow	COOP observer in Mount Pulaski measured 5.8 inches of snow while the NWS staff in Lincoln measured 7.3 inches	n/a	n/a	n/a
1/1/1999 thru 1/3/1999	12:00 p.m.	Heavy Snow	COOP observer in Lincoln measured 11.6 inches of snow; winds increased from the northwest and temperatures dropped, causing dangerous wind chills and treacherous driving conditions with extensive blowing and drifting	n/a	n/a	$47,952
Subtotal:				**0**	**0**	**$47,952**

Figure 45
(Sheet 5 of 9)
Severe Winter Storms – Snow and Ice Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death	Property Damages
3/8/1999 thru 3/9/1999	12:00 p.m.	Heavy Snow	4 to 7.5 inches of snow with a report of 7.5 inches in San Jose and the COOP observer in Mount Pulaski measuring 4.3 inches while the NWS staff in Lincoln measured 5.5 inches; both COOP observers also indicated that there was glaze present	n/a	n/a	n/a
2/14/2003 thru 2/16/2003	11:00 p.m.	Winter Storm	NWS staff in Lincoln measured 3.1 inches of snow while the COOP observer in Mount Pulaski measured 5.4 inches; both observers indicating that ice pellets and glaze were present; 30 to 50 mph winds caused major blowing and drifting	n/a	n/a	n/a
11/24/2004	3:00 p.m.	Winter Storm	COOP observer in Mount Pulaski measured 4 inches of snow while the NWS staff in Lincoln measured 4.6 inches; the snow fell in a relatively short amount of time and was accompanied by sustained winds of 20 to 30 mph with gusts of 40 to 50 mph that caused considerable blowing and drifting; the high winds and the weight of the wet snow downed numerous trees and power lines across the region	n/a	n/a	n/a
1/5/2005 thru 1/6/2005	1:00 p.m.	Ice Storm	ice accumulations of ¼ to ½ inch with the COOP observer in Mount Pulaski and the NWS staff in Lincoln measuring 0.25 to 0.30 inches respectively; there were numerous reports of downed trees and power lines as well as numerous traffic accidents	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 45
(Sheet 6 of 9)
Severe Winter Storms – Snow and Ice Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death	Property Damages
11/30/2006 thru 12/1/2006	9:00 a.m.	Winter Storm	freezing rain, heavy sleet and snow with ice accumulations between 1 and 2 inches and snow accumulations of around 3 inches; the COOP observer in Mount Pulaski indicated that there was between ½ and 1 ½ inches of ice accumulations on ground, trees and power lines and measured 3.5 inches of snow; trees and power lines sustained considerable damage; snow and ice covered roads resulted in numerous vehicular accidents; an Amtrak train became stranded on the tracks in rural Logan County during the storm and the approximately 400 passengers had to be evacuated and temporary lodging and food provided until the storm had passed; this event was part of a federally-declared disaster (Declaration #1681)	n/a	n/a	$60,595
1/12/2007 thru 1/13/2007	6:00 p.m.	Ice Storm	freezing rain with ice accumulations of ¼ to ½ inch; ice caused modest tree limb and power line damage as well as numerous vehicular accidents	n/a	n/a	n/a
2/12/2007 thru 2/14/2007	8:00 p.m.	Blizzard	7 to 12 inches of snow with the COOP observer in Mount Pulaski measuring 10 inches of snow and the NWS staff in Lincoln measuring 11.2 inches; strong northerly winds gusting from 35 to 45 mph created blizzard conditions; many locations reported snow drifts ranging from 3 to 6 feet, prompting the closure of many area roads	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$60,595**

Figure 45
(Sheet 7 of 9)
Severe Winter Storms – Snow and Ice Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death	Property Damages
12/8/2007 thru 12/9/2007	1:00 p.m.	Ice Storm	freezing rain with ice accumulations of 0.3 to 0.4 inches; many vehicular accidents were reported; an indirect fatality occurred in Logan County when a 35 year-old female slid off the road and was ejected from her car	0	1	n/a
1/31/2008 thru 2/1/2008	2:00 p.m.	Heavy Snow	COOP observer in Mount Pulaski measured 7.5 inches of snow while the NWS staff in Lincoln measured 8.4 inches	n/a	n/a	n/a
11/30/2008 thru 12/1/2008	12:00 a.m.	Winter Storm	NSW staff in Lincoln measured 2.3 inches of snow while the COOP observer in Mount Pulaski measured 3.6 inches; gusty northwesterly winds caused considerable blowing and drifting; falling temperatures created slick and hazardous road conditions which led to numerous traffic accidents; one person was killed in a car accident 11 miles north of Lincoln	0	1	n/a
12/18/2008 thru 12/19/2008	n/a	Ice Storm	ice accumulations of ¼ to ¾ inch with ½ inch measured at the NWS staff in Lincoln; widespread tree damage and power outages were reported; increasing west to northwest winds in the wake of the departing storm resulted in additional downed tree branches and power outages into the 20th	n/a	n/a	n/a
1/14/2009	12:00 a.m.	Winter Storm	COOP observer in Mount Pulaski measured 2.1 inches of snow while the NWS staff in Lincoln measured 4 inches; strong northwesterly winds caused considerable blowing and drifting; numerous traffic accidents occurred; a woman lost control of her car on IL Rte. 121 near Mount Pulaski and slid into the path of an oncoming semi-truck and was killed	0	1	n/a
Subtotal:				**0**	**3**	**$0**

Figure 45
(Sheet 8 of 9)
Severe Winter Storms – Snow and Ice Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death	Property Damages
1/27/2009 thru 1/28/2009	12:00 a.m.	Winter Storm	NWS staff in Lincoln measured 1.8 inches of snow while the COOP observer in Mount Pulaski measured 2.5 inches; 2 vehicles collided on IL Rte. 54 about 1 mile east of Chestnut at 5:30 a.m. on the 28th injuring one person and killing another	1	1	n/a
1/6/2010 thru 1/7/2010	8:00 p.m.	Winter Storm	COOP observer in Mount Pulaski measured 4.2 inches of snow while the NWS staff in Lincoln measured 5.7 inches; gusty northwesterly winds created considerable blowing and drifting	n/a	n/a	n/a
12/12/2010 thru 12/13/2010	3:00 a.m.	Blizzard	2 to 4 inches of snow with the NWS staff in Lincoln and COOP observer in Mount Pulaski measuring 2.2 to 2.9 inches respectively; strong winds gusting in excess of 35 mph created blizzard conditions; several vehicular accidents occurred because of the icy road conditions and poor visibility, including a 20 vehicle pile-up on I-55 near Elkhart that injured 3 people and closed the interstate for several hours	3	0	n/a
2/1/2011 thru 2/2/2011	10:00 a.m.	Blizzard	9 to 13 inches of snow with the COOP observer in Mount Pulaski and the NWS staff in Lincoln measuring 9.3 to 12 inches respectively; high winds of 45 to 55 mph created blizzard conditions which resulted in drifts more than 7 feet high and the closure of most roads in the county; all of the schools in the county were closed for at least three days; the Lincoln High School roof was damaged which caused flooding in the school; this event was part of a federally-declared disaster (Declaration #1960)	n/a	n/a	566,211
Subtotal:				**4**	**1**	**$566,211**

Figure 45
(Sheet 9 of 9)
Severe Winter Storms – Snow and Ice Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death	Property Damages
12/20/2012	1:30 p.m.	Blizzard	high winds of 35 to 45 mph with gusts over 50 mph caused snow accumulations of around 1 inch to blow creating blizzard conditions; numerous traffic accidents were reported across the County; numerous vehicles were stalled on I-55 south of Lincoln and a multiple vehicle accident occurred at mile market 6 on I-55 north of Lincoln; power outages were reported in Latham and Chestnut	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**
GRAND TOTAL:				**4**	**4**	**$674,758**

Sources: Climate Atlas of Illinois.
Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member responses to Logan County Critical Facilities Damaged by Natural Hazard Events Questionnaire.
Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member responses to Logan County Natural Hazard Events Questionnaire.
Illinois State Water Survey.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, COOP Data / Record of Climatological Observations.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.
National Weather Service, Weather Forecast Office – Central Illinois, Chris Miller, Warning Coordination Meteorologist.

Figure 46
Extreme Cold Events Reported in Logan County
1995 through 2012

Date(s)	Start Time	Event Type	Magnitude	Injuries	Death
12/8/1995 thru 12/9/1995	7:00 a.m.	Extreme Windchill	winter weather accompanied by strong winds gusting up to 30 mph combined with temperatures near zero to produce wind chills values as low as -45°F	n/a	n/a
1/18/1996 thru 1/19/1996	10:00 a.m.	Extreme Windchill	winter weather accompanied by gusty winds of 25 to 35 mph produced wind chills values near -40°F	n/a	n/a
2/2/1996 thru 2/4/1996	12:00 a.m.	Extreme Cold	bitterly cold weather swept across central Illinois causing many people to experience problems with cars and frozen pipes; according to the COOP observer in Lincoln, the actual temperatures on the 2nd ranged from 2°F to -19°F, on the 3rd they ranged from 2°F to -20°F and on the 4th they ranged from 16°F to -16°F	n/a	n/a
1/15/1997 thru 1/17/1997	3:00 a.m.	Extreme Windchill	winter weather accompanied by strong winds between 20 and 30 mph with higher gusts combined with cold temperatures to produce wind chill values well below -40°F	n/a	n/a
1/1/1999 thru 1/3/1999	12:00 p.m.	Extreme Windchill	a heavy snow storm accompanied by strong northwest winds combined with falling temperatures to produce dangerous wind chill values	n/a	n/a
1/5/1999	5:00 a.m.	Extreme Cold	a record low temperature for January of -25°F was recorded by the COOP observer in Lincoln	n/a	n/a
1/15/2009 thru 1/16/2009	12:00 a.m.	Extreme Cold/ Windchill	bitterly cold weather swept across central Illinois; early morning temperatures well below zero combined with brisk northwesterly winds to produce wind chill values of -25°F to -40°F	n/a	n/a
Subtotal:				**0**	**0**
GRAND TOTAL:				**0**	**0**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

3.4 FLOODS

IDENTIFYING THE HAZARD

What is the definition of a flood?

The Federal Emergency Management Agency (FEMA) defines a "flood" as a general or temporary condition where two or more acres of normally dry land or two or more properties are inundated by:

- overflow of inland or tidal waters;
- unusual and rapid accumulation or runoff of surface waters from any source;
- mudflows; or
- a sudden collapse or subsidence of shoreline land.

The severity of a flooding event is determined by a combination of topography and physiography, ground cover, precipitation and weather patterns and recent soil moisture conditions. On average, flooding causes more than $2 billion in property damage each year in the United States. Floods cause utility damage and outages, infrastructure damage (both to transportation and communication systems), structural damage to buildings, crop loss, decreased land values and impede travel.

What types of flooding occur in Logan County?

There are two main types of flooding that affect Logan County: flash flooding and general flooding. General flooding can be broken down into two categories: riverine flooding and shallow or overland flooding. The following provides a brief description of each type.

Flash Floods

A flash flood is a rapid rise of water along a stream or low-lying area. This type of flooding generally occurs within six hours of a significant rain event and is usually produced when heavy localized precipitation falls over an area in a short amount of time. Considered the most dangerous type of flood event, flash floods happen quickly with little or no warning. Typically, there is no time for the excess water to soak into the ground nor are the storm sewers able to handle the shear volume of water. As a result, streams overflow their banks and low-lying (such as underpasses, basements etc.) areas can rapidly fill with water.

Flash floods are very strong and can tear out trees, destroy buildings and bridges and scour out new channels. Flash flood-producing rains can also weaken soil and trigger mud slides that damage homes, roads and property. Six inches of fast-moving water can knock a person off their feet, while it takes only two feet of water to carry away most vehicles.

Riverine Floods

A riverine flood is a gradual rise of water in a river or stream that results in the waterway overflowing its banks. This type of flooding affects low lying areas near rivers, streams, lakes and reservoirs and generally occurs when:

- persistent storm systems enter the area and remain for extended periods of time,

- winter and spring rains combine with melting snow to fill river basins with more water than the river or stream can handle,
- ice jams create natural dams which block normal water flow, and
- torrential rains from tropical systems make landfall.

Shallow/Overland Floods

A shallow or overland flood is the pooling of water outside of a defined river or stream. There are a couple of types of overland flooding including sheet flow and ponding. Overland flooding generally occurs when the ground is still frozen or persistent storm systems have left the ground saturated and additional rainfall cannot soak in.

If the surface runoff cannot find a channel, it may flow out over a large area at a somewhat uniform depth in what's called sheet flow. In other cases the runoff may collect in depressions and low-lying areas where it cannot drain out, creating a ponding effect. Ponding floodwaters do not move or flow away, they remain in the temporary ponds until the water can infiltrate the soil, evaporate or are pumped out.

What is a base flood?

A base flood refers to any flood having a 1% chance of occurring in any given year. It is also known as the 100-year flood or the one percent annual chance flood. The base flood is the national standard used by the National Flood Insurance Program (NFIP) and the State of Illinois for the purposes of requiring the purchase of flood insurance and regulating new development.

Many individuals misinterpret the term "100-year flood". This term is used to describe the risk of future flooding; it does not mean that it will occur once every 100 years. Statistically speaking, a 100-year flood has a 1/100 (1%) chance of occurring in any given year. In reality, a 100-year flood could occur two times in the same year or two years in a row, especially if there are other contributing factors such as unusual changes in weather conditions, stream channelizations or changes in land use (i.e., open space land developed for housing or paved parking lots). It is also possible not to have a 100-year flood event over the course of 100 years.

While the base flood is the standard most commonly used for floodplain management and regulatory purposes in the United States, the 500-year flood is the national standard for protecting critical facilities, such as hospitals and power plants. A 500-year flood has a 1/500 (0.2%) chance of occurring in any given year.

What is a floodplain?

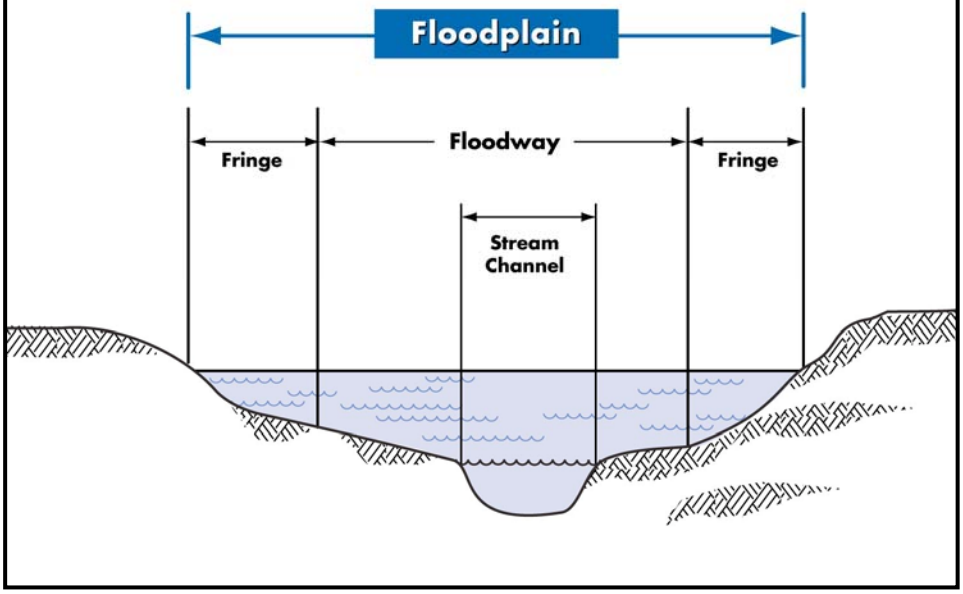
The general definition of a floodplain is any land area susceptible to being inundated or flooded by water from any source (i.e., river, stream, lake, estuary, etc.). This general definition differs slightly from the regulatory definition of a floodplain.

A regulatory or base floodplain is defined as the land area that is covered by the floodwaters of the base flood. This land area is subject to a 1% chance of flooding in any given year. The base floodplain is also known as the 100-year floodplain or a Special Flood Hazard Area (SFHA). It

is this second definition that is generally most familiar to people and the one that is used by the NFIP and the State of Illinois.

A base floodplain is divided into two parts: the floodway and the flood fringe. **Figure 50** illustrates the various components of a base floodplain.

Figure 50
Floodplain Illustration



Source: Illinois Department of Natural Resources, Quick Guide to Floodplain Management.

The floodway is the channel of a river or stream and the adjacent floodplain that is required to store and convey the base flood without increasing the water surface elevation. Typically the floodway is the most hazardous portion of the floodplain because it carries the bulk of the base flood downstream and is usually the area where water is deepest and is moving the fastest. Floodplain regulations prohibit construction within the floodway that results in an increase in the floodwater's depth and velocity.

The flood fringe is the remaining area of the base floodplain, outside of the floodway, that is subject to shallow inundation and low velocity flows. In general, the flood fringe plays a relatively insignificant role in storing and discharging floodwaters. The flood fringe can be quite wide on large streams and quite small or nonexistent on small streams. Development within the flood fringe is typically allowed via permit if it will not significantly increase the floodwater's depth or velocity and the development is elevated above or otherwise protected to the base flood elevation.

What is a Special Flood Hazard Area?

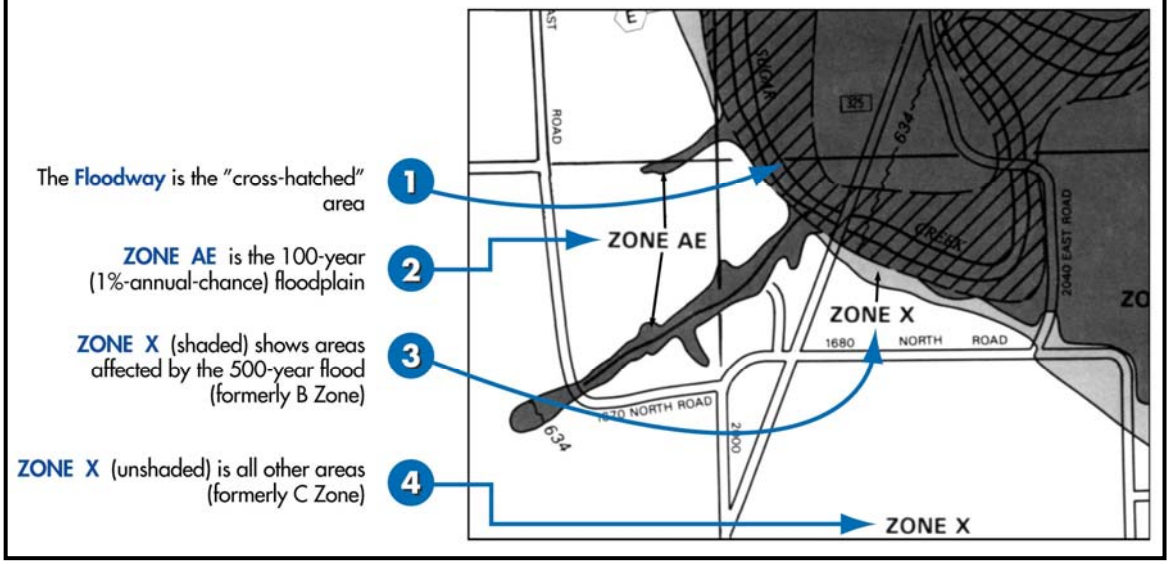
A Special Flood Hazard Area (SFHA) is the base floodplain. As discussed previously, this is the land area that is covered by the floodwaters of the base flood and has a 1% chance of flooding in

any given year. The term SFHA is most commonly used when referring to the based floodplain on the Flood Insurance Rate Maps (FIRM) produced by FEMA. The SFHA is the area where floodplain regulations must be enforced by a community as a condition of participation in the NFIP and the area where mandatory flood insurance purchase requirements apply. Special Flood Hazard Areas are delineated on the FIRMs and may be designated as Zones A, AE, A1-30, AO, AH, AR, and A99 depending on the amount of flood data available, the severity of the flood hazard or the age of the flood map.

What are Flood Insurance Rate Maps?

Flood Insurance Rate Maps (FIRMs) are maps that identify both the Special Flood Hazard Areas and the risk premium zones applicable to a community. These maps are produced by FEMA in association with the NFIP for floodplain management and insurance purposes. Digital versions of these maps are referred to as DFIRMs. **Figure 51** shows an example of a FIRM.

Figure 51
Example of a Flood Insurance Rate Map (FIRM)



Source: Illinois Department of Natural Resources, Quick Guide to Floodplain Management.

A FIRM will generally shows a community's base flood elevations, flood zones and floodplain boundaries. The information presented on a FIRM is based on historic, meteorological, hydrologic and hydraulic data as well as open-space conditions, flood-control projects and development. ***These maps only define flooding that occurs when a creek or river becomes overwhelmed. They do not define overland flooding that occurs when an area receives extraordinarily intense rainfall and storm sewers and roadside ditches are unable to handle the surface runoff.***

What are flood zones?

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk. These zones are depicted on a community's FIRM. Each zone reflects the severity or type

of flooding in the area. The following provides a brief description of each of the flood zones that may appear on a community's FIRM.

- **Zone A.** Zone A, also known as the Special Flood Hazard Area (SFHA) or base floodplain, is defined as the floodplain area that has a 1% chance of flooding in any given year. There are multiple Zone A designations, including Zones A, AO, AH, A1-30, AE, AR or A99. Land areas located within Zone A are at a high risk for flooding.

  A home located with Zone A has a 26% chance of suffering flood damage over the life of a 30 year mortgage. In communities that participate in the NFIP, structures located within Zone A are required to purchase flood insurance.

- **Zone X (shaded).** Zone X (shaded), formerly known as Zone B, is defined as the floodplain area between the base flood (Zone A) and the 500-year flood. Land areas located within Zone X (shaded) are affected by the 500-year flood and are considered at a moderate risk for flooding.

  Zone X (shaded) is also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, shallow flooding areas with average depths of less than one foot or drainage areas less than one square mile. In communities that participate in the NFIP, structures located within Zone X (shaded) are not required to purchase flood insurance, however it is made available to all property owners and renters.

- **Zone X (unshaded).** Zone X (unshaded), formerly known as Zone C, is defined as all other land areas outside of Zone A and Zone X (shaded). Land areas located in Zone X (unshaded) are considered to have a low or minimal risk of flooding. In communities that participate in the NFIP, structures located with Zone X (unshaded) are not required to purchase flood insurance, however it is made available to all property owners and renters.

What is a Repetitive Loss Structure or Property?

FEMA defines a "repetitive loss structure" as a National Flood Insurance Program-insured structure that has received two or more flood insurance claim payments of more than $1,000 each within any 10-year period since 1978. Historically, these structures account for approximately one-third of the nation's flood insurance claim payments. Identifying these structures and working with local jurisdictions to implement the appropriate mitigation measures to eliminate or reduce the damages caused by repeated flooding to these structures is important to FEMA and the NFIP. These structures not only increase the NFIP's annual losses, they drain funds needed to prepare for catastrophic events.

What is floodplain management?

Floodplain management is the administration of an overall community program of corrective and preventative measures to reduce flood damage. These measures take a variety of forms and generally include zoning, subdivision or building requirements, special-purpose floodplain ordinances, flood control projects, education and planning. Where floodplain development is permitted, floodplain management provides a framework that minimizes the risk to life and property from floods by maintaining a floodplain's natural function. Floodplain management is a key component of the National Flood Insurance Program.

What is the National Flood Insurance Program?

The National Flood Insurance Program (NFIP) is a federal program, administered by FEMA, that:

- mitigates future flood losses nationwide through community-enforced building and zoning ordinances; and
- provides access to affordable, federally-backed insurance protection against losses from flooding to property owners in participating communities.

It is designed to provide an insurance alternative to disaster assistance to meet escalating costs of repairing damage to buildings and their contents due to flooding. The U.S. Congress established the NFIP on August 1, 1968 with the passage of the National Flood Insurance Act of 1968. This Program has been broadened and modified several times over the years, most recently with the passage of the Flood Insurance Reform Act of 2004.

Prior to the creation of the NFIP, the national response to flood disasters was generally limited to constructing flood-control projects such as dams, levees, sea-walls, etc. and providing disaster relief to flood victims. While flood-control projects were able to initially reduce losses, their gains were offset by unwise and uncontrolled development practices within floodplains. In light of the continued increase in flood losses and the escalating costs of disaster relief to taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for protection.

Participation in the NFIP is voluntary and based on an agreement between local communities and the federal government. If a community agrees to adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in a Special Flood Hazard Area (base floodplain), then the government will make flood insurance available within the community as a financial protection against flood losses.

If a community chooses not to participate in the NFIP or a participating community decides not to adopt new floodplain management regulations or amend its existing regulations to reference new flood hazard data provided by FEMA, then the following sanctions will apply.

- Property owners will not be able to purchase NFIP flood insurance policies and existing policies will not be renewed.
- Federal disaster assistance will not be provided to repair or reconstruct insurable buildings located in identified flood hazard areas for presidentially-declared disasters that occur as a result of flooding.
- Federal mortgage insurance and loan guarantees, such as those written by the Federal Housing Administration and the Department of Veteran Affairs, will not be provided for acquisition or construction purposes within an identified flood hazard areas. Federally-insured or regulated lending institutions, such as banks and credit unions, are allowed to make conventional loans for insurable buildings in identified flood hazard areas of non-participating communities. However, the lender must notify applicants that the property

is in an identified flood hazard area and that it is not eligible for federal disaster assistance.

- Federal grants or loans for development will not be available in identified flood hazard areas under programs administered by federal agencies such as the Environmental Protection Agency, Small Business Administration and the Department of Housing and Urban Development.

What is the NFIP's Community Rating System?

The NFIP's Community Rating System (CRS) is a voluntary program developed by FEMA to provide incentives (in the form of flood insurance premium discounts) for NFIP participating communities that have gone beyond the minimum NFIP floodplain management requirements to develop extra measures to provide protection from flooding. CRS discounts on flood insurance premiums range from 5% up to 45%. Those discounts provide an incentive for new flood protection activities that can help save lives and property in the event of a flood.

Are alerts issued for flooding?

Yes. The National Weather Service Weather Forecast Office in Lincoln, Illinois is responsible for issuing ***flood watches*** and ***warnings*** for Logan County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Watch.** A flash flood or flood watch is issued when current or developing hydrologic conditions are favorable for flash flooding or flooding to develop in or close to the watch area. It does not mean that flooding is imminent, just that individuals need to be alert and prepared.
- **Warning.** A flash flood or flood warning is issued when flooding is in progress, imminent or highly likely. Warnings indicate imminent danger to life and property for those who are in the area of the flooding.
- **Urban and Small Stream Flood Advisory.** An urban and small stream flood advisory is issued when heavy rain will cause flooding of streets and low-lying places in urban areas or if small rural or urban streams are expected to reach or exceed their banks. Advisories alert the public to flooding which is generally only an inconvenience and does not pose a threat to life and/or property.

PROFILING THE HAZARD

When has flooding occurred previously? What is the extent of these previous floods?

Figures 52 and **53**, located at the end of this section, summarize the previous occurrences as well as the extent or magnitude of the flood events recorded in Logan County. The flood events are separated into two categories: general floods (riverine and shallow/overland) and flash floods.

Flood Fast Facts – Occurrences

Number of General Floods Reported (1951 – 2012): ***20***

Number of Flash Floods Reported (1981 – 2012): ***26***

Most Likely Month for Floods to Occur: ***May***

Most Likely Month for Flash Floods to Occur: ***June***

Most Likely Time for Flash Floods to Occur: ***Late Afternoon/ Late Evening***

NOAA's Storm Events Database, National Weather Service COOP Data records, records from the National Weather Service Central Illinois Weather Forecast Office in Lincoln and Planning Committee member records have documented 20 reported occurrences of general flooding between 1951 and 2012 and 26 reported occurrences of flash flooding between 1981 and 2012 in Logan County.

Figure 54 charts the reported occurrences of general flooding and flash flooding by month. Twelve of the 20 general flood events (60%) took place in April, May and June. One May event, one June event and one October event spanned more than one month, however, for illustration purposes only the month the event started is graphed. In comparison, 17 of the 26 flash flood events (65%) took place in May, June and July.

Figure 54
Flood Events by Month

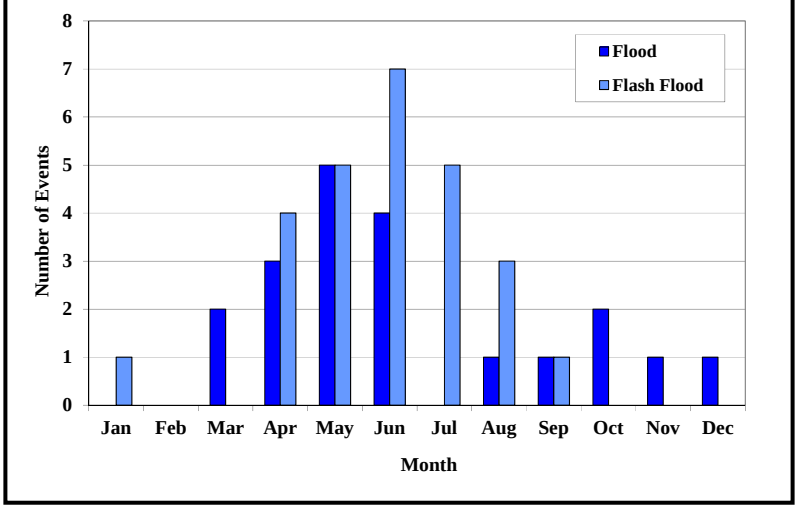


Figure 55 charts the reported occurrences of flash flooding in Logan County by hour. There was insufficient data available to chart the start time of the reported general flood events. Of the 26 flash flood events, start times were unavailable for two events. Approximately 67% of the remaining 24 flash flood events with recorded times began during the p.m. hours. Eight of the events (33%) took place between 3 p.m. and 7 p.m. while an additional eight events (33%) took place between 8 p.m. and 12:00 a.m. (midnight).

What locations are affected by floods?

While specific locations are affected by general flooding, many areas of the County can be impacted by overland and flash flooding because of the topography and seasonally high water table of the area. Approximately 15.1% of the area in Logan County is designated as being within the base floodplain and susceptible to riverine floods. The *2010 Illinois Natural Hazard Mitigation Plan* by IEMA classifies Logan County's hazard rating for floods as "high."

Figure 55
Flash Flood Events by Hour
1981 – 2012

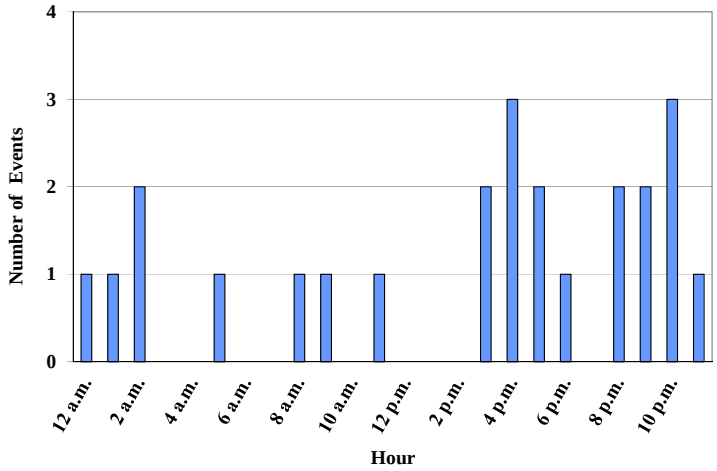


Figure 56 identifies the bodies of water by participating jurisdictions that are known to cause flooding or have the potential to flood. Water bodies with Special Flood Hazard Areas are identified in bold.

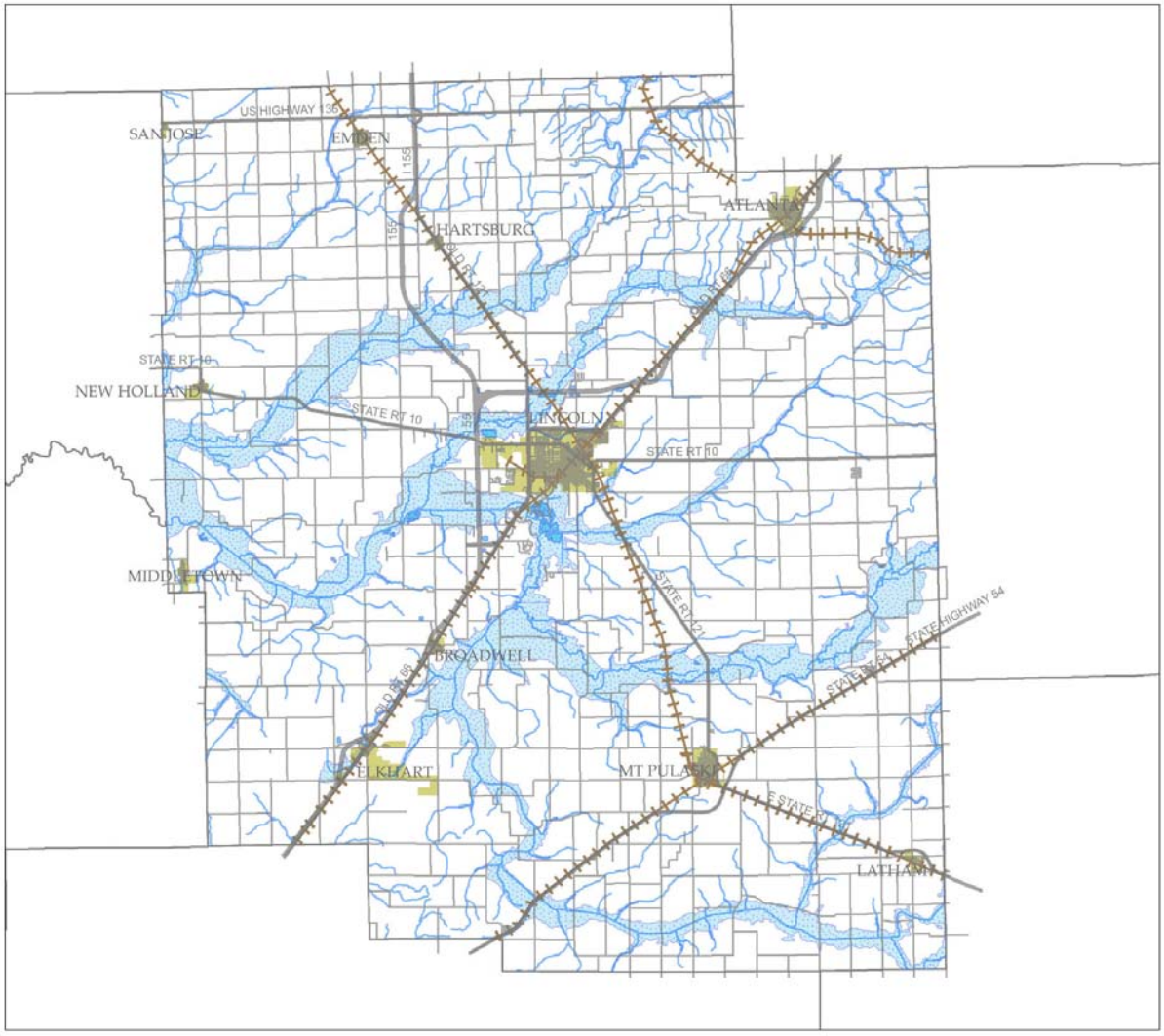
Figure 56
Bodies of Water Subject to Flooding in Logan County

Participating Jurisdiction	Water Bodies
Atlanta	two intermittent tributaries of Kickapoo Creek
Broadwell	---
Elkhart	**Elkhart Slough**, **intermittent tributary of Lake Fork**
Emden	---
Hartsburg	---
Lincoln	**Brainard Branch, Kickapoo Creek, Salt Creek, Salt Springs Branch**
Mount Pulaski	---
Unincorporated Logan County	**Brainard Branch, Clear Creek, Deer Creek, Elkhart Slough, Kickapoo Creek,** Laenna Lake, **Lake Fork,** Lincoln Lakes, **McGarvey Slough, Middle Fork of Sugar Creek, North Fork of Lake Fork, Pike Creek, Prairie Creek, Prairie Creek Ditch, Salt Creek, Salt Springs Branch, South Fork of Lake Fork, Sugar Creek, West Fork of Sugar Creek**

Source: FEMA DFIRMs.

Figure 57 identifies the floodplains in Logan County. This figure is based on the DFIRMs for Logan County that became effective February 18, 2011. While a large portion of the area prone to riverine flooding is in the unincorporated portions of the County, Elkhart and Lincoln are also susceptible to riverine flooding because of their proximity to floodplains. To view the DFIRMs for the participating municipalities, see **Appendix N**.

Figure 57
Floodplain Areas in Logan County



Do any of the participating jurisdictions take part in the NFIP?

Yes. Logan County, Atlanta, Elkhart, Lincoln and Mount Pulaski all participate in the NFIP. **Figure 58** provides information about each jurisdiction's participation in the NFIP, including the date each participant joined and the year of the most recently adopted floodplain zoning ordinance. Broadwell, Emden and Hartsburg have no identified flood hazard boundaries within their corporate limits and are not required to participate.

Figure 58
NFIP Participating Jurisdictions

Participating Jurisdictions	Participation Date	Current Effective FIRM Date	CRS Participation	Most Recently Adopted Floodplain Zoning Ordinance
Logan County	9/2/1988	2/18/2011	No	2010
Atlanta	4/23/1980	2/18/2011 (NSFHA)	No	2011
Elkhart	9/4/1986	2/18/2011	No	2011
Lincoln	10/16/1979	2/18/2011	No	2011
Mount Pulaski	2/18/2011	2/18/2011 (NSFHA)	No	2010

Source: FEMA, Community Status Book.

What is the probability of future flood events occurring?

Logan County has had 46 verified occurrences of flooding (both general and flash flooding) between 1951 and 2012. With 46 occurrences over the past 62 years, the probability or likelihood of a flood event occurring in Logan County in any given year is 74%. There were six years over the past 62 years where two or more general flood events occurred. This indicates that the probability that more than one general flood event may occur during any given year within the County is 10%. However, the gaps in flood data between 1951-1961 and 1966-1979 cause a distortion in both these probabilities.

If only the events recorded by NOAA's Storm Events Database are analyzed, then there have been 27 verified occurrences flooding between 1994 and 2012. With 27 events in 19 years, Logan County should expect to experience at least one flood event each year. There were five years over the past 19 years where two or more flood events occurred. This indicates that the probability that more than one flood event may occur during any given year within the County is 26%.



Very heavy rains resulted in flash flooding in and around Lincoln in January, 2005.

Photograph provided by Chris Miller, NWS - Lincoln.

A probability based on 19 years of data may not be as accurate as a probability based on 62 years of data. However, a probability based on the 1994-2012 data may provide a more reliable representation of the threat the County faces from flooding than a probability calculated from a longer time frame with gaps.

ASSESSING VULNERABILITY

Several factors including topography, precipitation and an abundance of rivers and streams make Illinois especially vulnerable to flooding. Since the 1940s, Illinois climate records show an increase in heavy precipitation which has led to increased flood peaks on Illinois rivers.

Are the participating jurisdictions vulnerable to flooding?

Yes. Logan County, including the participating municipalities, is vulnerable to the dangers presented by flooding. Precipitation levels, a high seasonal water table, and generally flat topography are factors that cumulatively make virtually the entire County susceptible to some form of flooding. Flooding occurs along the floodplains of all the rivers and streams within the County as well as outside of the floodplains in low-lying areas where drainage problems occur due to culvert or drainage ditches that need improvement or proper maintenance.



Heavy rains led to flash flooding in Elkhart on July 4, 1981. There was over 6 feet of standing water and almost all of the streets were flooded and impassable.

Photograph and information provided by Margaret Lee.

Figure 59 details the number of flash flood events by participating jurisdiction. All of the general flood events, with the exception of one, were considered countywide events. The only event with a specific location listed occurred in Lincoln on June 12, 2000.

Figure 59
Verified Flash Flood Events by Participating Jurisdiction

Participating Jurisdiction	Flash Flood Events	
	Number	Year
Atlanta	1	2002
Broadwell	0	---
Elkhart	1	1981
Emden	1	1995
Hartsburg	0	---
Lincoln	7	1995, 1998, 2002, 2002*, 2003, 2003, 2005
Mount Pulaski	5	1999, 2002, 2002*, 2004, 2010
Countywide	6	1986, 1994, 2000, 2004, 2008, 2010
Unincorporated Areas	3	2002*, 2003*, 2009
northeastern portion of the county	1	1998
northwestern portion of the county	1	2004
central portion of the county	1	2010
southern portion of the county	2	1999, 2009
western portion of the county	1	2010
eastern portion of the county	1	2010

* Flooding occurred in the vicinity of this location.

Vulnerability to flooding can change depending on several factors, including land use. As land used primarily for agricultural and open space purposes is converted for residential and commercial/industrial uses, the number of buildings and impervious surfaces (i.e., parking lots, roads, sidewalks, etc.) increases. As the number of buildings and impervious surfaces increases, so too does the potential for flash flooding. Rather than infiltrating the ground slowly, rain and snowmelt that falls on impervious surfaces runs off and fills ditches and storm drains quickly creating drainage problems and flooding.

As described in Section 1.3, substantial changes in land use (from forested, open and agricultural land to residential, commercial and industrial) are not anticipated within the County in the immediate future. No substantial increases in residential or commercial/industrial developments are expected within the next five years.

What impacts resulted from the recorded floods?

Floods as a whole have caused an estimated $500,000 in crop damage and $53,035,000 in property damages and resulted in one death. Included in the property damage total is $50 million for an April 1994 general flood event which represents losses sustained in 10 counties (including Logan County). A breakdown by county was unavailable. In comparison, the State of Illinois averages four deaths per year and an estimated $257 million annually in property damage losses, making flooding the single most financially damaging natural hazard in Illinois. The following provides a breakdown of impacts by category.

Flood Fast Facts – Impacts/Risk

General Flood Events
- Total Property Damage: ***$50,000,000****
- Infrastructure/Critical Facilities Damage†: ***n/a***
- Fatalities: ***1***

Flash Flood Events
- Total Property Damage: ***$3,035,000***
- Infrastructure/Critical Facilities Damage^: ***n/a***
- Crop Damage: ***$500,000***

Risk/Vulnerability to:
- Public Health & Safety – General Flooding: ***Low***
- Public Health & Safety – Flash Flooding: ***Medium***
- Buildings/Infrastructure/Critical Facilities: ***Medium/High***

* Represents losses sustained by 10 counties during the April 1994 flood event. A detailed breakdown by county was not available.

† During the April 1994 flood event the Lincoln Wastewater Treatment Facility was flooded; however a damage estimate was unavailable.

^ During the May 1995 flash flood event the Lincoln Developmental Center experienced major flooding; however a damage estimate was unavailable.

Not included in the property damage total above is approximately $592,000 that has been spent over the past 10 years to address damages to bridges and culverts as a direct result of flooding and erosion. According to the Logan County Highway Engineer, this figure does not include replacement of bridges and culverts due to structural condition or other issues. Most of the work involved erosion control at existing bridges to counteract scour that has already occurred.

While both general and flooding events occur on a fairly regular basis within the County, the number of injuries and deaths is low. Consequently, the risk or vulnerability to public health and safety from *general flooding* is seen as relatively low. However, over half of the recorded flood events are a result of flash flooding. Since there is very little warning associated with flash flooding, the risk to public health and safety from *flash flooding* is elevated to medium.

News articles with photographs showing the extent of flooding experienced within the County are located in the **Appendix M**.

General Floods

The data provided by NOAA's Storm Events Database indicates that between 1951 and 2012, one of the 20 general flood events caused $50 million in property damages. As mentioned previously, the property damage total for the April 1994 flood event represents losses sustained in 10 counties (including Logan County). Damage information was either unavailable or none was recorded for the remaining 19 reported occurrences.

Included in the April 1994 property damage total is property damage sustained by infrastructure and critical facilities in Lincoln. While a damage estimate was unavailable, committee member records indicate that the Lincoln Wastewater Treatment Facility flooded during this event.

NOAA's Storm Events Database also documented one death as a result of the October/November 2009 countywide flood event. A 97-year-old man drowned while attempting to cross a water-covered road south of Mount Pulaski.

Flash Floods

The data provided by NOAA's Storm Events Database and records from the National Weather Service Central Illinois Weather Forecast Office in Lincoln indicate that between 1981 and 2012, three of the 26 flash flood events caused $3,035,000 in property damage and $500,000 in crop damage. Damage information was either unavailable or none was recorded for the remaining 23 reported occurrences. No injuries or deaths were reported as a result of any of the general flood events.



Kickapoo Creek overflowed its banks at Lawndale after heavy rains caused flash flooding on May 15, 2009.

Photograph provided by Chris Miller, NWS - Lincoln.

Included in the $2 million property damage figure for the May 1995 flash flood event is property damaged sustained by infrastructure and critical facilities in Lincoln. While an individual damage estimate was unavailable, the Lincoln Developmental Center did experience major flooding during this event.

What other impacts can result from flooding?

One of the primary threats from flooding is drowning. Nearly half of all flash flood deaths occur in vehicles as they are swept downstream. Most of these deaths take place when people drive into flooded roadway dips and low drainage areas. It only takes two feet of water to carry away most vehicles.

Floodwaters also pose biological and chemical risks to public health. Flooding can force untreated sewage to mix with floodwaters. The polluted floodwaters then transport the biological contaminants into buildings and basements and onto streets and public areas. If left

untreated, the floodwaters can serve as breeding grounds for bacteria and other disease-causing agents. Even if floodwaters are not contaminated with biological material, basements and buildings that are not properly cleaned can grow mold and mildew, which can pose a health hazard, especially for small children, the elderly and those with specific allergies.

Flooding can also cause chemical contaminants such as gasoline and oil to enter the floodwaters if underground storage tanks or pipelines crack and begin leaking during a flood event. Depending on the time of year, floodwaters also may carry away agricultural chemicals that have been applied to farm fields.

Structural damage, such as cracks forming in foundation, can also result from flooding. In most cases, however, the structural damage sustained during a flood occurs to the flooring, drywall and wood framing. In addition to structural damage, a flood can also cause serious damage to a building's content.

Are there any repetitive loss structures/properties within Logan County?

Yes. According to information obtained from IEMA, there are three repetitive flood loss properties located within Logan County. There are two single family dwellings located in Lincoln and one single family dwelling located in unincorporated Logan County. As described previously, FEMA defines a "repetitive loss structure" as an NFIP-insured structure that has received two or more flood insurance claim payments of more than $1,000 each within any 10-year period since 1978.

Figure 60 identifies the repetitive flood loss structures/properties by participating jurisdiction and provides the total flood insurance claim payments. The exact location and/or addresses of the insured properties are not included in this Plan to protect the owners' privacy. According to FEMA, there have been six flood insurance claim payments totaling $18,478 for the three repetitive flood loss structures/properties located in Logan County.

Figure 60
Repetitive Flood Loss Properties

Participating Jurisdiction	Structure Type	Number of Flood Insurance Claim Payments	Flood Insurance Claim Payments		Total Flood Insurance Claim Payments
			Structure	Content	
Lincoln	Single Family	2	$2,504	$718	$3,222
Lincoln	Single Family	2	$5,546	$0	$5,546
Unincorp. Logan Co.	Single Family	2	$7,485	$2,225	$9,710
Totals:		**6**	**$15,535**	**$2,943**	**$18,478**

Source: Purchis, Bryan, Hazard Mitigation Planner, Illinois Emergency Management Agency.

Are existing buildings, infrastructure and critical facilities vulnerable to flooding?

Yes. **Figure 61** identifies the existing residential structures by participating jurisdiction located within the base floodplain and vulnerable to riverine flooding. These counts were prepared by the Logan County Geographic Information System (GIS) Office and the consultant in consultation with the Illinois Department of Natural Resources Floodplain Program Manager.

Aside from key roads and bridges and buried power and communication lines, no other critical facilities or infrastructure vulnerable to flooding are located within the floodplain.

While 15.1% of the land area in Logan County lies within the base floodplain and is susceptible to riverine flooding, almost the entire County is vulnerable to flash flooding. As a result, a majority of the buildings, infrastructure and critical facilities that may be impacted by flooding are located outside of the base floodplain and are not easily identifiable.

Figure 61
Existing Residential Structures Vulnerable to Riverine Flooding

Participating Jurisdiction	Number of Residential Structures
Logan County (unincorporated)	116
Atlanta	0
Broadwell	0
Elkhart	15
Emden	0
Hartsburg	0
Lincoln	13
Mount Pulaski	0

Sources: Logan County GIS Office.
Paul Osman, Floodplain Program Manager, Illinois Department of Natural Resources, Office of Water Resources.

In general, roadways, culverts and bridges are vulnerable to all forms of flooding. Floodwaters can weaken infrastructure and cause washouts and collapses. Buried power and communication lines are also vulnerable to flooding. Water can infiltrate the lines and cause disruptions.



Water overtopped 1300 St. at the DeWitt County line during a recent heavy rain event.

Photograph provided Logan County EMA.

According to the Logan County Highway Engineer stream flowlines in Logan County are continuing to recede over time. Many of the County's bridges are being threatened by erosion which has exposed abutment pilings and reduced the load carrying capacity of the pier pilings. There is one bridge in the County that is currently closed due to the settlement of a pier which resulted from debris buildup and scour. **Appendix L** contains photographs of a few of the structures/culverts that have been damaged by erosion with the County.

Per the National Bridge Inspection Standards, the County inspects its bridges and large culverts once every two years. Of the 208 structures on its local inventory, 45 structures (22%) have stream channel conditions rated ***below*** "Satisfactory". These streams have banks that are being eroded by trees and debris that is restricting the channel. In most cases, this streambank erosion

will continue in the vicinity of the bridge, threatening the structural integrity of the pilings and footings.

There are several roads within the County that were constructed within the floodplain. During periods of heavy rain these roadways are often overtopped. Warning signs have been posted on many of these roads, but individuals continue to use them even when they are flooded. This has led to more than one fatality. Several of these roadways could be raised out of the floodplain reducing the risk to the lives and health of the residents in the County.

Based on the frequency and severity of recorded flood events within the County, the fact that most of the County is vulnerable to flash flooding and a majority of the buildings, infrastructure and critical facilities that may be impacted are located outside of the base floodplain, the risk or vulnerability of existing buildings, infrastructure and critical facilities to all forms of flooding is considered to be medium to high.

Are future buildings, infrastructure and critical facilities vulnerable to flooding?

The answer to this question depends on the type of flooding being discussed.

Riverine Floods

In terms of riverine floods, the vulnerability of future buildings, infrastructure and critical facilities located within NFIP-participating jurisdictions (Logan County, Atlanta, Elkhart, Lincoln and Mount Pulaski) is low as long as the existing floodplain ordinances are enforced. Enforcement of the floodplain ordinance is the mechanism that ensures that new structures either are not built in flood-prone areas or are elevated or protected to the base flood elevation.

Flash Floods

In terms of flash floods, all future buildings, infrastructure and critical facilities are still vulnerable depending on the amount of precipitation that is received, the topography and any land use changes undertaken within the participating jurisdictions.

What are the potential dollar losses to vulnerable structures from flooding?

An estimate of the potential dollar losses to vulnerable *residential structures* located within the *participating municipalities* can be calculated if several assumptions are made. These assumptions represent a probable scenario based on the reported occurrences of flooding in Logan County.

The purpose of providing an estimate is to help residents and municipal officials make informed decisions about how they can better protect themselves and their communities. These estimates are meant to provide a ***general idea*** of the magnitude of the potential damage that could occur from a flood event in each of the municipalities.

To calculate the overall potential dollar losses to vulnerable residential structures from a flood, a set of decisions/assumptions must be made regarding:

- type of flood event;
- scope of the flood event;
- number of potentially-damaged housing units;

- value of the potentially-damaged housing units; and
- percent damage sustained by the potentially-damaged housing units (i.e., damage scenario.)

The following provides a detailed discussion of each decision/assumption.

Type of Flood Event

Assumption #1

A riverine flood event will impact vulnerable residential structures within each municipality.

The first step towards calculating the potential dollar losses to vulnerable residential structures is to determine the type of flood event that will be used for this scenario. While flash flood events have caused the greatest amount of recorded flood damages in the County, identifying residential structures vulnerable to flash flooding is problematic because most are located outside of the base floodplain. In addition, the number of structures impacted can change with each event depending on the amount of precipitation received, the topography and the land use of the area.

Therefore, a riverine flood event will be used since it is a) relatively easy to identify vulnerable residential structures (i.e., those structures located within the base floodplain or Special Flood Hazard Areas) within each municipality using the DFIRMs and b) the number of structures impacted is generally the same from event to event.

Scope of the Flood Event

Assumption #2

All base floodplains within a municipality will flood and experience the same degree of flooding.

To establish the number of vulnerable residential structures or potentially-damaged housing units, the scope of the riverine flood event within each municipality must first be determined. In this scenario, the scope refers to the number of streams and creeks that overflow their banks and the degree of flooding experienced along base floodplains for each stream and creek.

Generally speaking, a riverine flood event only affects one or two rivers or streams at a time depending on the cause of the event (i.e., precipitation, snow melt, ice jam, etc.) and usually does not produce the same degree of flooding along the entire length of the river or creek. However, for this scenario, it was decided that:

- all streams and creeks with base floodplains would overflow their banks, and
- the base floodplains of each stream and/or creek located within the corporate limits of each municipality would experience the same degree of flooding.

This assumption results in the following conditions for each municipality:

- Atlanta, Broadwell, Emden, Hartsburg and Mount Pulaski would not experience any flooding since there are no streams or creeks with base floodplains located within their municipal limits;
- The Elkhorn Slough will overflow its banks and flood a portion of Elkhart along Old US Route 66;

- Brainard Branch, Kickapoo Creek, Salt Creek and Salt Spring Branch would overflow their banks and flood portions of Lincoln.

Number of Potentially-Damaged Housing Units

Assumption #3

The number of existing residential structures located within the base floodplain in each municipality will be used to determine the number of potentially-damaged housing units.

Since this scenario assumes that a riverine flood will impact all of the base floodplains within a municipality, the number of potentially-damaged housing units can be determined by counting the number of existing residential structures located within the base floodplain(s) in each municipality. These counts were prepared by the Logan County GIS Office and the consultant in consultation with the Illinois Department of Natural Resources Floodplain Program Manager.

The following municipalities have existing residential buildings located within the base floodplains of their communities:

- Elkhart has 15 residential buildings; and
- Lincoln has 13 residential buildings.

Value of Potentially-Damaged Housing Units

Assumption #4

The average market value for a residential structure in each municipality will be used to determine the value of potentially-damaged housing units.

Now that the number of potentially-damaged housing units has been determined, the monetary value of the units must be calculated. Typically when damage estimates are prepared after a natural disaster such as a flood, they are based on the market value of the structure. Since it would be impractical to determine the individual market value of each potentially-damaged housing unit, the average market value for a residential structure in each municipality will be used to calculate the potential dollar losses.

To determine the average market value, the average assessed value must first be calculated. The average assessed value is determined by taking the total assessed value of non farm buildings within a municipality and dividing that number by the total number of housing units in the municipality. **Figure 62** provides a sample calculation. The total assessed value is based on 2011 tax assessment information provided by the Logan County Supervisor of Assessments.

Figure 62
Calculation of Average Assessed Value

Total Assessed Value of Non Farm Buildings ÷ Total Housing Units = Average Assessed Value (Rounded to the Nearest Penny)

Atlanta: $20,738,900 ÷ 762 housing units = $27,216.40

To determine the average market value, the average assessed value is multiplied by three (the assessed value of a structure in Logan County is approximately one-third of the market value).

Figure 63 provides the average assessed value and average market value for each participating municipality.

Figure 63
Average Market Value of Housing Units

Participating Jurisdiction	Total Assessed Value of Non Farm Buildings (2011)	Total Housing Units (2010)	Average Assessed Value (Raw)	Average Market Value (Raw)	Average Market Value (Rounded)
Atlanta	$20,738,900	762	$27,216.40420	$81,649.21260	$81,649
Broadwell	$1,157,730	78	$14,842.69231	$44,528.07693	$44,528
Elkhart	$6,050,340	198	$30,557.27273	$91,671.81819	$91,672
Emden	$5,860,290	230	$25,479.52174	$76,438.56522	$76,439
Hartsburg	$2,977,510	140	$21,267.92857	$63,803.78571	$63,804
Lincoln	$126,779,860	6,411	$19,775.36422	$59,326.09266	$59,326
Mount Pulaski	$17,582,580	730	$24,085.72603	$72,257.17809	$72,257
Unincorporated County	$75,778,000	3,303	$22,942.17378	$68,826.52134	$68,827
County	$256,925,210	12,107	$21,221.21170	$63,663.63510	$63,664

Source: Brosamer, Rosanne, Logan County Supervisor of Assessments.

Damage Scenario

Assumption #5

The potentially-damaged housing units are one or two story homes with basements and the flood depth is two feet.

Structural Damage = 20%
Content Damage = 30%

The final decision that must be made to calculate potential dollar losses is to determine the percent damage sustained by the structure and the structure's contents during the flood event. In order to determine the percent damage using FEMA's flood loss estimation tables, assumptions must be made regarding a) the type of residential structure flooded (i.e., manufactured home, one story home without a basement, one or two story home with a basement, etc.) and b) the flood depth. For this scenario, it is assumed that the potentially-damaged housing units are one or two story homes with basements and the flood depth is two feet. With these assumptions the expected percent damage sustained by the ***structure*** is estimated to be 20% and the expected percent damage sustained by the structure's ***contents*** is estimated to be 30%.

Potential Dollar Losses

Now that all of the decisions/assumptions have been made, the potential dollar losses can be calculated. First the potential dollar losses to the ***structure*** of the potentially-damaged housing units must be determined. This is done by taking the average market value for a residential structure and multiplying that by the percent damage (20%) to get the average structural damage per unit. Next the average structural damage per unit is multiplied by the number of potentially-damaged housing units. **Figure 64** provides a sample calculation.

Next the potential dollar losses to the ***content*** of the potentially-damaged housing units must be determined. Based on FEMA guidance, the value of a residential housing unit's content is approximately 50% of its market value. Therefore, start by taking one-half the average market

value for a residential structure and multiply that by the percent damage (30%) to get the average content damage per unit. Next the average content damage per unit is multiplied by the number of potentially-damaged housing units. **Figure 65** provides a sample calculation.

Figure 64
***Structure* – Potential Dollar Loss Calculations**

Average Market Value Per Housing Unit x Percent Damage = Average Structural Damage

Elkhart: $91,672 x 20% = $18,334.40 per unit

Average Structural Damage x Number of Potentially-Damaged Housing Units = Potential Dollar Losses – Structure
(Rounded to the Nearest Dollar)

Elkhart: $18,334.40 per unit x 15 housing units = $275,016

Figure 65
***Content* – Potential Dollar Loss Calculations**

½ (Average Market Value Per Housing Unit) x Percent Damage = Average Content Damage

Elkhart: ½ ($91,672) x 30% = $13,750.80 per Unit

Average Content Damage x Number of Potentially-Damaged Housing Units = Potential Dollar Losses – Content
(Rounded to the Nearest Dollar)

Elkhart: $13,750.80 x 15 housing units = $206,262

Finally the ***total potential dollar losses*** may be calculated by adding together the potential dollar losses to the structure and the content. **Figure 66** provides a breakdown of the total potential dollar losses by municipality.

Figure 66
Estimated Potential Dollar Losses to Potentially-Damaged Housing Units from a Riverine Flood Event

Participating Jurisdiction	Average Market Value	Potentially-Damaged Housing Units	Potential Dollar Losses		Total Potential Dollar Losses
			Structure	Content	
Atlanta	$81,649	0	$0	$0	$0
Broadwell	$44,528	0	$0	$0	$0
Elkhart	$91,672	15	$275,016	$206,262	$481,278
Emden	$76,439	0	$0	$0	$0
Hartsburg	$63,804	0	$0	$0	$0
Lincoln	$59,326	13	$154,248	$115,686	$269,934
Mount Pulaski	$72,257	0	$0	$0	$0

This assessment illustrates why potential residential dollar losses should be considered when municipalities are deciding which mitigation projects to pursue. Potential dollar losses caused by riverine flooding to vulnerable residences within the participating municipalities would be expected to range from $260,000 to $480,000. There are five participating municipalities in this scenario who do not have any residences considered vulnerable to riverine flooding.

The calculations presented above are meant to provide the reader with a sense of the scope or magnitude of a large riverine flood event in dollars. These calculations do not include the physical damages sustained by businesses or other infrastructure. Monetary impacts to businesses can include loss of sales revenue either through the temporary closure or loss of crucial services (i.e., power, drinking water and sewer).

The damage sustained by infrastructure from a flood event can far surpass the damage experienced by residential structures. As a result, the cumulative monetary impacts to businesses and infrastructure can exceed the cumulative monetary impacts to residences. While average dollar amounts cannot be supplied for these items at this time, they should be taken into account when discussing the overall impacts that a large-scale riverine flood event could have on the participating jurisdictions.

Infrastructure & Critical Facilities

No other above-ground infrastructure or critical facilities within the participating jurisdictions, other than key roads and bridges, were identified as being vulnerable to riverine flooding.

Considerations

While the potential dollar loss scenario was only for a riverine flood event, the participating jurisdictions should be aware and consider the impacts that can result from a flash flood event. Since 1995, Logan County has experienced several major flash flood events that have caused over $3 million in damages.

These events illustrate the fact that all forms of flooding can and will impact the County and should be considered when officials discuss the overall monetary impacts of flooding on their communities. All participants should carefully consider the types of activities and projects that can be taken to minimize their vulnerability to flooding.

Figure 52
(Sheet 1 of 4)
General Flood Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Death	Property Damages
6/27/1951 thru 6/30/1951	n/a	countywide	Very heavy rain accompanied 2 tornadoes that struck Logan County during the evening of the 27th. The COOP observer in Lincoln measured 5.6 inches of rain while the observer in Mount Pulaski measured 9.2 inches of rain. The observer in Mount Pulaski measured a record 7.22 inches within a 24 hour period beginning at 9 p.m. on the 27th. The observer in Lincoln noted that many basements flooded in Lincoln and that a levee broke at Lake Fork during the morning of the 29th.	n/a	n/a	n/a
5/5/1961 thru 5/8/1961	n/a	countywide	Heavy rain fell over several days causing flooding within the county. The COOP observer in Mount Pulaski measured 4.9 inches of rain while the observer in Lincoln measured 6 inches.	n/a	n/a	n/a
5/10/1962	n/a	countywide	Heavy rain fell on already saturated ground resulting in flooding within the county. The COOP observer in Lincoln measured 0.6 inches of rain while the observer in Mount Pulaski measured 1.4 inches.	n/a	n/a	n/a
9/15/1965 thru 9/16/1965	n/a	countywide	Heavy rain led to flooding within the county. The COOP observer in Lincoln measured 3.4 inches of rain while the observer in Mount Pulaski measured 4.1 inches.	n/a	n/a	n/a
4/23/1966	n/a	countywide	Heavy rain fell on already saturated ground resulting in flooding within the county. The COOP observer in Lincoln measured 1.1 inches of rain while the observer in Mount Pulaski measured 1.6 inches.	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 52
(Sheet 2 of 4)
General Flood Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Death	Property Damages
3/4/1979 thru 3/31/1979	n/a	countywide	A series of rain events throughout the month coupled with partially frozen soils led to flooding within the county.	n/a	n/a	n/a
5/31/1980 thru 6/5/1980	n/a	countywide	Heavy rain fell over several days causing flooding within the county. The COOP observer in Mount Pulaski measured 2.1 inches of rain while the observer in Lincoln measured 2.5 inches.	n/a	n/a	n/a
6/1/1981 thru 8/31/1981	n/a	countywide	Higher-than-average precipitation from May through August led to flooding within the county.	n/a	n/a	n/a
12/2/1982 thru 12/6/1982	n/a	countywide	Very heavy rain fell over several days causing flooding within the county. The COOP observer in Mount Pulaski measured 5.6 inches of rain while the observer in Lincoln measured 6.7 inches.	n/a	n/a	n/a
4/1/1983 thru 4/5/1983	n/a	countywide	Heavy rain fell over several days causing flooding within the county. The COOP observer in Lincoln measured 1.6 inches of rain while the observer in Mount Pulaski measured 1.9 inches.	n/a	n/a	n/a
5/1/1983 thru 5/2/1983	n/a	countywide	Locally heavy rains led to flooding within the county. The COOP observer in Mount Pulaski measured 0.8 inches of rain while the observer in Lincoln measured 2.2 inches.	n/a	n/a	n/a
6/29/1983	n/a	countywide	Heavy rain fell on already saturated ground resulting in flooding within the county. The COOP observer in Mount Pulaski measured 0.4 inches of rain while the observer in Lincoln measured 0.8 inches.	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 52
(Sheet 3 of 4)
General Flood Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Death	Property Damages
3/1/1985 thru 3/31/1985	n/a	countywide	A series of rain events throughout the month coupled with partially frozen soils led to flooding within the county.	n/a	n/a	n/a
11/1/1985 thru 11/30/1985	n/a	countywide	A series of rain events throughout the month caused rivers and streams within the county to flood.	n/a	n/a	n/a
10/1/1986 thru 10/31/1986	n/a	countywide	An unusually wet September led to flooding within the county. The COOP Observer in Lincoln noted that 8.34 inches of rain fell during the month of September, setting a new monthly record.	n/a	n/a	n/a
5/15/1990 thru 5/17/1990	n/a	countywide	Thunderstorms, some severe, led to flooding within the county. The COOP observer in Lincoln measured 1.8 inches of rain while the observer in Mount Pulaski measured 2.1 inches.	n/a	n/a	n/a
8/1/1993 thru 8/31/1993	n/a	countywide	Higher-than-average precipitation through the spring and summer and the occurrence of this precipitation on a more or less continuous basis caused rivers and streams within the county to flood.	n/a	n/a	n/a
4/12/1994 thru 4/21/1994	12:00 p.m.	countywide	Flooding occurred along the Vermilion, Embarras, Sangamon, and Illinois rivers and their tributaries due to the very heavy rain that fell on April 11th and 12th. Thousands of homes had some kind of flood damage.	n/a	n/a	$50,000,000†
Subtotal:				**0**	**0**	**$50,000,000†**

† The property damage total of $50 million for the April 1994 flood event represents losses sustained in 10 counties (including Logan County.) A breakdown by county was not available.

Figure 52
(Sheet 4 of 4)
General Flood Events Reported in Logan County
1951 through 2012

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Death	Property Damages
6/12/2000	8:40 p.m.	Lincoln	Locally heavy rainfall in the southern part of Lincoln led to flooding of numerous fields and township roads in the area.	n/a	n/a	n/a
10/30/2009 thru 11/3/2009	1:00 p.m.	countywide	Heavy rains of 2 to 3 inches fell on already saturated ground during a 30 hour period causing numerous creeks, streams, ditches and rural roads to flood. A 97-year-old man drowned while attempting to cross a water-covered road south of Mount Pulaski on October 31st. His car got caught in 5 to 6 feet of water.	n/a	1	n/a
Subtotal:				**0**	**1**	**$0**
GRAND TOTAL:				**0**	**1**	**$50,000,000†**

† The property damage total of $50 million for the April 1994 flood event represents losses sustained in 10 counties (including Logan County.) A breakdown by county was not available.

Sources: Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member responses to Logan County Natural Hazard Events Questionnaire.
National Weather Service, Weather Forecast Office – Central Illinois, Chris Miller, Warning Coordination Meteorologist.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, COOP Data / Record of Climatological Observations.

Figure 53
(Sheet 1 of 5)
Flash Flood Events Reported in Logan County
1981 through 2012

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Death	Property Damage	Crop Damage
7/4/1981 thru 7/5/1981	12:00 a.m.	Elkhart	Very heavy rain caused flooding in over 20 homes and more than half of the basements in the village. There was over 6 feet of standing water and almost all of the streets were flooded and impassable except by boat. The COOP observer in Mount Pulaski measured 7.3 inches of rain while the COOP observer in Lincoln measured 5.3 inches.	n/a	n/a	n/a	n/a
9/19/1986 thru 9/20/1986	n/a	countywide	Very heavy rains resulted in flash flooding within the county. The COOP observers in Lincoln and Mount Pulaski measured between 2.8 and 3.7 inches of rain.	n/a	n/a	n/a	n/a
4/11/1994 thru 4/12/1994	n/a	countywide	Very heavy rain resulted in flash flooding within the county. The COOP observers in Lincoln and Mount Pulaski measured between 3.8 and 5.3 inches of rain.	n/a	n/a	n/a	n/a
5/16/1995 thru 5/17/1995	8:00 p.m.	- Lincoln - Emden	Heavy rains caused flash flooding of small streams. The COOP observer in Mount Pulaski measured 4.1 inches of rain while the observer in Lincoln measured 4.8 inches. The Lincoln Developmental Center, GTE Phone Center and several homes in the Lincoln Lakes subdivision experienced major flooding. In Emden the flooding resulted in a boil order.	n/a	n/a	$2,000,000	n/a
4/29/1998 thru 4/30/1998	4:40 p.m.	- Lincoln - northeastern portion of the county	The NWS Staff in Lincoln recorded 4 inches of rain in 3 hours with various other sites recording between 2 to 3 inches. Over 1,000 buildings sustained some kind of water damage with 150 homes having between 6 inches and 4 feet of water in homes or basements. 15 businesses sustained extensive damage. Numerous roads were closed due to high water.	n/a	n/a	$1,000,000	$500,000
Subtotal:				**0**	**0**	**$3,000,000**	**$500,000**

^ Flash flood event verified in the vicinity of this location(s).

Figure 53
(Sheet 2 of 5)
Flash Flood Events Reported in Logan County
1981 through 2012

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Death	Property Damage	Crop Damage
8/12/1999 thru 8/13/1999	11:00 p.m.	- Mount Pulaski - southern portion of the county	Severe thunderstorms produced heavy rains across southern Logan County. The COOP observer in Mount Pulaski measured 5 inches of rain within a couple of hours which resulted in flash flooding. Numerous roads were closed by floodwaters in the area, though no structural damage was reported.	n/a	n/a	n/a	n/a
6/20/2000	5:00 p.m.	countywide	Thunderstorms, some severe, produced 4 to 6 inches of rain within a few hours resulting in flash flooding across the county. Widespread flooding of roads, underpasses, viaducts and ditches was reported in Lincoln, Mount Pulaski and Broadwell. Around 40 homes experienced basement flooding.	n/a	n/a	$35,000	n/a
4/19/2002	9:27 p.m.	Mount Pulaski	Very heavy rain caused a viaduct to flood with water 4 feet deep on the east side of the city. The Mount Pulaski COOP observer measured 1.50 inches of rain.	n/a	n/a	n/a	n/a
4/27/2002	11:45 a.m.	Lincoln	Heavy rain resulted in flash flooding of an underpass on Old Rte. 66 on the north side of the city. The COOP observer in Lincoln measured 2.1 inches of rain.	n/a	n/a	n/a	n/a
5/7/2002	2:00 a.m.	Cornland[^]	Heavy rains resulted in flash flooding of IL Rte. 54 northeast of Cornland.	n/a	n/a	n/a	n/a
7/27/2002	1:26 a.m.	New Holland[^]	Heavy rain resulted in flash flooding on IL Rte. 10 near New Holland as well as along numerous rural roads. The COOP observer in Lincoln measured 2.4 inches of rain.	n/a	n/a	n/a	n/a
7/28/2002	4:25 p.m.	Atlanta	2 inches of rain fell in a short amount of time resulting in flash flooding along numerous roads, including I-55 for a short time.	n/a	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$35,000**	**$0**

[^] Flash flood event verified in the vicinity of this location(s).

Figure 53
(Sheet 3 of 5)
Flash Flood Events Reported in Logan County
1981 through 2012

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Death	Property Damage	Crop Damage
8/16/2002	5:15 a.m.	Lincoln[A] Mount Pulaski[A]	Very heavy rain fell over a short period of time resulting in flash flooding of several roads, including IL Rte. 121 south of Chestervale. The COOP observer in Mount Pulaski measured 2.3 inches of rain while the NWS staff in Lincoln measured 3.7 inches.	n/a	n/a	n/a	n/a
6/11/2003	6:15 p.m.	Latham[A]	Very heavy rain fell in a short amount of time resulting in flash flooding of several rural roads. The COOP observer in Mount Pulaski measured 1.4 inches of rain.	n/a	n/a	n/a	n/a
7/9/2003 thru 7/10/2003	10:51 p.m.	Lincoln	Very heavy rain fell for several hours resulting in flash flooding of many streets. The NWS staff in Lincoln measured 4.8 inches of rain.	n/a	n/a	n/a	n/a
7/21/2003	2:30 a.m.	Lincoln	Thunderstorms, some severe, produced very heavy rain within a short amount of time resulting in flash flooding of numerous roads. The NWS staff in Lincoln measured 2.1 inches of rain.	n/a	n/a	n/a	n/a
5/24/2004 thru 5/25/2004	10:45 p.m.	countywide	Thunderstorms, some severe, produced 3 inches of rain in a short amount of time resulting in flash flooding of numerous rural and urban roads.	n/a	n/a	n/a	n/a
6/15/2004	8:18 a.m.	Mount Pulaski	Heavy rains resulted in flash flooding of city streets. Four people had to be rescued from their cars on IL Rte. 121 under the Canadian National railroad bridge when the underpass became flooded. The COOP observer in Mount Pulaski measured 1.2 inches of rain.	n/a	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**	**$0**

[A] Flash flood event verified in the vicinity of this location(s).

Figure 53
(Sheet 4 of 5)
Flash Flood Events Reported in Logan County
1981 through 2012

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Death	Property Damage	Crop Damage
8/25/2004	4:46 p.m.	northwestern portion of the county	Very heavy rain resulted in flash flooding of numerous roads between San Jose and Lincoln. US Rte. 136 was closed for a time due to standing water. The NWS staff in Lincoln measured 2.2 inches of rain.	n/a	n/a	n/a	n/a
1/12/2005 thru 1/13/2005	10:20 p.m.	Lincoln	Very heavy rain over a relatively short period of time resulted in flash flooding of numerous streets in the city, including IL Rte. 10. The NWS staff in Lincoln measured 2.1 inches of rain.	n/a	n/a	n/a	n/a
6/3/2008 thru 6/4/2008	9:30 p.m.	countywide	Thunderstorms, some severe, produced very heavy rains that resulted in flash flooding of numerous roads across the County. Water was flowing over portions of IL Rte. 121 between Lincoln and Mount Pulaski and 700th St. between Elkart and Mount Pulaski. Flash flooding was experienced on IL Rte. 10 and Kickapoo Creek near Burton View and IL Rte. 10 from Beason to the County Line was closed. Extensive flooding along US Rte. 136 was reported near Emden. The COOP observer in Mount Pulaski measured 3.5 inches of rain while the NWS staff in Lincoln measured 4.4 inches.	n/a	n/a	n/a	n/a
5/15/2009	5:40 p.m.	- Latham - southern portion of the county	Thunderstorms, some severe, produced heavy rains that fell on already saturated ground and resulted in flash flooding in southeastern Logan County. IL Rte. 121 between Mount Pulaski and Latham was impassible due to high water. An apartment complex in Latham was evacuated due to rapidly rising water. The COOP observer in Mount Pulaski measured 2.9 inches of rain.	n/a	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**	**$0**

^ Flash flood event verified in the vicinity of this location(s).

Figure 53
(Sheet 5 of 5)
Flash Flood Events Reported in Logan County
1981 through 2012

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Death	Property Damage	Crop Damage
5/24/2010	8:00 p.m.	- Middletown - western portion of the county	4.5 inches of rain fell within 3 hours resulting in flash flooding in the western portion of the County. Many rural roads were inundated by the flooding, particularly near Middletown.	n/a	n/a	n/a	n/a
6/12/2010	3:00 p.m.	central portion of county	2.5 inches of rain resulted in flash flooding in central Logan County, including the city of Lincoln. Numerous roads were inundated with more than 1 foot of flowing water.	n/a	n/a	n/a	n/a
6/15/2010	3:30 p.m.	- Mount Pulaski - eastern portion of the county	1.5 inches of rain fell in an hour resulting in flash flooding along a narrow band in the eastern portion of the county. Numerous streets were flooded in Mount Pulaski, along with most rural roads northeast of the city.	n/a	n/a	n/a	n/a
6/22/2010	9:15 a.m.	countywide	1.5 to 2.3 inches of rain fell on top of already saturated ground and resulted in rapid flash flooding in most of the County. Many city streets in Lincoln were flooded which stranded several cars. Nearly 1 foot of water flowed from the parking lot into part of Lincoln Community High School. Most rural roads west and south of Lincoln were impassable.	n/a	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**	**$0**
GRAND TOTAL				**0**	**0**	**$3,035,000**	**$500,000**

^ Flash flood event verified in the vicinity of this location(s).

Sources: Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member responses to Logan County Natural Hazard Events Questionnaire.
National Weather Service, Weather Forecast Office – Central Illinois, Chris Miller, Warning Coordination Meteorologist.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, COOP Data / Record of Climatological Observations.

3.5 EXTREME HEAT

IDENTIFYING THE HAZARD

What is the definition of extreme heat?

Extreme heat is characterized by temperatures that hover 10 degrees or more above the average high temperature of a region for a prolonged period of time (several days to several weeks) and is often accompanied by high humidity. In comparison, a heat wave is generally defined as a prolonged period of excessive heat and humidity. While there is no universally agreed upon definition of a heat wave, for most the United States the "standard" definition is a period of three or more consecutive days of highs reaching at least 90°F.

Extreme heat events are usually a result of both high temperatures and high relative humidity. (Relative humidity refers to the amount of moisture in the air.) The higher the relative humidity or the more moisture in the air, the less likely that evaporation will take place. This becomes significant when high relative humidity is coupled with soaring temperatures.

On hot days the human body relies on the evaporation of perspiration or sweat to cool and regulate the body's internal temperature. Sweating does nothing to cool the body unless the water is removed by evaporation. When the relative humidity is high, then the evaporation process is hindered, robbing the body of its ability to cool itself.

On average, more than 1,000 people die each year in the United States from extreme heat. In fact, extreme heat claims more lives each year than floods, lightning, tornadoes and hurricanes combined.

What is the Heat Index?

In an effort to raise the public's awareness of the hazards of extreme heat, the National Weather Service devised the "Heat Index". The Heat Index, sometimes referred to as the "apparent temperature", is a measure of how hot it feels when relative humidity is added to the actual air temperature. **Figure 67** shows the Heat Index as it corresponds to various air temperatures and relative humidity.

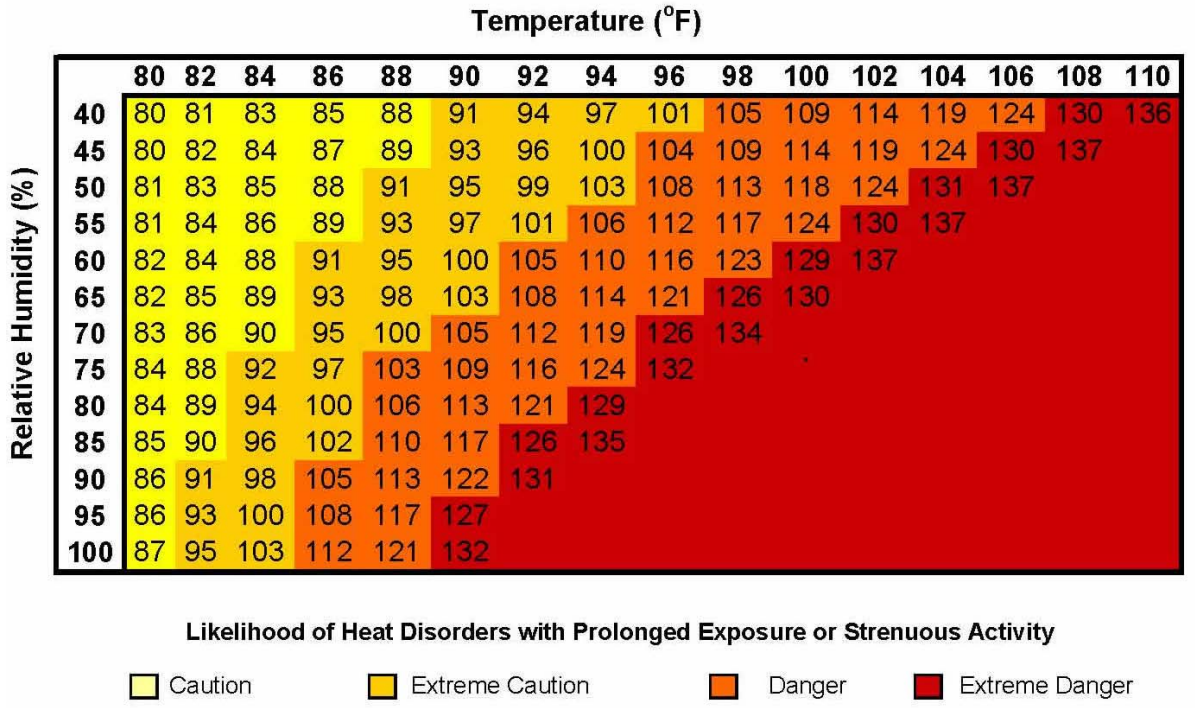
As an example, if the air temperature is 96°F and the relative humidity is 65%, then the Heat Index would be 121°F. It should be noted that the Heat Index values were devised for shady, light wind conditions. Exposure to full sunshine can increase Heat Index values by up to 15°F. Also strong winds, particularly with very hot, very dry air, can be extremely hazardous. When the Heat Index reaches 105°F or greater, there is an increased likelihood that continued exposure and/or physical activity will lead to individuals developing severe heat disorders.

What are heat disorders?

Heat disorders are a group of illnesses caused by prolonged exposure to hot temperatures and are characterized by the body's inability to shed excess heat. These disorders develop when the heat gain exceeds the level the body can remove or if the body cannot compensate for fluids and salt lost through perspiration. In either case the body loses its ability to regulate its internal

temperature. All heat disorders share one common feature: the individual has been overexposed to heat, or over exercised for their age and physical condition on a hot day. The following describes the symptoms associated with the different heat disorders.

Figure 67
Heat Index



Source: NOAA, National Weather Service.

- **Sunburn.** Sunburn is characterized by redness and pain of skin exposed too long to the sun without proper protection. In severe cases it can cause swelling, blisters, fever and headaches. It can significantly retard the skin's ability to shed excess heat.
- **Heat Cramps.** Heat cramps are characterized by heavy sweating and painful spasms, usually in the muscles of the legs and possibly the abdomen. The loss of fluid through perspiration leaves the body dehydrated resulting in muscle cramps. This is usually the first sign that the body is experiencing trouble dealing with heat.
- **Heat Exhaustion.** Heat exhaustion is characterized by heavy sweating, weakness, nausea, exhaustion, dizziness and faintness. Breathing may become rapid and shallow and the pulse thready (weak). The skin may appear cool, moist and pale. Blood flow to the skin increases, causing blood flow to decrease to the vital organs. This results in a mild form of shock. If not treated, the victim's condition will worsen.
- **Heat Stroke (Sunstroke).** Heat stroke is a life-threatening condition characterized by a high body temperature (106°F or higher). The skin appears to be dry and flushed with very little perspiration present. The individual may become mentally confused and

aggressive. The pulse is rapid and strong. There is a possibility that the individual will faint or slip into unconsciousness. If the body is not cooled quickly, then brain damage and death may result.

Studies indicate that, all things being equal, the severity of heat disorders tend to increase with age. Heat cramps in a 17-year-old may be heat exhaustion in someone 40 and heat stroke in a person over 60. Elderly persons, small children, chronic invalids, those on certain medications and persons with weight or alcohol problems are particularly susceptible to heat reactions.

Figure 68 below indicates the heat index at which individuals, particularly those in higher risk groups, might experience heat-related disorders. Generally, when the heat index is expected to exceed 105°F, the National Weather Service will initiate extreme or excessive heat alert procedures.

Figure 68
Relationship between Heat Index and Heat Disorders

Heat Index (°F)	Heat Disorders
80°F – 90°F	Fatigue is possible with prolonged exposure and/or physical activity
90°F – 105°F	Heat cramps, heat exhaustion and heat stroke possible with prolonged exposure and/or physical activity
105°F – 130°F	Heat cramps, heat exhaustion and heat stroke likely; heat stroke possible with prolonged exposure and/or physical activity
130°F or Higher	Heat stroke highly likely with continued exposure

Source: NOAA, Heat Wave: A Major Summer Killer.

What is an excessive heat alert?

An excessive heat alert is an advisory or warning issued by the National Weather Service when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines the type of alert issued. There are four types of alerts that can be issued for an extreme heat event. The following provides a brief description of each type of alert based on the ***excessive heat advisory/warning criteria*** established by National Weather Service Weather Forecast Office in Lincoln, Illinois. The Central Illinois office is responsible for issuing alerts for Logan County.

- **Outlook.** An excessive heat outlook is issued when the potential exists for an excessive heat event to develop over the next three to seven days.
- **Watch.** An excessive heat watch is issued when conditions are favorable for an excessive heat event to occur within the next 24 to 72 hours.
- **Advisory.** An excessive heat advisory is issued when the maximum heat index is expected to equal or exceed 100°F and/or the air temperature is expected to reach at least 95°F.
- **Warning.** An excessive heat warning is issued when the maximum heat index is expected to equal or exceed 105°F and the minimum heat index is expected to equal or exceed 75°F during a 48-hour period.

PROFILING THE HAZARD

When have extreme heat events occurred previously? What is the extent of these events?

Figure 69, located at the end of this section, summarizes the previous occurrences as well as the extent or magnitude of extreme heat events recorded in Logan County. NOAA's Storm Events Database has documented nine occurrences of extreme heat in Logan County between 1997 and 2012.

Extreme Heat Fast Facts – Occurrences

Number of Extreme Heat Events Reported (1997 – 2012): ***9***

Hottest Temperature Recorded in the County: ***113°F***

Most Likely Month for Extreme Heat Events to Occur: ***July***

Of the nine events, five (56%) took place in July making this the peak month for extreme heat events in Logan County. The remaining four events took place in June and August. Two of the nine events spanned more than one month. Approximately 56% of extreme heat events began during the a.m. hours.

According to the National Weather Service Central Illinois Weather Forecast Office in Lincoln, the hottest recorded temperature in Lincoln was 113°F on July 15, 1936. Between Monday, July 6, 1936 and Wednesday, July 15, 1936 there was only one day, Thursday, July 9th, when the temperatures did not reach at least 107°F. This ten-day period accounts for nine of the hottest days recorded in Lincoln.

What locations are affected by extreme heat?

Extreme heat events affect the entire County. A single extreme heat event will generally extend across an entire region and affect multiple counties. The *2010 Illinois Natural Hazard Mitigation Plan* classifies Logan County's hazard rating for extreme heat as "high."

What is the probability of future extreme heat events occurring?

Logan County has only experienced nine verified extreme heat events between 1997 and 2012. With nine occurrences over the past 16 years, the probability or likelihood that the County may experience an extreme heat event in any given year is 56%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to extreme heat?

Yes. All of Logan County is vulnerable to extreme heat. The County has experienced nine recorded extreme heat events over the past 16 years. Logan County is served by one state-designated cooling center located at the Illinois Department of Human Services office in Lincoln.

What impacts resulted from the recorded extreme heat events?

Damage information was either unavailable or none was recorded for any of the reported occurrences. NOAA's Storm Events Database did document two deaths as a result of the July 20, 1999 through July 26, 1999 extreme heat event. On the afternoon of July 20th, the heat

claimed the lives of two young boys (2 ½ and 1 ½ years old) in Atlanta when they wandered away and were later found in their parents' car.

Extreme Heat Fast Facts – Impacts/Risk

Extreme Heat Events
- Fatalities: ***2***

Risk/Vulnerability to:
- Public Health & Safety – General Population: ***Low***
- Public Health & Safety – Sensitive Populations: ***Medium***
- Buildings/Infrastructure/Critical Facilities: ***Low***

No other injuries or deaths were reported as a result of extreme heat in Logan County. This does not mean however that none occurred; it simply means that extreme heat was not identified as the primary cause. This is especially true for deaths. Usually heat is not listed as the primary cause of death, but rather an underlying cause. The heat indices were sufficiently high for all nine events to produce heat cramps or heat exhaustion with the possibility of heat stroke in cases of prolonged exposure or physical activity.

In comparison, Illinois averages 74 deaths per year as a result of extreme heat. Extreme heat has triggered more deaths than any other natural hazard in Illinois. More deaths are attributed to extreme heat than the combined number of deaths attributed to floods, tornadoes, lightning and extreme cold.

Even if injuries and death due to extreme heat are under reported in Logan County, the risk or vulnerability to public health and safety is relatively low for the general population. The risk or vulnerability is elevated to medium for sensitive populations such as the elderly, small children, chronic invalids, those on certain medications and persons with weight or alcohol problems who are more susceptible to heat reactions.

What other impacts can result from extreme heat events?

Other impacts of extreme heat include road buckling, power outages, early school dismissals and school closings. In addition, extreme heat events can also lead to an increase in water usage and may result in municipalities imposing water use restrictions. In Logan County, extreme heat should not impact municipal water supplies since none obtain their water from surface water bodies.

Are existing buildings, infrastructure and critical facilities vulnerable to extreme heat?

No. In general, existing buildings, infrastructure and critical facilities located in the County and the participating municipalities are not vulnerable to extreme heat events. Unlike other natural hazards, extreme heat events typically do not cause damage to buildings, infrastructure or critical facilities. The primary concern is for the health and safety of those living in the County and municipalities.

While buildings do not typically sustain damage from extreme heat events, in rare cases infrastructure and critical facilities may be directly or indirectly damaged by an event. While uncommon, extreme heat events have been known to contribute to damage caused to roadways within Logan County. The combination of extreme heat and vehicle loads has caused pavement cracking and buckling.

Extreme heat events have also been known to indirectly contribute to disruptions in the electrical grid. When the temperatures rise, the demand for energy also rises in order to operate air conditioners, fans and other devices. This increase in demand places stress on the electrical grid components, increasing the likelihood of power outages. While not common in Logan County, there is the potential for this to occur. The potential may increase over the next two decades if new power plants are not built to replace the state's aging nuclear power facilities that are expected to be decommissioned.

In general, the risk or vulnerability to buildings, infrastructure and critical facilities from extreme heat events is low, even taking into consideration the potential for disruptions to the electrical grid.

Are future buildings, infrastructure and critical facilities vulnerable to extreme heat?

No. Future buildings, infrastructure and critical facilities within the County and participating municipalities are no more vulnerable to extreme heat events than the existing building, infrastructure and critical facilities. As discussed above, buildings do not typically sustain damage from extreme heat events. Infrastructure and critical facilities may, in rare cases, be damaged by extreme heat, but very little can be done to prevent this damage.

What are the potential dollar losses to vulnerable structures from extreme heat?

Unlike other natural hazards that affect the County, extreme heat events do not typically damage buildings. The primary concern associated with extreme heat is the health and safety of those living in the County and municipalities, especially vulnerable populations such as the elderly, infants, young children and those with medical conditions.

Unlike other counties within the region, Logan County does not have large urban areas where living conditions (such as older, poorly-ventilated high rise buildings and low-income neighborhoods) tend to contribute to heat-related deaths and injuries during extreme heat events due to the lack of air-conditioning units, fans and cooling centers.

Figure 69
(Sheet 1 of 2)
Extreme Heat Events Reported in Logan County
1997 through 2012

Date(s)	Start Time	Magnitude	Injuries	Death
7/26/1997 thru 7/27/1997	9:00 a.m.	a brief heat wave hit central Illinois with temperatures ranging from 95°F to 100°F and heat indices ranging from 105°F to 115°F; there were numerous reports of heat-related injuries in most area hospitals; numerous reports of road buckling due to the high temperatures	n/a	n/a
6/26/1998 thru 6/28/1998	3:00 a.m.	a hot and humid air mass built across central Illinois causing temperatures to climb into the middle to upper 90s; the combination of high temperatures and high humidity produced heat indices of 105°F to 110°F; several heat-related illnesses were reported in area hospitals; several highways in the area had sections of roadway buckle due to the excessive heat	n/a	n/a
7/20/1999 thru 7/26/1999	10:00 a.m.	a heat wave caused temperatures to climb into the lower to middle 90s and heat indices to range between 105°F to 110°F; the event claimed the lives of two young boys (2 ½ and 1 ½ years old) in Atlanta when they wandered away on the afternoon of the 20th and were found about an hour later in their parents car	n/a	2
7/28/1999 thru 7/31/1999	10:00 a.m.	the heat returned to central Illinois after a two day break with temperatures again in the lower to middle 90s and heat indices ranging from 105°F to 110°F	n/a	n/a
7/22/2005 thru 7/25/2005	12:00 p.m.	a period of excessive heat and humidity developed across central Illinois and led to daytime high temperatures in the middle 90s to around 100°F with overnight lows only falling into the middle to upper 70s; the combination of the high temperatures and high humidity produced heat indices of 105°F to 115°F	n/a	n/a
7/30/2006 thru 8/2/2006	11:00 a.m.	an extended period of heat and humidity across central Illinois led to afternoon high temperatures ranging from 94°F to 100°F with overnight lows only falling into the middle 70s; the combination of the high temperatures and high humidity produced heat indices of 105°F to 110°F	n/a	n/a
Subtotal:			**0**	**2**

Figure 69
(Sheet 2 of 2)
Extreme Heat Events Reported in Logan County
1997 through 2012

Date(s)	Start Time	Magnitude	Injuries	Death
8/3/2010 thru 8/4/2010	12:00 p.m.	a larger upper-level ridge of high pressure over the southern US produced an extended period of hot and humid weather across central Illinois that led to temperatures well into the 90s with heat indices above 105°F	n/a	n/a
8/9/2010 thru 8/14/2010	2:00 p.m.	after a brief break the hot and humid weather returned to central Illinois producing temperatures well into the 90s with heat indices exceeding 105°F	n/a	n/a
6/29/2012 thru 7/7/2012	1:45 p.m.	an extended period of excessive heat and humidity occurred across central Illinois with afternoon high temperatures ranging from 95°F to 105°F and overnight lows generally remaining in the 70s; peak heat indices approached 110°F	n/a	n/a
Subtotal:			**0**	**0**
GRAND TOTAL:			**0**	**2**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

3.6 DROUGHT

IDENTIFYING THE HAZARD

What is the definition of a drought?

While there is no universally accepted definition of drought, it can generally be defined as a period of unusually persistent dry weather that continues long enough to cause serious problems such as crop damage and/or water supply shortages. A drought may also be defined as the cumulative deficit of precipitation relative to what is normal for a region over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group or environmental sector.

There are four types of drought. They are differentiated based on the use and need for water. The following provides a brief description of each type.

- **Meteorological Drought.** Meteorological drought is a period of well-below-average precipitation that spans a few months to a few years. It can be identified by a shortfall in precipitation. Due to climate differences, what might be considered a drought in one location of the country may not be in another location.
- **Agricultural Drought.** An agricultural drought is a period when soil moisture no longer meets the needs of a particular crop to germinate and grow. It can be identified by a deficit in soil moisture.
- **Hydrological Drought.** Hydrological drought is a period when surface and subsurface water supplies (i.e., streams, lakes, aquifers, etc.) drop below normal levels. It can be identified by a deficit in surface and groundwater.
- **Socioeconomic Drought.** Socioeconomic drought is a period when water shortages begin to affect people. In this case, there is not enough water to meet human and environmental needs.

The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. It is generally difficult to pinpoint the beginning and the end of a drought. Because the impacts of a drought accumulate slowly at first, a drought may not be recognized until it has become well established. Even during a drought there may be one or two months with above average precipitation totals. These wet months do not necessarily signal the end of a drought and generally do not have a major impact on moisture deficits.

Droughts can be short, lasting just a few months, or they can persist for several years before regional climate conditions return to normal. While drought conditions can occur at any time throughout the year, the most apparent time is during the summer months. Nationally, drought impacts often exceed $1 billion due in part to the sheer size of the areas affected.

How are droughts measured?

There are several quantitative measures (indices) that have been developed to measure drought in the United States. How these indices measure drought depends on the discipline affected (i.e., agriculture, hydrology, meteorology, etc.) and the region being considered. Although none

of the major indices are inherently superior to the rest, some are better suited than others for certain uses. Two of the indices highlighted in this plan are:

- the Palmer Drought Severity Index (PDSI) and
- the U.S. Drought Monitor.

The PDSI was the first comprehensive drought index developed in the United States and is still in use today. It is designed to indicate when weather conditions have been abnormally dry or wet and provides a standardized method of identifying and comparing drought conditions regardless of time or location.

The U.S. Drought Monitor is a relatively new index that combines quantitative measures with input from experts in the field. It is designed to provide the general public, media, government officials and others with an easily understandable "big picture" overview of drought conditions across the United States. In the last several years, NOAA has begun including the U.S. Drought Monitor's drought intensity ratings along with the weather information provided for drought events recorded with the National Climate Data Center.

The following provides a more detailed discussion of these two indices to aid the Plan's developers and the general public in understanding how droughts are identified and categorized. The information used to prepare this section utilizes one or both of these indices to identify previous drought events recorded in the County.

Palmer Drought Severity Index (PDSI)

The Palmer Drought Severity Index (PDSI), developed in 1965, was the first comprehensive drought index used in the United States. The PDSI is a long-term meteorological index that indicates when weather conditions have been abnormally dry or abnormally wet. It is most effective at measuring impacts that are sensitive to soil moisture conditions, such as agriculture.

The PDSI is calculated based on precipitation and temperature data, as well as the local available water content of the soil and the cumulative patterns of previous months. The index ranges from +4 (extremely moist) to -4 (extreme drought). **Figure 70** shows the classification system utilized by the PDSI.

Figure 70
Palmer Classification System

Index Value	Description
4.0 or more	extremely wet
3.0 to 3.99	very wet
2.0 to 2.99	moderately wet
1.0 to 1.99	slightly wet
0.5 to 0.99	incipient wet spell
0.49 to -0.49	near normal
-0.5 to -0.99	incipient dry spell
-1.0 to -1.99	mild drought
-2.0 to -2.99	moderate drought
-3.0 to -3.99	severe drought
-4.0 or less	extreme drought

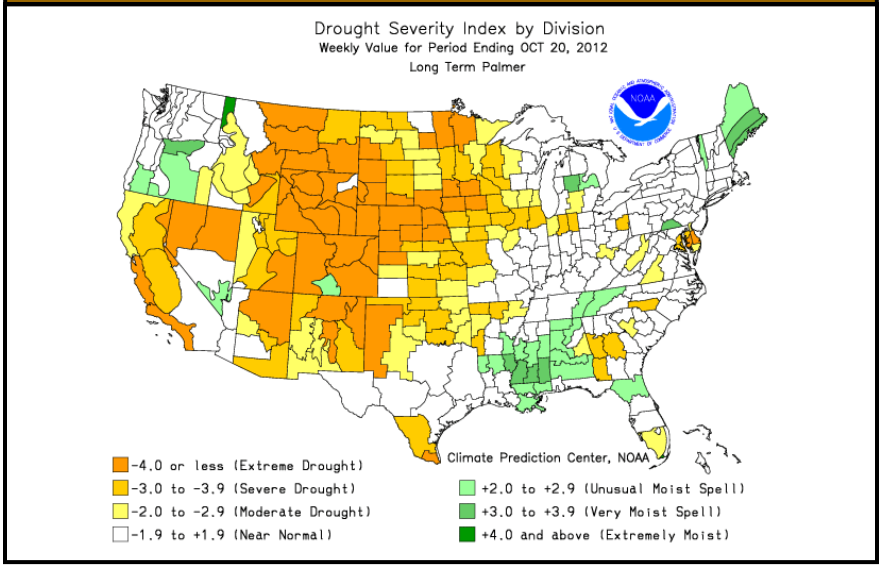
Source: National Drought Mitigation Center.

The PDSI has been useful as a drought monitoring tool and many federal and state agencies rely on it to trigger drought relief programs. It provides a standardized method to measure moisture conditions so that comparisons can be made between various locations and times. The PDSI is most useful when working with large areas of uniform topography. It is not as well suited for use in the western states, with their mountainous terrain and varying climate extremes.

Calculations of the PDSI are made for 350 climate divisions in the United States and Puerto Rico. PDSI values have typically been calculated on a monthly basis. The National Climate Data Center has records on the monthly PDSI values for every climate division in the United States dating back to 1895.

In addition to the monthly calculations, weekly PDSI values are now being calculated for the climate divisions during every growing season. NOAA's Climate Prediction Center produces a weekly map that shows the climate divisions and their PDSI value by color. **Figure 71** shows an example of this map.

Figure 71
Palmer Drought Severity Index Map



Source: National Weather Service, Climate Prediction Center.

U.S. Drought Monitor

A relatively new index used for assessing drought conditions is the U.S. Drought Monitor. The U.S. Drought Monitor is unique in that it blends multiple numeric measures of drought with the best judgments of experts to create a weekly map that depicts drought conditions across the United States. It began in 1999 as a federal, state and academic partnership, growing out of a Western Governors' Association initiative to provide timely and understandable scientific information on water supplies and drought for policymakers.

The Drought Monitor is produced by a rotating group of authors from the U.S. Department of Agriculture (USDA), the NOAA and the National Drought Mitigation Center located at the University of Nebraska – Lincoln. It incorporates reviews from a group of 250 climatologists, extension agents and others across the nation.

The Drought Monitor utilizes five drought intensity categories, D0 through D4, to identify areas of drought. **Figure 72** provides a brief description of each category.

Figure 72
U.S. Drought Monitor – Drought Severity Classifications

Category	Possible Impacts
D0 (Abnormally Dry)	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.
D1 (Moderate Drought)	Some damage to crops, pastures; streams, reservoirs, or wells low; some water shortages developing or imminent; voluntary water-use restrictions requested
D2 (Severe Drought)	Crop or pasture losses likely; water shortages common; water restrictions imposed
D3 (Extreme Drought)	Major crop/pasture losses; widespread water shortages or restrictions
D4 (Exceptional Drought)	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

Source: National Drought Mitigation Center.

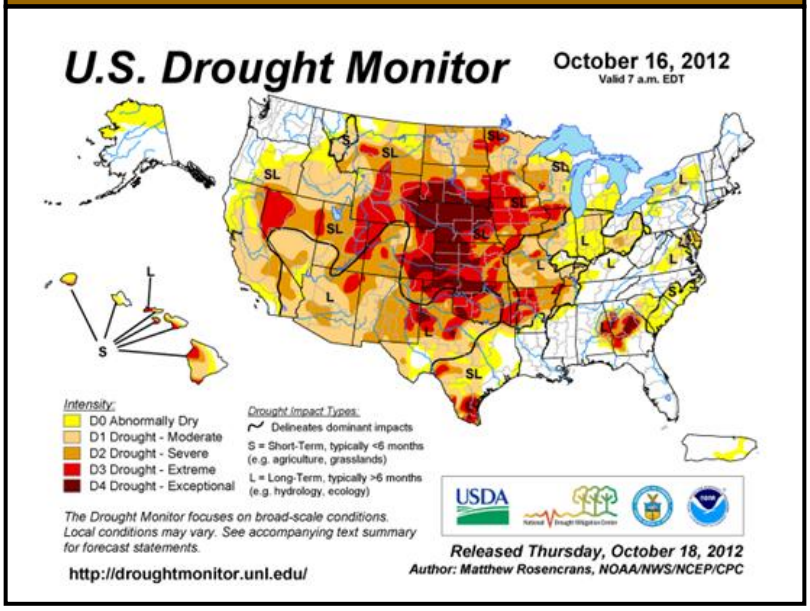
The drought intensity categories are based on five key indicators and numerous supplementary indictors. The five key indicators include the Palmer Drought Severity Index, Climate Prediction Center's Soil Moisture Model (percentiles), United States Geological Survey Weekly Streamflow (percentiles), Standardized Precipitation Index and Objective Short and Long-term Drought Indicator Blends (percentiles).

Because the ranges of the various indicators often don't coincide, the final drought category tends to be based on what a majority of the indictors show. The authors also weight the indices according to how well they perform in various parts of the country and at different times of the year. While the maps are based in part on the key indices and other measures of moisture, they also incorporate real-world conditions as reported by numerous experts throughout the country, providing a more comprehensive approach to identifying and monitoring drought conditions.

In addition to identifying and categorizing general areas of drought, the weekly map also identifies whether a drought's impacts are agricultural (crops, pastures and grasslands) and/or hydrological (rivers, groundwater and reservoirs). **Figure 73** shows an example of the U.S. Drought Monitor weekly map. A summary also accompanies the map outlining the general conditions by regions.

The U.S. Drought Monitor is designed to provide a general and up-to-date overview of current drought conditions. It is not designed to depict local conditions. As a result, there could be water shortages or crop failures within areas not designated as drought, just as there could locations with adequate water supplies in an area designated as D3 or D4.

Figure 73
U.S. Drought Monitor Map



Source: National Drought Mitigation Center.

PROFILING THE HAZARD

When have droughts occurred previously? What is the extent of these previous droughts?

Drought Fast Facts – Occurrences

Number of Drought Events Reported (1983 – 2012): ***4***

According to NOAA's Storm Events Database, the Illinois State Water Survey, the Illinois Emergency Management Agency and USDA there have been four official drought events reported in Logan County between 1983 and 2012. The following provides a summary of these previous occurrences as well as the extent or severity of each event.

- In 1983, all 102 Illinois counties were proclaimed state disaster areas because of high temperatures and insufficient precipitation beginning in mid-June.
- In 1988, approximately half of all Illinois counties (including Logan County) were impacted by drought conditions, although none of the counties were proclaimed state disaster areas. Lower than normal precipitation levels were recorded between April and June and unusually dry weather conditions persisted throughout the summer months.
- In 2005-2006, drought conditions impacted much of the state, including Logan County. A dry winter and spring developed into full blown drought conditions by the end of June. On June 7, 2005 Logan County was designated as D1 – moderate drought. The County was upgraded to D2 – severe drought on June 28, 2005 and then a week later on July 5, 2005 was upgraded again to D3 – extreme drought. The USDA designated 93 counties in Illinois, including Logan County, as primary agricultural disaster areas due to the damage and losses caused by drought on July 27, 2005.

Extreme drought conditions continued through July and into August. The County remained in severe to extreme drought conditions through most of September. The drought conditions in the County were downgraded to D1 – moderate drought on September 27, 2005. The County remained under the D1 designation through the spring of 2006 before it was removed on May 2, 2006.

- In 2011, drought conditions impacted the central portion of the state. This was a short-term agricultural drought that started in July and was over by the end of November. On November 2, 2011 the USDA designated 44 counties in Illinois as primary natural disaster areas because of losses caused by drought and excessive heat. While Logan County was not one of the designated counties, it did quality for natural disaster assistance because it was contiguous to the disaster area.
- In 2012 drought conditions impacted all of Illinois and most of the Midwest. On June 19, 2012 Logan County was designated as "D2" or being in a severe drought due to an abnormally warm and dry spring. Yearly rainfall deficits grew to as much as 5 to 10 inches in June. Rainfall at Lincoln only totaled 0.59 inches, making it the third dried June on record.

  Then on July 24th, 2012 Logan County was upgraded to "D3" or extreme drought due to the continued hot and dry conditions. The month was the tenth warmest July on record at Lincoln and the yearly rainfall deficits grew to as much as 8 to 13 inches in July. In Mount Pulaski, voluntary water restrictions were put into place and the bulk water sale station was closed. Extreme drought conditions continued through August, but were downgraded to D2 on September 6, 2012 and then to D1 on October 31, 2012 thanks to beneficial rainfall.

  Crop stress was extreme for corn and soybeans during this event. On August 1, 2012 the USDA designated 66 counties in Illinois, including Logan County, as primary natural disaster areas due to damage and losses caused by drought and extreme heat.

The Illinois State Water Survey records indicate that droughts also occurred in the region in 1931, 1934, 1936 and 1954; however, the extent to which Logan County was impacted was unavailable.

What locations are affected by drought?

Drought events affect the entire County. Droughts, like extreme heat and severe winter storms, tend to impact large areas, extending across an entire region and affecting multiple counties. The *2010 Illinois Natural Hazard Mitigation Plan* classifies Logan County's hazard rating for drought as "guarded."

What is the probability of future drought events occurring?

Logan County has experienced four droughts between 1983 and 2012. With four occurrences over 30 years, the probability or likelihood that the County may experience a drought in any given year is 13%. However, if earlier recorded droughts are factored in, then the probability that Logan County may experience a drought in any given year decreases slightly to 10%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to drought?

Yes. All of Logan County is vulnerable to drought. Neither the amount nor the distribution of precipitation; soil types; topography; or water table conditions provides protection for any area within the County.

What impacts resulted from the recorded drought events?

Drought Fast Facts – Impacts/Risk

Drought Events
- Crop Damage: ***$34.2 million***

Risk/Vulnerability to:
- Public Health & Safety: ***Low***
- Buildings/Infrastructure/Critical Facilities: ***Low***

Damage information was only available for one of the drought events between 1983 and 2012. According to NOAA's Storm Events Database, the 2012 drought caused an estimated $34.2 million in damages to the corn crop in Logan County. Disaster relief payment information was only available for 1998 drought event. Landowners and farmers in Illinois were paid in excess of $382 million in relief payments; however a breakdown by county was unavailable.

No injuries or deaths were reported as a result of any of the recorded drought events in Logan County. Consequently, the risk or vulnerability to public health and safety from drought is low.

What other impacts can result from drought events?

Based on statewide drought records available from the Illinois State Water Survey, the most common impacts that result from severe drought events in Illinois include reductions in crop yields and drinking water shortages. Even though damage information was only available for one of the recorded events, information gathered from County residents indicates the impacts experienced during the recorded drought events were similar to those seen statewide.

Crop Yield Reductions

Agriculture is the major industry in Logan County. According to the 2007 Census of Agriculture, there were 710 farms in Logan County occupying 320,356 acres. Farm land accounts for approximately 81% of all the land in Logan County. Of the 320,356 acres of farm land, approximately 95% or 303,129 acres of this land was in crop production. Less than one percent of this land is irrigated.

Crop sales accounted for $160,678,000 in revenue while livestock sales accounted for $19,533,000. Logan County ranks in the top 20 Illinois counties crop cash receipts and in the top 40 counties for livestock cash receipts. A severe drought would have a great financial impact on the large agricultural community, particularly if it occurred during the growing season. Dry weather conditions, particularly when accompanied by excessive heat, can result in diminished crop yields and place stress on livestock.

A reduction in crop yields was seen as a result of the 1983, 1988, 2005-2006 and 2012 droughts. **Figure 74** illustrates the reduction yields seen for corn and soybeans during the four recorded drought events.

Records obtained from the USDA's National Agricultural Statistics Service show that the 1983 drought resulted in corn yield reductions of 29.4% and soybeans yield reductions of 15.3% while the 1988 drought resulted in corn yield reductions of 51.4% and soybean yield reductions of 28.8%. In 2005, the drought caused a 23.4% reduction in corn yields and a 5.4% reduction in soybean yields while the 2012 drought caused a 44.3% reduction in corn yields and a 14.3% reduction in soybean yields.

Figure 74
Crop Yield Reductions Due To Drought in Logan County

Year	Corn		Soybeans	
	Yield (bushel)	% Reduction from Previous Year	Yield (bushel)	% Reduction from Previous Year
1982	136	--	42.5	--
1983	**96**	**29.4%**	**36**	**15.3%**
1984	137	--	38.5	--
1987	146	--	40	--
1988	**71**	**51.4%**	**28.5**	**28.8%**
1989	139	--	48	--
2004	188	--	56	--
2005	**144**	**23.4%**	**53**	**5.4%**
2006	171	--	**52**	**1.9%**
2007	197	--	**50**	**3.8%**
2010	155.7	--	57.6	--
2011	173.4	--	**55.2**	**4.2%**
2012	**96.5**	**44.3%**	**47.3**	**14.3%**

Source: USDA, National Agricultural Statistics Service.

Drinking Water Shortages

Municipalities that rely on surface water sources for their drinking water supplies are more vulnerable to shortages as a result of drought. However, in Logan County, ***none of the participating municipalities rely on surface water sources*** for their drinking water supplies. All obtain water from relatively deep underground wells. As a result, they are less susceptible to drinking water shortages, although a prolonged drought or a series of droughts in close succession do have the potential to impact water levels in aquifers used for providing drinking water wells that primarily serve farms.

Are existing buildings, infrastructure and critical facilities vulnerable to drought?

No. In general, existing buildings, infrastructure and critical facilities located in Logan County and the participating municipalities are not vulnerable to drought. As with extreme heat events, droughts typically do not cause damage to buildings, infrastructure or critical facilities. The true concern centers on the financial impacts that result from loss of crop yields and livestock.

While buildings do not typically sustain damage from drought events, in rare cases infrastructure and critical facilities may be directly or indirectly impacted. While uncommon, droughts can contribute to roadway damage. Severe soil shrinkage can compromise the foundation of a roadway and lead to cracking and buckling.

Prolonged heat associated with drought can also increase the demand for energy to operate air conditioners, fans and other devices. This increase in demand places stress on the electrical grid which increases the likelihood of power outages. Additionally, droughts have the potential to impact drinking water supplies. Reductions in the water levels of wells and surface water supplies can cause water shortages that require water conservation measures to be enacted in an effort to maintain a sufficient supply of water to provide drinking water and fight fires.

In general, the risk or vulnerability to buildings, infrastructure and critical facilities from drought is low, even taking into consideration the potential impact a drought may have on drinking water supplies and the stress that prolonged heat may place on the electrical grid.

Are future buildings, infrastructure and critical facilities vulnerable to drought?

No. Future buildings, infrastructure and critical facilities within the County are no more vulnerable to drought than the existing building, infrastructure and critical facilities. As discussed above, buildings do not typically sustain damage from drought. Infrastructure and critical facilities may, in rare cases, be damaged by drought, but very little can be done to prevent this damage.

What are the potential dollar losses to vulnerable structures from drought?

Unlike other natural hazards that affect the County, drought does not typically damage buildings. The primary concern associated with drought is loss of crop yields and the potential impacts to drinking water supplies.

With no comprehensive damage information available for previous occurrences there is no way to accurately estimate future potential dollar losses. However, since a major portion of the County is involved in farming activities, it is likely that there will be future dollar losses to drought. In addition, reduced water levels and the water conservation measures that typically accompany a drought will most likely impact businesses and industries that are water-dependent (i.e., car washes, landscapers etc.).

3.7 EARTHQUAKES

IDENTIFYING THE HAZARD

What is the definition of an earthquake?

An earthquake is a sudden shaking of the ground caused when rocks forming the earth's crust slip or move past each other along a fault (a fracture in the rocks). Most earthquakes occur along the boundaries of the earth's tectonic plates. These slow-moving plates are being pulled and dragged in different directions, sliding over, under and past each other. Occasionally, as the plates move past each other, their jagged edges will catch or stick causing a gradual buildup of pressure (energy).

Eventually, the force exerted by the moving plates overcomes the resistance at the edges and the plates snap into a new position. This abrupt shift releases the pent-up energy, producing vibrations or seismic waves that travel outward from the earthquake's point of origin. The location below the earth's surface where the earthquake starts is known as the hypocenter or focus. The point on the earth's surface directly above the focus is the epicenter.

The destruction caused by an earthquake may range from light to catastrophic depending on a number of factors including the magnitude of the earthquake, the distance from the epicenter, the local geologic conditions as well as construction standards and time of day (i.e., rush hour). Earthquake damage may include power outages, general property damage, road and bridge failure, collapsed buildings and utility damage (ruptured gas lines, broken water mains, etc.).

Most of the damage done by an earthquake is caused by its secondary or indirect effects. These secondary effects result from the seismic waves released by the earthquake and include ground shaking, surface faulting, liquefaction, landslides and, in rare cases, tsunamis.

According to the U.S. Geological Survey earthquakes pose a significant risk to more than 75 million Americans in 39 states. Twenty-six urban areas across the United States, including St. Louis, Missouri, are at risk of significant seismic activity. The Federal Emergency Management Agency has estimated future annual earthquake losses in the United States at $5.6 billion a year.

What is a fault?

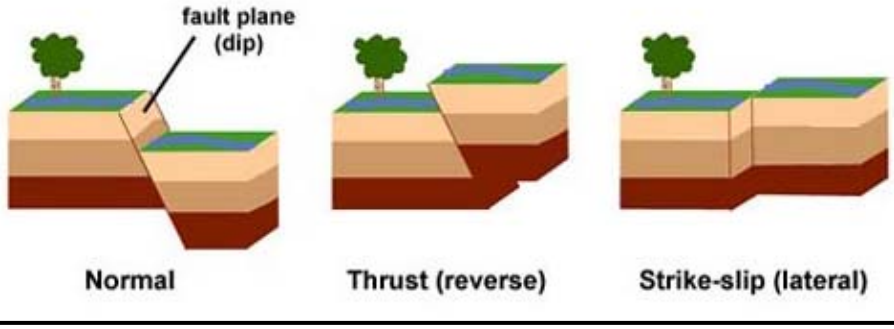
A fault is a fracture or zone of fractures in the earth's crust between two blocks of rock. They may range in length from a few millimeters to thousands of kilometers. Many faults form along tectonic plate boundaries.

Faults are classified based on the angle of the fault with respect to the surface (known as the dip) and the direction of slip or movement along the fault. There are three main groups of faults: normal, thrust (reverse) and strike-slip (lateral). **Figure 75** provides an illustration of each type of fault.

Normal faults occur in response to pulling or tension along the two blocks of rock causing the overlying block to move down the dip of the fault plane. Most of the faults in Illinois are normal

faults. Thrust or reverse faults occur in response to squeezing or compression of the two blocks of rock causing the overlying block to move up the dip of the fault plane. Strike-slip or lateral faults can occur in response to either pulling/tension or squeezing/compression causing the blocks to move horizontally past each other.

Figure 75
Fault Illustration



Source: U. S. Geological Survey.

Geologists have found that earthquakes tend to recur along faults, which reflect zones of weakness in the earth's crust. Even if a fault zone has recently experienced an earthquake, there is no guarantee that all the stress has been relieved. Another earthquake could still occur.

What are tectonic plates?

Tectonic plates are large, irregularly-shaped, relatively rigid sections of the earth's crust that float on the top, fluid layer of the earth's mantle. There are about a dozen tectonic plates that make up the surface of the planet. These plates are approximately 50 to 60 miles thick and the largest are millions of square miles in size.

How are earthquakes measured?

The severity of an earthquake is measured in terms of its magnitude and intensity. A brief description of both terms and the scales used to measure each are provided below.

Magnitude

Magnitude refers to the amount of seismic energy released at the hypocenter of an earthquake. The magnitude of an earthquake is determined from measurements of ground vibrations recorded by seismographs. As a result, magnitude is represented as a single, instrumentally determined value. A loose network of seismographs has been installed all over the world to help record and verify earthquake events.

There are several scales that measure the magnitude of an earthquake. The most well known is the Richter Scale. This logarithmic scale provides a numeric representation of the magnitude of an earthquake through the use of whole numbers and decimal fractions. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in ground vibrations measured. In addition, each whole number increase corresponds to the release of about 31 times more energy than the amount associated with the preceding whole

number. It is important to note that the Richter Scale is used only to determine the magnitude of an earthquake, it does not assess the damage that results.

Once an earthquake's magnitude has been confirmed, it can be classified. **Figure 76** categorizes earthquakes by class based on their magnitude (i.e., Richter Scale value). Any earthquake with a magnitude less than 3.0 on the Richter Scale is classified as a microquake while any earthquake with a magnitude of 8.0 or greater on the Richter Scale is considered a "great" earthquake. Earthquakes with a magnitude of 2.0 or less are not commonly felt by individuals. The largest earthquake to occur in the United States since 1900 took place off the coast of Alaska on March 28, 1964 and registered a 9.2 on the Richter Scale.

Figure 76
Earthquake Magnitude Classes

Class	Magnitude (Richter Scale)
micro	smaller than 3.0
minor	3.0 – 3.9
light	4.0 – 4.9
moderate	5.0 – 5.9
strong	6.0 – 6.9
major	7.0 – 7.9
great	8.0 or larger

Source: Michigan Technological University, Department of Geological and Mining Engineering and Sciences, UPSeis

Intensity

Intensity refers to the effect an earthquake has on a particular location. The intensity of an earthquake is determined from observations made of the damage inflicted on individuals, structures and the environment. As a result, intensity does not have a mathematical basis; instead it is an arbitrary ranking of observed effects. In addition, intensity generally diminishes with distance. There may be multiple intensity recordings for a region depending on a location's distance from the epicenter.

Although numerous intensity scales have been developed over the years, the one currently used in the United States is the Modified Mercalli Intensity Scale. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. The lower numbers of the intensity scale are based on human observations (i.e., felt only by a few people at rest, felt quite noticeably by persons indoors, etc).

The higher numbers of the scale are based on observed structural damage (i.e., broken windows, general damage to foundations etc.). Structural engineers usually contribute information when assigning intensity values of VIII or greater. **Figure 77** provides a description of the damages associated with each level of intensity as well as comparing Richter Scales values to Modified Mercalli Intensity Scale values.

Generally the Modified Mercalli Intensity value assigned to a specific site after an earthquake is a more meaningful measure of severity to the general public than magnitude because intensity refers to the effects actually experienced at that location.

Figure 77
Comparison of Richter Scale and Modified Mercalli Intensity Scale

Richter Scale	Modified Mercalli Scale	Observations
1.0 – 1.9	I	Felt by very few people; barely noticeable. No damage.
2.0 – 2.9	II	Felt by a few people, especially on the upper floors of buildings. No damage.
3.0 – 3.9	III	Noticeable indoors, especially on the upper floors of buildings, but may not be recognized as an earthquake. Standing cars may rock slightly; vibrations similar to the passing of a truck. No damage.
4.0	IV	Felt by many indoors and a few outdoors. Dishes, windows, and doors disturbed. Standing cars rocked noticeably. No damage.
4.1 – 4.9	V	Felt by nearly everyone. Small, unstable objects displaced or upset; some dishes and glassware broken. Negligible damage.
5.0 – 5.9	VI	Felt by everyone. Difficult to stand. Some heavy furniture moved. Weak plaster may fall and some masonry, such as chimneys, may be slightly damaged. Slight damage.
6.0	VII	Slight to moderate damage to well-built ordinary structures. Considerable damage to poorly-built structures. Some chimneys may break. Some walls may fall.
6.1 – 6.9	VIII	Considerable damage to ordinary buildings. Severe damage to poorly built buildings. Some walls collapse. Chimneys, monuments, factory stacks, columns fall.
7.0	IX	Severe structural damage in substantial buildings, with partial collapses. Buildings shifted off foundations. Ground cracks noticeable.
7.1 – 7.9	X	Most masonry and frame structures and their foundations destroyed. Some well-built wooden structures destroyed. Train tracks bent. Ground badly cracked. Landslides.
8.0	XI	Few, if any structures remain standing. Bridges destroyed. Wide cracks in ground. Train tracks bent greatly. Wholesale destruction.
> 8.0	XII	Total damage. Lines of sight and level are distorted. Waves seen on the ground. Objects thrown up into the air.

Sources: Michigan Technological University, Department of Geological and Mining Engineering and Sciences, UPSeis.
U.S. Geological Survey.

When and where do earthquakes occur?

Earthquakes can strike any location at any time. However, history has shown that most earthquakes occur in the same general areas year after year, principally in three large zones around the globe. The world's greatest earthquake belt, the circum-Pacific seismic belt (nicknamed the "Ring of Fire"), is found along the rim of the Pacific Ocean, where about 81 percent of the world's largest earthquakes occur.

The second prominent belt is the Alpide, which extends from Java to Sumatra and through the Himalayan Mountains, the Mediterranean Sea and out into the Atlantic Ocean. It accounts for about 17 percent of the world's largest earthquakes, including those in Iran, Turkey and Pakistan. The third belt follows the submerged mid-Atlantic Ridge, the longest mountain range in the world, nearly splitting the entire Atlantic Ocean north to south.

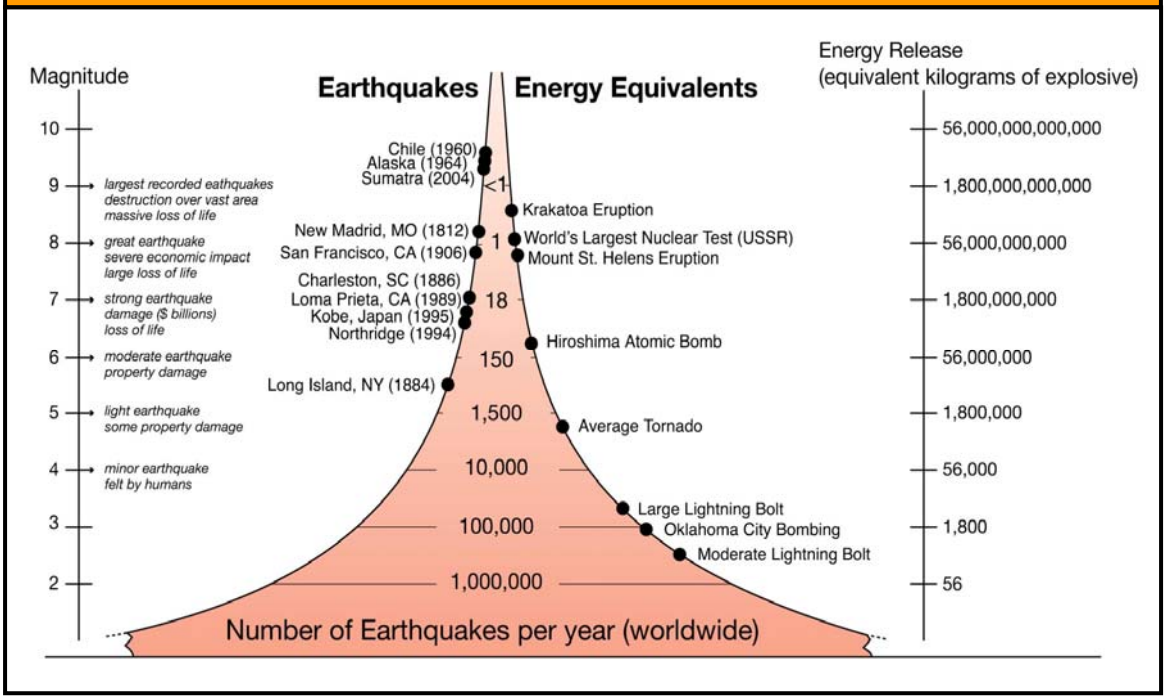
While most earthquakes occur along plate boundaries some are known to occur within the interior of a plate. (As the plates continue to move and plate boundaries change over time,

weakened boundary regions become part of the interiors of the plates.) Earthquakes can occur along zones of weakness within a plate in response to stresses that originate at the edges of the plate or from deep within the earth's crust. The New Madrid earthquakes of 1811 and 1812 occurred within the North American plate.

How often do earthquakes occur?

Earthquakes occur everyday. Worldwide, small earthquakes, such as magnitude 2 earthquakes, occur several hundred times a day. These earthquakes are known as microquakes and are generally not felt by humans. Major earthquakes, such as magnitude 7 earthquakes, generally occur more than one a month. **Figure 78** illustrates the approximate number of earthquakes that occur worldwide per year based on magnitude. This figure also identifies manmade and natural events that release approximately the same amount of energy for comparison.

Figure 78
Approximate Number of Earthquakes Recorded Annually



Source: Incorporated Research Institutions for Seismology, Education and Outreach Series – Educational One-Pagers, How Often Do Earthquakes Occur?

PROFILING THE HAZARD

Are there any fault zones located within the County?

No. There are no known fault zones located in Logan County or any of the surrounding counties.

When have earthquakes occurred previously? What is the extent of these previous quakes?

According to the Illinois State Geological Survey *Earthquakes In Illinois: 1795 – 2012* map, no earthquakes have originated in Logan County during the last 200 years. While no earthquakes

have originated in the County, residents have felt ground shaking caused by earthquakes that have originated outside of the County. The following provides a brief description, by region, of those events.

Earthquake Fast Facts – Occurrences

Earthquakes Originating in the County (1795 – 2012): ***0***
Fault Zones Located within the County: ***None***
Earthquakes Originating in nearby Counties (1795-2012): ***3***
Fault Zones Located in Nearby Counties: ***None***

Central Illinois

Several earthquakes have originated in nearby Mason, Menard and McLean Counties. Damage information was unavailable for any of these events.

- On December 27, 1885 an earthquake originated in McLean County approximately 4 miles south of Bloomington with an estimated magnitude of 3.4.
- An earthquake originated in Mason County approximately 3 miles north-northeast of Kilbourne on July 19, 1909 and was estimated to be a magnitude 4.5 earthquake.
- On November 10, 1923 an earthquake originated in Menard County approximately 2 miles west-southwest of Petersburg with an estimated magnitude of 3.5.

Southern Illinois

Logan County residents also felt ground shaking caused by several earthquakes that have originated in southeastern Illinois.

- On April 18, 2008, a magnitude 5.4 earthquake was reported in southeastern Illinois near Bellmont in Wabash County. The earthquake was located along the Wabash Valley seismic zone. Minor structural damage was reported in several towns in Illinois and Kentucky. Ground shaking was felt over all or parts of 18 states in the central United States and southern Ontario, Canada.
- A magnitude 5.1 earthquake took place on June 10, 1987 in southeastern Illinois near Olney in Richland County. This earthquake was also located along the Wabash Valley seismic zone. Only minor structural damage was reported in several towns in Illinois and Indiana. Ground shaking was felt over all or parts of 17 states in the central and eastern United States and southern Ontario, Canada.
- The strongest earthquake in the central United States during the 20th century occurred along the Wabash Valley seismic zone in southeastern Illinois near Dale in Hamilton County. This magnitude 5.4 earthquake occurred on November 9, 1968 with an intensity estimated at VII for the area surrounding the epicenter. Moderate structural damage was reported in several towns in south-central Illinois, southwest Indiana and northwest Kentucky. Ground shaking was felt over all or parts of 23 states in the central and eastern United States and southern Ontario, Canada.

Three of the ten largest earthquakes ever recorded within the continental United States took place in 1811 and 1812 along the New Madrid seismic zone. This zone which lies within the central Mississippi Valley, extending from northeast Arkansas through southeast Missouri, western Tennessee, western Kentucky and southern Illinois. These magnitude 7.7 and 7.5 major earthquakes were centered near the town of New Madrid, Missouri and caused widespread devastation to the surrounding region and rang church bells 1,000 miles away in Boston.

The quakes locally changed the course of the St. Francis and Mississippi Rivers and created Reelfoot Lake, which covers an area of more than 10 square miles in northwestern Tennessee. These earthquakes were not an isolated incident. The New Madrid seismic zone is one of the most seismically active areas of the United States east of the Rockies. Since 1974 more than 4,000 earthquakes have been recorded within this seismic zone, most of which were too small to be felt.

What locations are affected by earthquakes?

Earthquake events can affect the entire County. Earthquakes, like drought and extreme heat, impact large areas, extending across an entire region and affecting multiple counties. Logan County's proximity to two earthquake fault zones (the New Madrid and the Wabash Valley) makes the entire area likely to be affected by an earthquake if these faults become seismically active. The *2010 Illinois Natural Hazard Mitigation Plan* classifies Logan County's hazard rating for earthquakes as "elevated."

What is the probability of future earthquake events occurring?

As with flooding, calculating the probability of future earthquakes changes depending on the magnitude of the event. According to the ISGS, Illinois is expected to experience a magnitude 3.0 earthquake every year, a magnitude 4.0 earthquake every four years and a magnitude 5.0 earthquake every 20 years. The likelihood of an earthquake with a magnitude of 6.3 or greater occurring somewhere in the central United States within the next 50 years is between 86% and 97%.

While the major earthquakes of 1811 and 1812 do not occur often along the New Madrid fault, they are not isolated events. In recent decades, scientists have collected evidence that earthquakes similar in size and location to those felt in 1811 and 1812 have occurred several times before within the central Mississippi Valley around 1450 A.D., 900 A.D. and 2350 B.C.

The general consensus among scientists is that earthquakes similar to the 1811-1812 earthquakes are expected to recur on average every 500 years. The U.S. Geological Survey and the Center for Earthquake Research and Information (CERI) at the University of Memphis estimate that for a 50-year period the probability of a repeat of the 1811-1812 earthquakes is between 7% and 10% and the probability of an earthquake with a magnitude of 6.0 or larger is between 25% and 40%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to earthquakes?

Yes. All of Logan County is vulnerable to earthquakes. The unique geological formations topped with glacial drift soils found in the central United States conduct an earthquake's energy farther than in other parts of the Nation. Consequently, earthquakes that originate in the Midwest tend to be felt at greater distances than earthquakes with similar magnitudes that originate on the West Coast.

This vulnerability, found throughout most of Illinois and all of Logan County, is compounded by relatively high water tables within the region. When earthquake shaking mixes the groundwater and soil, ground support is further weakened thus adding to the potential structural damages experienced by buildings, roads, bridges, electrical lines and natural gas pipelines.

The *Projected Earthquake Intensities Map* prepared by the Missouri State Emergency Management Agency predicts that if a magnitude 6.7 earthquake were to take place anywhere along the New Madrid seismic zone, then the highest projected intensity felt in Logan County would be a V on the Modified Mercalli Intensity Scale. If a magnitude 8.6 earthquake were to occur, then the highest projected intensity felt would be a VII.

The infrequency of major earthquakes, coupled with relatively low magnitude/intensity of past events, has led the public to perceive that Logan County is not vulnerable to damaging earthquakes. This perception has allowed the County and participating municipalities to develop largely without regard to earthquake safety.

What impacts resulted from the recorded earthquake events?

While Logan County residents felt the earthquakes that occurred in 2008, 1987 and 1968, no damages were reported as a result of these events. Given the magnitude of the great earthquakes of 1811 and 1812, it is almost certain that individuals in what is now Logan County felt those quakes; however historical records do not indicate the intensity or impacts that these quakes had on the County.

Earthquake Fast Facts – Risk

Risk/Vulnerability to:

- Public Health & Safety – Moderate Quake: ***Low***
- Public Health & Safety – Great Quake: ***Medium***
- Buildings/Infrastructure/Critical Facilities – Moderate Quake: ***Low***
- Buildings/Infrastructure/Critical Facilities – Great Quake: ***Medium***

The risk or vulnerability to public health and safety from an earthquake is dependent on the intensity and location of the event. Since there are no known faults in Logan County, the likelihood that an earthquake will originate in the County is very small, decreasing the chances for catastrophic damages. Any impacts that are felt by Logan County residents will most likely originate from outside the County, either from the Wabash Valley or New Madrid faults.

As a result the risk or vulnerability to public health and safety from a moderate earthquake such as the one that occurred on April 18, 2008 is low. However, if a great earthquake similar to those experienced in 1811 and 1812 were to occur, then the risk or vulnerability to public health and safety would be elevated to medium.

What other impacts can result from earthquakes?

Earthquakes can impact human life, health and public safety. **Figure 79** details the potential impacts that may be experienced by the County should a magnitude 6.0 or greater earthquake occur in the region.

Are existing buildings, infrastructure and critical facilities vulnerable to earthquakes?

Yes. All existing buildings, infrastructure and critical facilities located in Logan County and the participating municipalities are vulnerable to damage from earthquakes. Unreinforced masonry

buildings are most at risk during an earthquake because the walls are prone to collapse outward. Steel and wood buildings have more ability to absorb the energy from an earthquake. Wood buildings with proper foundation ties have rarely collapsed in earthquakes.

Figure 79
Potential Earthquake Impacts

Direct	Indirect
Buildings • Temporary displacement of businesses, households, schools and other critical services where heat, water and power are disrupted • Long-term displacement of businesses, households, schools and other critical services due to structural damage or fires *Transportation* • Damages to bridges (i.e., cracking of abutments, subsidence of piers/supports, etc.) • Cracks in the pavement of critical roadways • Increased traffic on Interstates 55 and 155 (especially if the quake originates along the New Madrid fault) as residents move out of the area to seek shelter and medical care and as emergency response, support services and supplies move south to aid in recovery • Misalignment of rail lines due to landslides (most likely near stream crossings), fissures and/or heaving *Utilities* • Downed power and communication lines • Breaks in drinking water and sanitary sewer lines resulting in the temporary loss of service • Disruptions in the supply of natural gas due to cracking and breaking of pipelines *Health* • Injuries/deaths due to falling debris and fires *Other* • Cracks in the earthen dams of the lakes and reservoirs within the County which could lead to dam failures	*Health* • Use of County health facilities to treat individuals injured closer to the epicenter • Emergency services (ambulance, fire, law enforcement) may be needed to provide aid in areas where damage was greater *Other* • Disruptions in land line telephone service throughout an entire region (i.e., central and southern Illinois) • Depending on the seasonal conditions present, more displacements may be expected as those who may not have enough water and food supplies seek alternate shelter due to temperature extremes that make their current housing uninhabitable

Depending on the intensity of the earthquake, building damage in Logan County could range from negligible to moderate in well-built structures and considerable in poorly-built structures. An earthquake has the ability to damage infrastructure and critical facilities such as roads and utilities. In the event of a strong earthquake, bridges are expected to experience moderate damage such as cracking in the abutments and subsidence of piers and supports. The structural integrity may be compromised to the degree where safe passage is not possible, resulting in adverse travel times as alternate routes are taken. Some rural families may become isolated

where alternate paved routes do not exist. In addition, cracks may form in the pavement of key roadways.

An earthquake may also down overhead power and communication lines causing power outages and disruptions in communications. Cracks or breaks may form in natural gas pipelines and drinking water and sewage lines resulting in temporary loss of service. In addition, an earthquake could cause cracks to form in the earthen dams located within the County, increasing the likelihood of a dam failure.

As with public health and safety, the risk or vulnerability to buildings, infrastructure and critical facilities is dependent on the intensity and location of the event. The risk to buildings, infrastructure and critical facilities from a moderate earthquake is likely to be low, while the risk from a great earthquake is likely to be medium.

Are future buildings, infrastructure and critical facilities vulnerable to earthquakes?

Yes. All future buildings, infrastructure and critical facilities located in Logan County and the participating municipalities are vulnerable to damage from earthquakes. While six of the participating municipalities have building codes in place, these codes do not contain seismic provisions that address structural vulnerability for earthquakes. As a result, future buildings, infrastructure and critical facilities face the same vulnerabilities as those of existing buildings, infrastructure and critical facilities described previously.

What are the potential dollar losses to vulnerable structures from earthquakes?

With no reports of property damage associated with the recorded earthquake events, there is no way to accurately estimate future potential dollar losses to vulnerable structures in Logan County. Sufficient information was not available to make useful predictions regarding potential earthquake damage through the use of computer modeling.

Since all structures within the County are vulnerable to damage, it is likely that there will be future dollar losses from a strong earthquake. As a result, participating jurisdictions were asked to consider mitigation projects that could provide wide ranging benefits for reducing the impacts or damages associated with earthquakes.

3.8 DAMS

IDENTIFYING THE HAZARD

What is the definition of a dam?

A dam is an artificial barrier constructed across a stream channel or a man-made basin for the purpose of storing, controlling or diverting water. Dams typically are constructed of earth, rock, concrete or mine tailings. The area directly behind the dam where water is impounded or stored is referred to as a reservoir.

According to the National Inventory of Dams (NID), there are approximately 84,130 dams in the United States and Puerto Rico, with 1,504 dams located in Illinois. (The NID is maintained by the U.S. Army Corps of Engineers and is updated approximately every two years.) Of the 1,504 dams in Illinois, 94% are constructed of earth.

What is the definition of a dam failure?

A dam failure is the partial or total collapse, breach or other failure of a dam that causes flooding downstream. In the event of a dam failure, the people, property and infrastructure downstream could be subject to devastating damages. The potential severity of a full or partial dam failure is influenced by two factors:

- the capacity of the reservoir and
- the extent and type of development and infrastructure located downstream.

There are two categories of dam failures, "flood" or "rainy day" failures and "sunny day" failures. A "flood" or "rainy day" failure usually results when excess precipitation and runoff cause overtopping or a buildup of pressure behind a dam which leads to a breach. Even normal storm events can lead to "flood" failures if debris plugs the water outlets. Given the conditions that lead to a "flood" failure (i.e., rainfall over a period of hours or days), there is usually a sufficient amount of time to warn and evacuate residents downstream.

Unlike a "flood" failure, there is generally no warning associated with a "sunny day" failure. A "sunny day" failure is usually the result of improper or poor dam maintenance, internal erosion, vandalism or an earthquake. This unexpected failure can be catastrophic because it may not allow enough time to warn and evacuate residents downstream.

No one knows precisely how many dam failures have occurred in the United States, however, it is estimated that hundreds have taken place over the last century. Some of the worst failures have caused catastrophic property and environmental damage and have taken hundreds of lives. The worst dam failure in the last 50 years occurred on February 26, 1972 in Buffalo Creek, West Virginia. A tailings dam owned by the Buffalo Mining Company failed, taking the lives of 125 people, injuring 1,100 people, destroying 500 homes and causing more than $400 million in damages.

Dam failures have been documented in every state, including Illinois. According to the Dam Incident Database compiled by the National Performance of Dams Program, there have been 20 reported dam failures in Illinois between 1950 and 2001.

What causes a dam failure?

Dam failures can result from one or more of the following:

- ***prolonged periods of rainfall and flooding*** (the cause of most failures);
- ***inadequate spillway capacity*** resulting in excess flow overtopping the dam;
- ***internal erosion*** caused by embankment or foundation leakage ;
- ***improper maintenance*** (including failure to remove trees, repair internal seepage problems, maintain gates, valves and other operational components, etc.);
- ***improper design*** (including use of improper construction materials and practices);
- ***negligent operation*** (including failure to remove or open gates or valves during high flow periods);
- ***failure of an upstream dam on the same waterway***;
- ***landslides into reservoirs*** which cause surges that result in overtopping of the dam;
- ***high winds*** which can cause significant wave action and result in substantial erosion; and
- ***earthquakes*** which can cause longitudinal cracks at the tops of embankments that can weaken entire structures.

How are dams classified?

Each dam in Illinois is assigned a hazard classification based on the potential for loss of life and damage to property in the event of a dam failure. The three classifications are Class I, Class II and Class III. **Figure 80** provides a brief description of each hazard classification. The hazard classifications used in Illinois are similar to those used by the U.S. Army Corps of Engineers to classify dams listed in the National Inventory of Dams. It is important to note that the hazard classification assigned is not an indicator of the adequacy of the dam or its physical integrity and in no way reflects the current condition of the dam.

Figure 80
Dam Hazard Classification System

Class	Description
Class I	Dams located where failure has a high probability of causing loss of life or substantial economic loss downstream (i.e., a dam located where its failure may cause additional damage to such structures as a home, a hospital, a nursing home, a highly travelled roadway, a shopping center or similar type facilities where people are normally present downstream of the dam).
Class II	Dams located where failure has a moderate probability of causing loss of life or may cause substantial economic loss downstream (i.e., a dam located where its failure may cause additional damage to such structures as a water treatment facility, a sewage treatment facility, a power substation, a city park, a U.S. Route or Illinois Route highway, a railroad or similar type facilities where people are downstream of the dam for only a portion of the day or on a more sporadic basis).
Class III	Dams located where failure has a low probability of causing loss of life, where there are no permanent structures for human habitation, or minimal economic loss downstream (i.e., a dam located where its failure may cause additional damage to agricultural fields, timber areas, township roads or similar type areas where people seldom are present and where there are few structures).

Source: Illinois Administrative Code.

Are there any classified dams owned by any of the participating jurisdictions?

No. There are no publicly-owned classified dams within Logan County.

Are there any privately-owned classified dams within the County?

Yes. There are three privately-owned classified dams within Logan County. **Figure 81** provides a brief description of each dam. Two of the classified dams are owned by International Coal/Viper Mine.

Figure 81
Privately-Owned Classified Dams Located in Logan County

Name	Owner	Type	Purpose	Completion Date	Classification
International Coal/Viper Mine Slurry Impoundment Dam	International Coal Group	Earth	Tailings	1984	Class I
International Coal/Viper Mine Freshwater Impoundment Dam	International Coal Group	Earth	Tailings	1982	Class III
Hickory Lake Dam	Private	Earth	Recreation	1972	Class III

Sources: Diedrichsen, Mike, Illinois Department of Natural Resources, Office of Water Resources.
U.S. Army Corps of Engineers, National Inventory of Dams Interactive Report.

PROFILING THE HAZARD

When have dam failures occurred previously? What is the extent of these previous dam failures?

There have been no recorded dam failures in Logan County.

What locations are affected by dam failures?

Dam failures have the potential to impact unincorporated areas of Logan County. **Figure 82** shows the locations of the privately-owned classified dams in Logan County.

What is the probability of future dam failure events occurring?

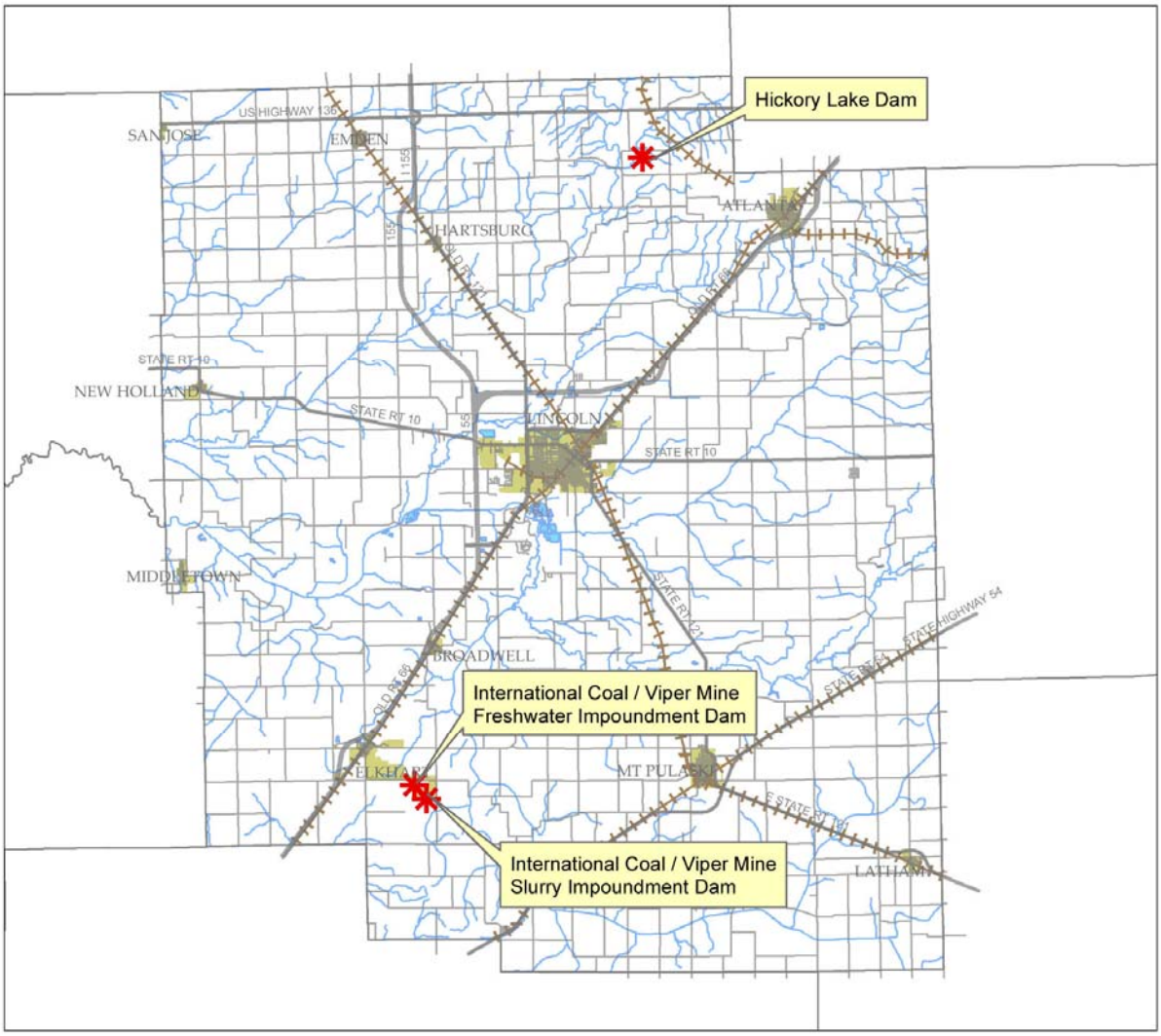
Since none of the dams have experienced a dam failure, it is difficult to specifically establish the probability of a future failure; however, it is estimated to be relatively low.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to dam failures?

Yes. Portions of unincorporated Logan County are vulnerable to the dangers presented by dam failures from dams located in Logan County. In addition, the unincorporated east-central portion of the County and Lincoln are also vulnerable to inundation from a failure of the Clinton Power Station Dam (Clinton Lake Dam) located four miles east of Clinton in adjacent DeWitt County. This Class I earth dam was constructed by the Exelon Corporation to create Clinton Lake, a cooling water reservoir for the Clinton Nuclear Power Station. The lake holds approximately 5,000 acres of water and has nearly 130 miles of shoreline.

Figure 82
Locations of Classified Dams in Logan County



None of the other participating jurisdictions are considered to be vulnerable to dam failures, either from within or outside of the County.

What impacts resulted from the recorded dam failures?

Since there have been no recorded dam failures in Logan County, there are no recorded impacts.

Dam Failure Fast Facts – Risk

Risk/Vulnerability to:

- Public Health & Safety – Logan County Dams: ***Low***
- Public Health & Safety – Clinton Power Station Dam (DeWitt County): ***Low/Medium***
- Buildings/Infrastructure/Critical Facilities – Logan County Dams: ***Low***
- Buildings/Infrastructure/Critical Facilities – Clinton Power Station Dam(DeWitt County): ***Low/Medium***

The risk or vulnerability to public health and safety from a dam failure is dependent on several factors including the severity of the event, the capacity of the reservoir and the extent and type of development and infrastructure located downstream. Based on the location, size and classification of the dams in Logan County the risk from a dam failure is low. The risk would be low to medium for those portions of the County that may be inundated by a failure of the Clinton Power Station Dam.

What other impacts can result from dam failures?

The impacts from a dam failure are similar to those of a flood. There is the potential for injuries, loss of life and property damage. Depending on the type of dam failure, there may be little, if any warning that an event is about to occur, similar to flash flooding. As a result, one of the primary threats to individuals is from drowning. Motorists who choose to drive over flooded roadways run the risk of having their vehicles swept off the road and downstream. Flooding of roadways is also a major concern for emergency response personnel who would have to find alternative routes around any section of road that becomes flooded due to a dam failure.

In addition to concerns about injuries and death, the water released by a dam failure poses the same biological and chemical risks to public health as floodwaters. The flooding that results from a dam failure has the potential to force untreated sewage to mix with floodwaters. The polluted floodwaters then transport the biological contaminants into buildings and basements and onto roads and public areas. If left untreated, the floodwaters can serve as breeding grounds for bacteria and other disease-causing agents. Even if floodwaters are not contaminated with biological material, basements and buildings that are not properly cleaned can grow mold and mildew which can pose a health hazard, especially for small children, the elderly and those with specific allergies.

Flooding from dam failures can also cause chemical contaminants such as gasoline and oil to enter floodwaters if underground storage tanks or pipelines crack and begin leaking during a dam failure event. Depending on the time of year, the water released by a dam failure may also carry away agricultural chemicals that have been applied to farm fields and cause damage to or loss of crops.

Are existing buildings, infrastructure and critical facilities vulnerable to dam failures?

Yes. Existing buildings, infrastructure and critical facilities are vulnerable to dam failures within the County and outside of the County. The Emergency Action Plan for the Clinton Power

Station Dam indicates that the Chestnut-Beason Park and structures on the north and west sides of Chestnut and the south side of Lincoln are vulnerable to inundation from a dam failure. Depending on the type of failure, the water is expected to take between 2 ½ hours and 7 hours to reach Chestnut.

While Emergency Action Plans were unavailable for the three Logan County classified dams, a visual inspection of the area surrounding the dams indicates that there are buildings and infrastructure that are vulnerable to a dam failure.

Depending on whether there is a full or partial dam failure, all of the vulnerable buildings, infrastructure and critical facilities may be inundated by water and structural damage may result. Because none of the reservoirs within the County are immense in size, the damage sustained from dam failure flooding may not be to the structure, but to the contents of the building or nearby infrastructure.

In addition to impacting structures, a dam failure can damage roads and utilities. Roadways, culverts and bridges can be weakened by dam failure floodwaters and may collapse under the weight of a vehicle. Power and communication lines, both above and below ground, are also vulnerable to dam failure flooding. Depending on their location and the velocity of the water as it escapes the dam, power poles may be snapped causing disruptions to power and communication. Water may also get into any buried lines causing damage and disruptions.

As with public health and safety, the risk or vulnerability to buildings, infrastructure and critical facilities is dependent on several factors including the severity of the event, the capacity of the reservoir and the extent and type of development and infrastructure located downstream. In general, the risk from a dam failure in Logan County is low. The risk would be low to medium for those structures and critical facilities that may be inundated by a failure of the Clinton Power Station Dam.

Are future buildings, infrastructure and critical facilities vulnerable to dam failures?

Yes. All future buildings, infrastructure and critical facilities located within the flood path of a classified dam are vulnerable to damage from a dam failure. As a result, future buildings, infrastructure and critical facilities face the same vulnerabilities as those of existing buildings, infrastructure and critical facilities described previously.

What are the potential dollar losses to vulnerable structures from dam failures?

Unlike other hazards, such as flooding, there are no standard loss estimation models or methodologies for dam failures. Given that there have been no recorded dam failures in Logan County, sufficient information was not available to prepare a reasonable estimate of future potential dollar losses to vulnerable structure from dam failures.

3.9 MAN-MADE HAZARDS

While the process to develop this Plan focused on natural hazards, the Planning Committee recognized that man-made hazards can also pose risks to public health and property. The extent and magnitude of the impacts that result from man-made hazard events can be influenced by natural hazard events. For example, severe winter storms can cause accidents involving trucks transporting hazardous substances. These accidents may lead to the release of these substances which can result in injury and potential contamination of the natural environment.

Consequently, the Planning Committee decided to profile the more prominent man-made hazards in Logan County. The man-made hazards assessed in this Plan include:

- Hazardous Substances
  - Generation
  - Transportation
- Waste Disposal
- Hazardous Material Incidents
- Waste Remediation
- Terrorism

3.9.1 Hazardous Substances

Hazardous substances broadly include any flammable, explosive, biological, chemical, or physical material that has the potential to harm public health or the environment. For the purposed of this Plan, the term hazardous substance includes hazardous product and hazardous waste. A hazardous waste is defined as the byproduct of a manufacturing process that is either listed or has the characteristics of ignitability, corrosivity, reactivity or toxicity and cannot be reused. A hazardous product is all other hazardous material.

Hazardous substances can pose a public health threat to individuals at their workplace and where they reside. The type and quantity of the substance, the pathway of exposure (inhalation, ingestion, dermal, etc.), and the frequency of exposure are factors that will determine the degree of adverse health effects experienced by individuals. Impacts can range from minor, short-term health issues to chronic, long-term illnesses.

In addition to impacting public health, hazardous substances can also cause damage to buildings, infrastructure and the environment. Accidents involving hazardous substances can range from minor (scarring on building floors and walls) to catastrophic (i.e., destruction of entire buildings, structural damage to roadways, etc.) and lead to injuries and death. The number of accidents involving hazardous substances in Illinois and across the Nation every year underscores the need for trained and equipped emergency responders to minimize damages.

Since 1970, significant changes have occurred in regards to how hazardous substances are transported and disposed. Comprehensive regulations and improved safety and industrial hygiene practices have reduced the frequency of incidents involving hazardous substances. Based on the small number of facilities in Logan County that generate and use hazardous substances, the population size, transportation patterns, and land use, the probability of a release occurring in Logan County should remain relatively low compared to other counties in Illinois. The relatively low numbers of transportation accidents should not diminish municipal or county commitment to emergency management.

The following subsections identify the general pathways – generation and transportation – by which hazardous substances pose a risk to public health and the environment in Logan County.

3.9.1.1 Generation

Logan County has several sites that generate hazardous substances as a result of their operations according to the Illinois Environmental Protection Agency (IEPA). **Figure 83** identifies the hazardous substance generators located in Logan County.

Figure 83
Generators of Solid & Liquid Hazardous Substances – 2010

Name	Hazardous Substances Generated	Amount Generated (Pounds)
Elkhart		
Viper Mine (781 600th Street)	barium compounds chromium compounds lead compounds manganese compounds mercury nickel compounds vanadium compounds zinc compounds	67,610 14,627 4,732 224,439 120 11,873 25,130 70,474
	Total:	*419,005*
Lincoln		
ADM Alliance Nutrition. (2250 W. Fifth Street)	copper compounds manganese compounds zinc compounds	1,005 347 658
	Total:	*2,010*
Lincoln		
Eaton Corp (1725 1200th Avenue)	copper	3
Lincoln		
Saint Gobain Containers (301 S. Simmons St.)	lead compounds	245

Source: U.S. Environmental Protection Agency, TRI Explorer, Releases: Facility Report.

3.9.1.2 Transportation

Roadways

Illinois has the nation's third largest highway system with over 139,000 miles of highways, streets, and roads and over 26,400 bridges. Most of the vehicle traffic in Logan County is carried on Interstate 55, a major north-south highway which connects Logan County to Springfield, St. Louis, and Chicago. Another major north-south highway in Logan County is Interstate 155 which connects Lincoln to Peoria. US 136 is a major east-west two-lane highway in central Illinois that runs along the northern edge of Logan County. While State Routes 10, 54 and 121 carry smaller quantities of traffic they each connect to four-lane interstate highways in the region. While this modern roadway system provides convenience and efficiency for commuters, it also aids in-state and intra-state commerce which includes the transportation of hazardous substances.

Roadway accident records involving the shipment hazardous wastes and products in Logan County from 2007 through 2011 were obtained from the IEPA and the Illinois Emergency Management Agency. There was one recorded accident during this time period and this incident involved product, not waste material. On October 23, 2007 anhydrous ammonia was released from a nurse tank on 1842nd Ave., approximately 2 ½ miles southeast of Mount Pulaski.

Railways

Illinois' rail system is the country's second largest, with the Chicago and East St. Louis terminals being two of the nation's busiest. In Logan County there are three rail lines – two owned by Canadian National and one owned by Union Pacific. One of the Canadian National rail lines enters the County at the northwestern corner near Emden and extends southeast passing through Emden, Hartsburg, Lincoln, Chestervale, Mt. Pulaski, and Latham before entering Macon County.

The other Canadian National rail line enters the County at the eastern border near Chestnut and extends southwest passing through Chestnut, Mount Pulaski, Lake Fork and Cornland before entering Sangamon County. Union Pacific operates a main rail line from Chicago to Springfield and St. Louis and enters the County from the northeastern corner near Atlanta and extends southwest passing through Atlanta, Lawndale, Lincoln, Broadwell and Elkhart before entering Sangamon County.

Since 2000, hazardous substances moving through Illinois have accounted for between 6 and 10 percent of the total freight traffic. Annual tonnage of hazardous substances moving through Illinois has varied in recent years between 30 million tons to 47 million tons. In comparison, the Association of American Railroads estimates that approximately six percent of all rail traffic in the United States involves the movement of hazardous substances.

The Illinois Commerce Commission (ICC) is required to maintain records on railway accidents which involve hazardous substances. Their records are divided into three categories. These three categories are described in **Figure 84**.

Figure 84
Railroad Accident Classification Categories

Category	Description
A	railroad derailments resulting in the release of the hazards substance(s) being transported
B	railroad derailments where hazards substance(s) were being transported but no release occurred
C	releases of hazardous substance(s)s from railroad equipment occurred, however no railroad derailment was involved

Since 2000, there have been no rail accidents involving hazardous substances in Logan County according to the ICC. In comparison, ICC records indicate that since 2001 the annual number of railway accidents in Illinois involving hazardous substances has ranged between 35 and 113.

Figure 85 provides a breakdown by category of the railway accidents/incidents involving hazardous substances that have occurred in Illinois.

Figure 85
Railway Accidents/Incidents Involving Hazardous Substances: 2001 – 2011

Year	Category	Accident/Incident Location			
		Illinois	Logan County	Cook & Collar Counties	All Other Counties
2001	A	4	0	1	3
	B	13	0	3	10
	C	65	0	36	29
2002	A	13	0	7	6
	B	6	0	1	5
	C	73	0	44	29
2003	A	4	0	1	3
	B	7	0	2	5
	C	73	0	46	27
2004	A	16	0	6	10
	B	4	0	2	2
	C	57	0	30	27
2005	A	11	0	4	7
	B	8	0	3	5
	C	57	0	29	28
2006	A	6	0	1	5
	B	12	0	6	6
	C	95	0	58	37
2007	A	7	0	5	2
	B	10	0	8	2
	C	81	0	46	35
2008	A	7	0	4	3
	B	4	0	2	2
	C	62	0	38	24
2009	A	5	0	1	4
	B	5	0	3	2
	C	25	0	14	11
2010	A	3	0	2	1
	B	20	0	17	3
	C	80	0	42	38
2011	A	8	0	1	7
	B	10	0	9	1
	C	60	0	33	27

The top 20 hazardous substances moved by rail through Illinois include: sodium hydroxide, petroleum gases (liquefied), sulfuric acid, anhydrous ammonia, chlorine, sulfur, vinyl chloride, propane, fuel oil, denatured alcohol, methanol, gasoline, phosphoric acid, hydrochloric acid, styrene monomer, carbon dioxide (refrigerated liquid), ammonium nitrate, sodium chlorate, and diesel fuel.

Pipelines

Energy gases (natural gas and liquefied petroleum gas), petroleum liquids (crude oil and gasoline) and liquid and gas products used in industrial processes are carried in above-ground and buried pipelines across Illinois. In Logan County, there are two pipelines that carry natural gas (Panhandle Eastern and Ameren) and one pipeline that carries hazardous liquid (Magellan).

Two incidents involving pipelines occurred in Logan County during the five year study period. Both incidents involved natural gas pipelines and they occurred in Lincoln. Natural gas vapors were released in both incidents but no injuries, explosions or fatalities occurred. A daycare facility was temporarily evacuated as a precautionary measure during one incident on March 16, 2009 when a contractor dug into a pipe with a backhoe.

There were three high profile incidents across the Nation in 2010, including one in Illinois that have raised public concerns about our aging pipeline infrastructure. The following provides a brief description of each incident.

- On September 9, 2010, a 30-inch high pressure natural gas pipeline ruptured in the San Francisco suburb of San Bruno, California that resulted in an explosion that killed eight people, destroyed over 30 homes and damaged an entire neighborhood.
- On July 26, 2010 a 30-inch liquid product pipeline rupture near Marshall, Michigan and released at least 840,000 gallons of oil into a creek that leads to the Kalamazoo River, a tributary of Lake Michigan.
- Soon afterward on September 9, 2010, another pipeline release received national attention. A 34-inch liquid product pipeline in the Chicago Suburb of Romeoville, Illinois released over 360,000 gallons of crude oil that flowed through sewers and into a retention pond narrowly avoiding the Des Plaines River. This release triggered numerous odor complaints from residents in the adjacent municipalities of Lemont and Bolingbrook.

Continual monitoring and maintenance of these pipelines is necessary to prevent malfunctions from corrosion, aging, or other factors that could lead to a release. In addition, to normal wear and tear experienced by pipelines, the possibility of sabotage and seismic activity triggering a release must be considered when considering emergency response scenarios.

3.9.2 Waste Disposal

Solid Waste

Waste disposal has caused surface water and ground water contamination in Illinois and across the Nation. Beginning in the late 1970s substantial regulatory changes strengthened the design, operating, and monitoring requirements for landfills where the majority of waste is disposed. These regulatory changes have helped reduce the public health threat posed by landfills. Although the rise in recycling activity has reduced the amount of waste disposed, the majority of solid waste (waste generated in households) continues to be disposed of in landfills. In 2010, 43 landfills were operating in Illinois; however, three of these landfills have closed.

According to the 24th Annual Landfill Capacity Report, there are no landfills currently operating in Logan County.

There are currently five Illinois landfills that serve Logan and the adjacent counties. These landfills are:

- Sangamon Valley Landfill, Inc. in Springfield (Sangamon County);
- ADS/McLean County #2 Landfill in Bloomington (McLean County);
- Indian Creek Landfill #2 in Hopedale (Tazewell County);
- Clinton Landfill #3 (DeWitt County); and
- Veolia ES Valley View Landfill in Decatur (Macon County)

At the present rate that solid waste is being generated, the IEPA estimates that there is sufficient capacity to meet the disposal needs of this region for approximately 26 years, if not longer.

Hazardous Waste

There are currently no off-site hazardous waste disposal facilities located in Logan County. Furthermore, there are no on-site hazardous waste treatment or disposal operations located in the County.

3.9.3 Hazardous Material Incidents

Hazardous materials, also known as hazardous substances, broadly include any flammable, explosive, biological, chemical, or physical material that has the potential to harm public health or the environment. A hazardous material or HazMat incident refers to any accident involving the release of hazardous substances. These accidents can take place where the substances are used, generated or stored or while they are being transported. In addition, HazMat incidents also include the release of hazardous substances, such as fuel, used to operate vehicles. These releases can be the result of an accident or a leak. **Figure 86** provides information on the HazMat incidents recorded in Logan County.

Between 2007 and 2011, there were 39 HazMat incidents recorded in Logan County. Of the 39 incidents, one involved a roadway accident, and none involved railway accidents. Many of the incidents recorded in Logan County are similar to those reported in other rural counties in that they commonly involve agricultural chemicals, fuel and oil. Taking the middle year (2009) of the time period studied reveals that there were seven HazMat incidents recorded in Logan County. In comparison, 1,162 incidents were recorded in 2009 for the entire state. A majority of these incidents occurred in Cook and the collar counties.

HazMat incidents in Illinois and across the Nation have resulted in serious injuries, evacuation of nearby residents, and environmental degradation requiring emergency cleanup actions. In Logan County, approximately two injuries requiring hospitalization resulted from separate HazMat incidents between 2007 and 2011. None of the recorded incidents caused severe, widespread damages or resulted in evacuation.

Based on the recorded incidents, Logan County experienced an average of nearly eight HazMat incidents annually. Based on the use of hazardous substances in agribusiness and the transportation corridors through the County, HazMat incidents are likely to continue to take place at the rate reflected in the 5-year study period. Although these incidents should not be

Figure 86
HazMat Incidents in Logan County: 2007 – 2011

Date	Location	Hazardous Substances Released
2007		
4/26/2007	Lincoln	Diesel Fuel
4/26/2007	Lincoln	Diesel Fuel
6/15/2007	Broadwell	Diesel Fuel & Crankcase Oil
7/5/2007	Lincoln	Diesel Fuel
7/6/2007	Broadwell	Unknown Liquid
10/23/2007	Mt. Pulaski*	Annhydrous Ammonia^
11/20/2007	Lincoln	Annhydrous Ammonia
12/1/2007	Lincoln	Diesel Fuel
12/5/2007	Elkhart	Kerosene, Diesel Fuel & Gasoline
2008		
1/1/2008	Lincoln	Diesel Fuel
1/31/2008	Atlanta	Diesel Fuel
2/13/2008	Lincoln	Diesel Fuel
4/23/2008	Lincoln	Gasoline
5/1/2008	Atlanta	Gasoline
6/10/2008	Lincoln	Gasoline
2009		
2/6/2009	Lincoln	Liquid Livestock Waste
3/6/2009	Lincoln	Natural Gas
3/16/2009	Lincoln	Natural Gas
6/7/2009	San Jose	Diesel Fuel
8/25/2009	Hartsburg	Acrylic Acid
10/15/2009	Lincoln	Racing Fuel, Kerosene & Gasoline
12/31/2009	Lincoln	Diesel Fuel
2010		
4/12/2010	Williamsville*	Annhydrous Ammonia
5/5/2010	Latham	Diesel Fuel
8/19/2010	Lincoln	Diesel Fuel
10/8/2010	Lincoln	Unknown Liquid
10/21/2010	Lincoln	Annhydrous Ammonia
11/2/2010	Lincoln	Annhydrous Ammonia
12/1/2010	New Holland	Liquid Fertilizer
12/12/2010	Williamsville*	Diesel Fuel & Gasoline
2011		
1/19/2011	Lincoln	Diesel Fuel
1/20/2011	Lincoln	Diesel Fuel
1/21/2011	Lincoln	Diesel Fuel
1/30/2011	Lincoln	Diesel Fuel
2/4/2011	Emden	Diesel Fuel
5/19/2011	Lincoln	Motor Oil
6/30/2011	Hartsburg	Gasoline
11/8/2011	Elkhart	Diesel Fuel
12/27/2011	Lincoln	Diesel Fuel

* Incident verified in the vicinity of this location.

^ Incident involved the transportation of a hazardous substance by road. See *Section 3.9.1.2 – Transportation: Roadways* for more information.

expected to occur with the same frequency experienced in more industrialized and urbanized areas of Illinois, constant vigilance, proper training and equipment, and prompt response are needed to minimize the potential impacts of each incident.

3.9.4 Waste Remediation

Hazardous waste remediation in Illinois is primarily handled through two programs: the federal Superfund program and the state Site Remediation Program. Sites that pose the largest threat to public health and the environment are typically found in the Superfund program. Most other hazardous waste sites are handled through the Site Remediation Program.

Superfund(CERLCA) Program/National Priorities List

Since the advent of the national Superfund program in 1981, there have been 51 Superfund sites in Illinois. However, there are ***no Superfund sites in Logan County*** and there are ***no candidate sites*** awaiting proposal to the National Priorities List.

Illinois Site Remediation Program (non-Superfund)

Sites that do not qualify for the federal Superfund program, but where hazardous waste exists that poses a risk to public health and the environment, are regulated through the Illinois Site Remediation Program (SRP). Since the mid-1980s, remediation activities have been conducted and monitored at nearly 4,000 sites in Illinois. When inspections and sampling results indicate that remediation objectives have been achieved, the IEPA issues a No Further Remediation (NFR) Letter to the property owner. This letter describes what remediation activities have been taken and whether any portion of the property, based on future property use, might need additional remediation.

There are ***eight SRP sites*** in Logan County. Two of these SRP sites have received NFR letters, and six are actively being remediated.

Leaking Underground Storage Tank Program

Petroleum products leaking from underground storage tanks are regulated through the Leaking Underground Storage Tank program. This program began in the late 1980s as a result of the threats posed by vapors in homes and businesses, contaminated groundwater, and contaminated soil. In Illinois over 14,500 acres of soil contaminated by leaking underground tanks have been remediated since 1988.

In Logan County there are ***65 cases involving remediation of leaks and contaminated soil*** through this program. Forty-eight of these sites have received No Further Remediation (NFR) Letters. All but four of the remaining sites have submitted reports describing the extent of the leak and remediation activities taken to date. Some of these sites await further action by the site owners. No sites in Logan County received a "high priority classification."

3.9.5 Terrorism

Terrorism has different definitions across the globe. For the purpose of this Plan, terrorism will be defined as any event that includes ***violent acts*** which ***threaten or harm lives, health or property*** conducted by ***domestic or foreign*** individuals or groups a***imed at civilians, the federal government or symbolic locations*** intended to ***cause widespread fear***.

The attack on the World Trade Center and the Pentagon on September 11, 2001 by foreign terrorists galvanized national action against terrorism and resulted in the creation of the United States Department of Homeland Security. While the number of terrorist activities garnering national attention in the U.S. has been relatively small, approximately 80,000 terrorist events have occurred worldwide between 1970 and 2007 according to the National Consortium for the Study of Terrorism and Responses to Terrorism. During this same time span, the Consortium documented 1,347 terrorist events within the U.S. The greatest number of these events occurred in New York (266), Miami (70), San Francisco (66), Washington (59) and Los Angeles (54). There are approximately 40 terrorist groups have been documented as operating within the U.S.

Acts of terrorism have resulted in deaths and injuries as a result of kidnappings, hijackings, bombings, and the use of chemical and biological weapons. The Global Terrorism Database has documented 18 fatalities and 44 injuries attributed to terrorism in the United States since 2000. The attack on the World Trade Center and the Pentagon on September 11, 2001 resulted in nearly 3,000 additional deaths and an estimated 12,000 injuries.

The Federal Bureau of Investigation's (FBI) provides supporting documentation on domestic terrorist attacks between 1970 and 2005 in a series of reports on terrorism. These reports provide a chronological summary of terrorist incidents in the United States with detailed information on attacks between 1980 and 2005. During this time period 192 incidents were documented within the United States. Five of these incidents occurred in Illinois; four in the Chicago area and one downstate.

In the past several years there have been other terrorism incidents in Illinois that have received media coverage. In 2001, a suspected terrorist with possible ties to al-Qaeda was apprehended after engaging in communication and fiscal activities in support of terrorism in the Peoria and Macomb areas. Most recently a single individual from Macon County sought to carry out his anger at the federal government by detonating a van filled with explosive outside of the Federal Courthouse in Springfield on September 24, 2009. This attempt was thwarted by the FBI.

It is impossible to predict with any reasonable degree of accuracy how many terrorism events might be expected to occur in Logan County or elsewhere in Illinois. Although targets for terrorist activity are more likely centered in larger urban areas, recruitment, training and other support activities, such as the one described above, are as likely to occur in rural areas as in urban areas.

The economic resources available to some terrorist groups coupled with the combination of global tensions, economic uncertainty and frustration towards government appear to have recently raised the frequency of attempts. Enhanced efforts by law enforcement officials and civilian vigilance for unusual activity or behavior will be needed to repel terrorists whether they are domestic or foreign in origin.

4.0 MITIGATION STRATEGY

4.0 MITIGATION STRATEGY

This section focuses on determining how to reduce or eliminate the potential loss of life and property damage that results from the natural hazards identified in the Risk Assessment section of this Plan. In order to accomplish this objective, the Planning Committee developed a mitigation strategy that included the following steps:

- formulating mitigation goals to reduce or eliminate long-term vulnerabilities to natural hazards;
- identifying, analyzing and prioritizing a comprehensive range of specific mitigation actions including those related to continued compliance with the National Flood Insurance Program; and
- describing how each jurisdiction will implement the mitigation actions identified.

Provided below is a detailed discussion of each mitigation strategy step.

4.1 HAZARD MITIGATION GOALS

The first step outlined in the mitigation strategy is to develop mitigation goals that aim to reduce or eliminate long-term vulnerabilities to the natural hazards identified. The mitigation goals are general guidelines that explain what the participants want to achieve in terms of hazard and loss prevention.

A preliminary list of eight hazard mitigation goals was developed and distributed to the Planning Committee members at the first meeting on August 9, 2012. Members were asked to review the list before the second meeting and consider whether any changes needed to be made or if additional goals should be included. At the Planning Committee's November 1, 2012 meeting, the group discussed the preliminary list of goals and approved them with a minor revision to Goal 6. **Figure 87** lists the approved goals.

Figure 87
Hazard Mitigation Goals

Goal 1	Educate people about the hazards (natural and man-made) they face and the ways they can protect themselves, their homes, and their businesses from those hazards.
Goal 2	Protect the lives, health, and safety of the people and animals in the County from the dangers of natural and man-made hazards.
Goal 3	Protect existing infrastructure and design new infrastructure (roads, bridges, utilities, water supplies, sanitary sewer systems, etc.) to be resilient to the impacts of natural and man-made hazards.
Goal 4	Incorporate natural and man-made hazard mitigation into community plans and regulations.
Goal 5	Place a priority on protecting public services, including critical facilities, utilities, roads and schools.
Goal 6	Preserve and protect the streams and floodplains in our County.
Goal 7	Ensure that new developments do not create new exposures to damage from natural and man-made hazards.
Goal 8	Protect historic, cultural, and natural resources from the effects of natural and man-made hazards.

4.2 IDENTIFYING, ANALYZING & PRIORITIZING MITIGATION ACTIONS

The second step outlined in the mitigation strategy involves identifying, analyzing and prioritizing a comprehensive range of specific mitigation actions. Mitigation actions include any projects, plans, activities or programs identified by participants that helps achieve one or more of the goals identified above.

4.2.1 Identification and Analysis

After developing hazard mitigation goals and reviewing the results of the risk assessment, Committee members representing the County and participating municipalities were asked to consult with their respective government entities to identify a comprehensive range of mitigation actions specific to the hazards and vulnerabilities associated with their jurisdiction. Representatives of Logan County, Atlanta, Elkhart, Lincoln and Mount Pulaski were asked to identify mitigation actions that ensure their continued compliance with the National Flood Insurance Program.

The compiled lists of mitigation actions were reviewed to assure the appropriateness and suitability of each action. Those actions that were not deemed appropriate and/or suitable were either reworded or eliminated. Next, each mitigation action was assigned to one of six broad categories which allowed Committee members to compare and consolidate similar actions. **Figure 88** identifies each category and provides a brief description.

Figure 88
Mitigation Action Categorization

Category	Description
Regulatory Activities (RA)	Regulatory activities are designed to reduce a jurisdiction's vulnerability to specific hazard events. These activities are especially effective in hazard prone areas where development has yet to occur. Examples include: planning and zoning, floodplain regulations and local ordinances (i.e., building codes, etc.).
Structural Projects (SP)	Structural projects lessen the impact that a hazard has on a particular structure through design and engineering. Examples include: storm sewers, road and bridge projects, storm/tornado shelters, flood walls and seismic retrofits.
Public Information & Awareness (PI)	Public information and awareness activities are used to educate individuals about the potential hazards that affect their community and the mitigation strategies that they can take part in to protect themselves and their property. Examples include: outreach programs, school programs, brochures and handout materials, evacuation planning and drills, volunteer activities (i.e., culvert cleanout days, initiatives to check in on the elderly/disabled during hazard events such as storms and extreme heat events, etc.).
Studies (S)	Studies are used to identify activities that can be undertaken to reduce the impacts associated with certain hazards. Examples include: hydraulic and drainage studies.
Miscellaneous Projects (MP)	Miscellaneous projects is a catchall for those activities or projects that help to reduce or lessen the impact that a hazard may have on a critical facility or community service. Examples include: snow fences, generators, warning sirens, etc.
Property Protection (PP)	Property protection activities are designed to retrofit existing structures to withstand natural hazards or to remove structures from hazard prone areas. In Illinois, this category of activities primarily pertains to flood protection. Examples include: acquisition, relocation, foundation elevation, insurance (i.e., flood, homeowners, etc.) and retrofitting (i.e., impact resistant windows, etc.).

Finally, each mitigation action was analyzed to determine:

- which hazard or hazards are being mitigated for;
- whether the impacts associated with a particular hazard(s) would be reduced or eliminated;
- the general size of the population affected by the action (i.e., small, medium or large);
- what goal or goals would be fulfilled;
- whether the effects on new or existing buildings and infrastructure would be reduced; and
- continued compliance with the National Flood Insurance Program.

4.2.2 Prioritization

After reviewing and analyzing the identified mitigation actions, the Planning Committee members worked together to develop a method to prioritize each action. **Figure 89** identifies and describes the four-tiered prioritization methodology adopted by the Committee. The methodology developed provides a means of objectively determining which actions have a greater likelihood of eliminating or reducing the long-term vulnerabilities associated with the most frequently-occurring natural hazards.

While prioritizing the projects is useful and does provide the participants with additional information, it is important to keep in mind that the implementation of all the mitigation actions identified is desirable regardless of which prioritization category an action falls under.

Figure 89
Mitigation Action Prioritization Methodology

		Hazard	
		Most Significant Hazard **(M)** (i.e., severe storms, tornadoes, severe winter storms, floods,)	Less Significant Hazard **(L)** (i.e., extreme heat, drought, earthquakes, dam failures)
Mitigation Action	Mitigation Action with the Potential to Virtually Eliminate or Significantly Reduce Impacts **(H)**	**HM** mitigation action will virtually eliminate damages and/or significantly reduce the probability of deaths and injuries from the most significant hazards	**HL** mitigation action will virtually eliminate damages and/or significantly reduce the probability of deaths and injuries from less significant hazards
	Mitigation Action with the Potential to Reduce Impacts **(L)**	**LM** mitigation action has the potential to reduce damages, deaths and/or injuries from the most significant hazards	**LL** mitigation action has the potential to reduce damages, deaths and/or injuries from less significant hazards

4.3 IMPLEMENTING MITIGATION ACTIONS

The final step outlined in the mitigation strategy involves describing how each jurisdiction will implement the mitigation actions identified. For each of mitigation action identified by the participants, the appropriate government entity was asked to:

- identify the party or parties responsible for oversight and administration;
- determine what funding source(s) are available or will be pursued; and
- describe the time frame for completion.

In addition, a preliminary qualitative cost/benefit analysis was conducted on each mitigation action. The costs and benefits were analyzed in terms of the general overall cost to complete an action as well as the action's likelihood of permanently eliminating or reducing the risk associated with a specific hazard. The general descriptors of high, medium and low were used. These terms are not meant to translate into a specific dollar amount, but rather to provide a relative comparison between the actions identified by each jurisdiction.

The analysis is only meant to give the participants a starting point to compare which actions are likely to provide the greatest benefit based on the financial cost and staffing effort needed. It is understood that when a grant application is submitted for a specific action, a detailed cost/benefit analysis will most likely be required to receive funding.

4.4 MITIGATION STRATEGY RESULTS

Figures 90 through **99** summarize the results of the mitigation strategy. The mitigation actions identified are arranged by participating jurisdiction.

Figure 90
(Sheet 1 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Board												
HM	Purchase and install R95 grounding system at Logan County Courthouse to protect critical systems and improve the building's ability to survive a lightning strike/ electromagnetic pulse event.	MMH, SS	MP	Reduces	Small	2, 3, 5	N/A	Yes	County Board	1 year	TBD	Medium/High
HM	Retrofit the Logan County Courthouse to include a tornado safe shelter with automatic emergency backup generator for use by staff and area residents. The shelter would also serve as a heating/cooling center and emergency services shelter and contact center.	DF, EQ, EH, F, SS, SWS, T	SP	Reduces	Small	2, 3, 5	N/A	Yes	County Board	2 years	75% Federal 25% Local	High/High
HM	Purchase and install automatic emergency backup generators at the Logan County Airport to provide uninterrupted power during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	N/A	Yes	County Board	2-3 years	TBD	Medium/Medium
HM	Remove debris, vegetative overgrowth, snags and drifts in Salt Creek to increase carrying capacity and reduce/prevent flood problems, which pose a risk to public safety.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	County Board	2 years	County	Low/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 2 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Board Continued…												
LM	Obtain permit from U.S. Army Corps. of Engineers to dredge Salt Creek.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	N/A	N/A	County Board	2 years	County	Low/High
HM	Dredge Salt Creek to increase carrying capacity and alleviate flood problems, which pose a risk to public safety.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	County Board	2 years	TBD	High/High
HM	Remove debris, vegetative overgrowth, snags and drifts in Kickapoo Creek to increase carrying capacity and reduce/prevent flood problems, which pose a risk to public safety.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	County Board	2 years	County	Low/Medium
LM	Obtain permit from U.S. Army Corps. of Engineers to dredge Kickapoo Creek.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	N/A	N/A	County Board	2 years	County	Low/High
HM	Dredge Kickapoo Creek to increase carrying capacity and alleviate flood problems, which pose a risk to public safety.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	County Board	2 years	TBD	High/High
LM	Develop a Memorandum of Agreement with Beason-Chestnut Public Water District to install fire hydrants in unincorporated Beason to aid in suppressing fires caused by a natural hazard event.	DR, EH, EQ, SS, SWS, T	MP	Reduces	Small	2, 3	Yes	Yes	County Board	1 year	County	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 3 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Board Continued…												
HM	Purchase and install fire hydrants in unincorporated Beason to aid in suppressing fires caused by a natural hazard event.	DR, EH, EQ, SS, SWS, T	SP	Reduces	Small	2, 3	Yes	Yes	County Board	1 year	TBD	Medium/High
LM	Develop a Memorandum of Agreement with Beason-Chestnut Public Water District to install a water storage tower in unincorporated Beason. This storage tower will provide the area with an available water reserve for use during drought and to aid in suppressing fires caused by a natural hazard event.	DR, EH, EQ, SS, SWS, T	MP	Reduces	Small	2, 3	Yes	Yes	County Board	1 ½ years	County	Low/High
HM	Purchase and install a water storage tower in unincorporated Beason to provide an available water reserve for used during drought and to aid in suppressing fires caused by a natural hazard event.	DR, EH, EQ, SS, SWS, T	SP	Reduces	Small	2, 3	Yes	Yes	County Board	1 ½ years	TBD	Medium/High
LM	Develop a Memorandum of Agreement with Beason-Chestnut Public Water District to install fire hydrants in unincorporated Chestnut to aid in suppressing fires caused by a natural hazard event.	DR, EH, EQ, SS, SWS, T	MP	Reduces	Small	2, 3	Yes	Yes	County Board	TBD	County	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 4 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Board Continued…												
HM	Purchase and install fire hydrants in unincorporated Chestnut to aid in suppressing fires caused by a natural hazard event.	DR, EH, EQ, SS, SWS, T	SP	Reduces	Small	2, 3	Yes	Yes	County Board	TBD	TBD	Medium/High
LM	Develop a Memorandum of Agreement with Beason-Chestnut Public Water District to install a water storage tower in unincorporated Chestnut. This storage tower will provide the area with an available water reserve for use during drought and to aid in suppressing fires caused by a natural hazard event.	DR, EH, EQ, SS, SWS, T	MP	Reduces	Small	2, 3	Yes	Yes	County Board	TBD	County	Low/High
HM	Purchase and install a water storage tower in unincorporated Chestnut to provide an available water reserve for used during drought and to aid in suppressing fires caused by a natural hazard event.	DR, EH, EQ, SS, SWS, T	SP	Reduces	Small	2, 3	Yes	Yes	County Board	TBD	TBD	Medium/High
Emergency Management Agency												
HM	Purchase and install storm warning siren system in unincorporated Lawndale.	SS, T	MP	Reduces	Small	2	N/A	N/A	EMA	1 year	TBD	Low/High
HM	Purchase and install storm warning siren system in unincorporated Beason.	SS, T	MP	Reduces	Small	2	N/A	N/A	EMA	1 year	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 5 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Emergency Management Agency Continued…												
HM	Purchase and install storm warning siren system in unincorporated Chestnut.	SS, T	MP	Reduces	Small	2	N/A	N/A	EMA	1 year	TBD	Low/High
HM	Purchase and install storm warning siren systems in unincorporated subdivisions within the County.	SS, T	MP	Reduces	Small	2	N/A	N/A	EMA	1 year	TBD	Low/High
HM	Install storm warning devices at the Logan County Airport and Fairgrounds to alert large crowds attending special events of threats posed by adverse weather.	EH, F, SS, T	MP	Reduces	Medium	2	N/A	N/A	EMA	1 year	TBD	Low/High
HM	Install storm warning devices at Lincoln Park District parks to alert individuals of threats posed by adverse weather.	EH, F SS, T	MP	Reduces	Small	2	N/A	N/A	EMA	1 year	TBD	Low/High
HM	Construct an equipment storage warehouse adjacent to the Logan County Safety Complex to protect equipment from inclement weather.	EQ, F, SS, SWS, T	SP	Eliminates	Medium	2, 3, 5	Yes	N/A	EMA	2 years	TBD	Medium/Medium
HM	Design and construct tornado safe shelters with emergency backup generators at trailer and manufactured housing parks and recreational facilities to serve individuals who do not have a safe place to seek shelter during a storm event.	SS, T	SP	Reduces	Small	2	N/A	N/A	EMA	2 years	75% Federal 25% Local	Medium/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 6 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Emergency Management Agency Continued…												
LM	Develop public information materials for all hazards that inform residents about the risks to life and property associated with each hazard and the proactive actions that they can take to reduce or eliminate their risk.	DF, EH, EQ, F, SS, SWS, T	PI	Reduces	Large	1, 2	Yes	Yes	EMA	TBD	TBD	Low/High
Emergency Telephone System Board & Emergency Management Agency												
HM	Develop a reverse 911 warning system to notify residents/responders countywide of emergency information.	DF, EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2	N/A	N/A	ETSB / EMA	1 ½ years	TBD	Medium/High
Health Department												
HM	Purchase and install an automatic emergency backup generator at the Health Department to provide uninterrupted power to refrigeration units to maintain vaccine integrity during power outages and to power the Health Department EOC.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	N/A	Yes	Health Department	TBD	TBD	Low/High
LM	Develop public information materials for all hazards that inform residents about the health risks associated with each hazard and the proactive actions that they can take to reduce or eliminate their risk.	DF, EH, EQ, F, SS, SWS, T	PI	Reduces	Large	1, 2	Yes	Yes	Health Department	TBD	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 7 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Highway Department												
LM	Obtain new high resolution orthographic photography of Logan County with LIDAR topographic Digital Elevation Model (1 ft. contours) for flood analysis.	F, SS, SWS	MP	Reduces	Large	2, 3, 5, 7	Yes	Yes	Highway Department	TBD	TBD	Medium/Medium
LM	Upon obtaining new LIDAR data, perform floodway delineation analysis of selected waterways and streams in the County to identify areas where flood mitigation measures need to be implemented.	F, SS, SWS	S	Reduces	Medium	2, 3, 5 7	Yes	Yes	Highway Department	TBD	75% Federal 25% Local	Low/Medium
HM	Relocate Salt Springs Branch levee along CH 9 (Primm Rd.) westward to create a larger floodway for the stream and alleviate erosion of the existing power poles and roadway. The current stream channel is too narrow and has cut into the bank next to the roadway exposing the power line poles below grade and eroding the roadway shoulder.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	N/A	Yes	Highway Department	TBD	TBD	High/Medium
HM	Replace the CH 9 (Primm Rd.) bridge over Deer Creek to increase capacity and alleviate recurring roadway flooding.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	N/A	Yes	Highway Department	TBD	TBD	High/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 8 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Highway Department Continued…												
HM	Raise a section of CH 22 at Salt Creek (near Structure #054-3053) and construct an overflow structure to alleviate overtopping of the roadway and erosion caused by flooding.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	N/A	Yes	Highway Department	TBD	TBD	High/Medium
HM	Install erosion control on foreslopes of CH 20 near Sugar Creek to prevent roadway erosion caused by recurrent overtopping.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	N/A	Yes	Highway Department	TBD	TBD	Medium/High
HM	Install larger culvert under CH 9 at 875th Street and grade ditches to increase carrying capacity and reduce roadway flooding problems.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	N/A	Yes	Highway Department	TBD	TBD	Medium/Medium
HM	Install larger culverts along CH 10 at 1150th Avenue to alleviate drainage and flooding problems.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	N/A	Yes	Highway Department	TBD	TBD	Medium/Medium
LM	Conduct hydraulic study to determine the appropriate remedy(s) to prevent further streambed erosion and meandering of Kickapoo Creek at CH 28.	F, SS, SWS	S	Reduces	Small	2, 3, 5	N/A	Yes	Highway Department	TBD	TBD	Low/Medium
HM	Select, design and construct the appropriate remedy(s) to prevent further streambed erosion and meandering of Kickapoo Creek at CH 28.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	N/A	Yes	Highway Department	TBD	TBD	High/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 9 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Highway Department Continued…												
LM	Conduct hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems at various locations within the County.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department	Ongoing	TBD	Low/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems at various locations within the County.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department	Ongoing	TBD	High/High
HM	Clean brush and debris out of waterways at bridge and culvert locations within the County.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department	Ongoing	Highway Department	Low/High
Aetna Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 10 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Atlanta Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High
Broadwell Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 11 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Chester Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High
Corwin Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 12 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
East Lincoln Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High
Elkhart Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 13 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Eminence Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High
Hurlbut Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 14 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Leanna Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High
Lake Fork Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 15 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Mount Pulaski Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High
Oran Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 16 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Orvil Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High
Prairie Creek Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 17 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Sheridan Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High
West Lincoln Township												
LM	Conduct a hydraulic study to determine the cause and suggest appropriate remedies to alleviate recurring drainage problems within the Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	High/Medium
HM	Clean brush and debris out of waterways at bridge and culvert locations within the Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Highway Department / Township	Ongoing	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 90
(Sheet 18 of 18)
Logan County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
Zoning Office												
LM	Make the most recent Flood Insurance Rate Maps available at the County Zoning Office to assist the public in considering where to construct new buildings.*	F	RA	Reduces	Medium	1, 2, 3 5, 6, 7	Yes	Yes	Zoning Office	TBD	County	Low/High
LM	Make County officials aware of the most recent Flood Insurance Rate Maps and issues related to construction in a floodplain.*	F	PI	Reduces	Small	1, 2, 3 5, 6, 7	Yes	Yes	Zoning Office	TBD	County	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Medium	1, 2, 3, 5, 6, 7	Yes	Yes	Zoning Office	TBD	County	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	MMH	Man-Made Hazards
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado
F	Flood		

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 91
(Sheet 1 of 2)
Atlanta Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Purchase and install new storm siren(s).	SS	MP	Reduces	Medium	2	N/A	N/A	Public Works	TBD	TBD	Medium/High
HM	Construct a tornado safe room/shelter as part of an expansion of City Hall.	EH, F, SS, SWS, T	SP	Reduces	Medium	2, 3	N/A	Yes	Public Works	TBD	75% Federal 25% Local	Medium/High
LM	Establish digital coordinates for all critical facilities/infrastructure within the City for use with GIS mapping.	EQ, F, SS, SWS, T	MP	Reduces	Large	2, 3, 5	N/A	N/A	Public Works	TBD	TBD	Low/Medium
HM	Construct an equipment storage building at the wastewater treatment facility to protect maintenance equipment from inclement weather. This building would also serve as an emergency storm shelter.	EQ, F, SS, SWS, T	SP	Eliminates	Medium	2, 3, 5	Yes	N/A	Public Works	4 years	TBD	High/Medium
LM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Public Works	TBD	75% Federal 25% Local	Medium/High
HM	Repair/reline sewer line sections where storm water infiltration is occurring to prevent sewage backups.	F, SS, SWS	SP	Eliminates	Small	2, 3, 5	Yes	Yes	Public Works	TBD	75% Federal 25% Local	Medium/High
LM	Purchase and install lightning detection/ notification system at the Atlanta Sports Center Complex.	SS	MP	Reduces	Small	2	N/A	N/A	Public Works	TBD	TBD	Medium/Medium
LM	Construct a replacement bin for road salt to prevent salt loss.	F, SS, SWS	MP	Eliminates	Small	3, 5	Yes	N/A	Public Works	TBD	TBD	Medium/Low
LM	Conduct a drainage study to determine the appropriate drainage remedy(s) to address recurring drainage problems within the City.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Public Works	TBD	TBD	Medium/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 91
(Sheet 2 of 2)
Atlanta Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the City, especially on the northwest side.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Public Works	TBD	TBD	High/High
HM	Replace storm tile on Weed Street to alleviate recurring drainage issues.	F, SS, SWS	SP	Eliminates	Small	2, 3, 5	Yes	Yes	Public Works	TBD	TBD	Medium/High
LM	Make informational materials about the National Flood Insurance Program available to the public.*	F	PI	Reduces	Medium	1, 2, 6, 7	Yes	Yes	City	TBD	City	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Medium	1, 2, 3, 5, 6, 7	Yes	Yes	City	TBD	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 92
Broadwell Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Construct a tornado safe shelter as part of an expansion of the Village's existing severe weather shelter.	EH, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	High/High
HM	Purchase and install an automatic emergency backup generator at drinking water pump house to provide uninterrupted power to pump water during prolonged power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	N/A	Yes	Village Board	TBD	TBD	Medium/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 93
(Sheet 1 of 7)
Elkhart Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Retrofit an existing building or construct a new building to serve as a tornado safe shelter for Village residents.	EH, F, SS, SWS, T	SP	Reduces	Large	2, 3	Yes	Yes	Village Board	1-2 years	75% Federal 25% Local	High/High
HM	Purchase and install an automatic emergency backup generator at the tornado safe shelter to provide uninterrupted power to critical systems during power outages.	EH, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	Yes	Yes	Village Board	1-2 years	TBD	Medium/High
LM	Conduct a drainage/hydraulic study to determine the cause(s) and identify the appropriate remedy(s) to alleviate recurring flooding issues within the Village.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	1 year	75% Federal 25% Local	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring flooding issues within the Village.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	1-2 years	75% Federal 25% Local	High/Medium
LM	Conduct a study to determine if the capacity of the existing water wells is adequate to provide for the Village's future water needs. In addition, identify potential sources that would increase water usage demand and the effects a hydrological drought would have on the Village's water supply.	DR	S	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	1 year	TBD	Medium/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 93
(Sheet 2 of 7)
Elkhart Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LM	Conduct a study to determine the locations of point source discharges of septic effluent into drainage ditches/streams to reduce the potential for waterborne disease outbreaks during flood events.	F, SS	S	Reduces	Large	2	N/A	N/A	Village Board	1 year	TBD	Medium/Low
HM	Purchase and install an automatic emergency backup generator at drinking water pump house to provide uninterrupted power to pump water during prolonged power outages.	DF, EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	N/A	Yes	Village Board	1 year	TBD	Medium/High
LM	Develop a Memorandum of Agreement with electric utility to construct a housing around the pole-mounted transformer that serves the drinking water pump house to protect it from natural hazard events. In the past high winds have damaged the transformer causing a loss of power to the pump house and resulting in damage to the pump house motor.	SS, SWS, T	MP	Reduces	Large	2, 3, 5	N/A	Yes	Village Board	1 year	Village	Low/Medium
HM	Construct housing around pole-mounted transformer serving the drinking water pump house to protect it from natural hazard events.	SS, SWS, T	MP	Reduces	Large	2, 3, 5	N/A	Yes	Village Board	1 year	TBD	Low/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 93
(Sheet 3 of 7)
Elkhart Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LM	Conduct a study to determine the appropriate size and number of new/upsized water lines, mains and hydrants needed within the Village to supply drinking water and aid in fire suppression in the event of a natural hazard event. Fire suppression is a major concern for the northeast portion of the Village where the topography requires an in-line booster pump be used to provide water to residents.	DR, EH, SS, T	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	1-2 years	TBD	Medium/High
HM	Install new/upsized water lines, mains and fire hydrants at various locations within the Village to supply drinking water and aid in suppressing fires caused by a natural hazard event.	DR, EH, SS, T	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	High/High
HM	Purchase portable pumps to help in the removal of excess water from downtown Elkhart during flood events.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	1-2 years	TBD	Low/Medium
HM	Create a volunteer network to check on individuals with disabilities during natural hazard events.	DF, EH, EQ, F, SS, SWS, T	PI	Reduces	Small	2	N/A	N/a	Village Board	3 years	Village	Low/High
HM	Create a volunteer network to conduct sandbagging along Latham Street to reduce flood damages, especially to downtown businesses.	F, SS	PI	Reduces	Small	2, 3, 5	N/A	Yes	Village Board	3 years	Village	Low/Medium
HM	Purchase and install new storm sirens as needed.	SS, T	MP	Reduces	Large	2	N/A	N/A	Village Board	3 years	TBD	Medium/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 93
(Sheet 4 of 7)
Elkhart Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LM	Conduct a study to identify the components necessary for the construction of a comprehensive storm water collection system to address recurring flood problems caused by excess storm water runoff.	F, SS, SWS	S	Reduces	Medium	2, 3, 5, 8	Yes	Yes	Village Board	1 year	TBD	Medium/High
HM	Select, design and construct the appropriate components to create a comprehensive storm water collection system to address recurring flood problems caused by excess stormwater runoff.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 8	Yes	Yes	Village Board	1-2 years	TBD	High/High
HM	Identify residents with special needs within the Village and determine how best to alert them to an oncoming hazard event.	DF, EH, F, SS, SWS, T	PI	Reduces	Small	1, 2, 4	N/A	N/A	Village Board	TBD	Village	Low/High
HM	Remove debris, vegetative overgrowth, snags and drifts in Elkhart Slough (within the Village limits) to increase carrying capacity and reduce flooding problems, especially along Kennedy Road where water can impede travel and causes property damage.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	2-3 years	Village	Low/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 93
(Sheet 5 of 7)
Elkhart Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LM	Obtain permit from U.S. Army Corps of Engineers to dredge Elkhart Slough.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	2-3 years	Village	Low/Medium
HM	Dredge Elkhart Slough to increase carrying capacity and alleviate flooding problems, especially along Kennedy Road where water can impede travel and causes property damage.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	2-3 years	TBD	High/Medium
HM	Design and construct an infiltration basin to manage stormwater runoff and reduce the likelihood of flooding.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	2-3 years	75% Federal 25% Local	High/Medium
LL	Review available data on International Coal/Viper Mine Class I Slurry Impoundment Dam and Class III Freshwater Impoundment Dam located southeast of the Village. Determine the potential damages that could result within the Village from a failure at either dam and identify potential actions that can be taken to mitigate those damages.	DF	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	1 year	TBD	Medium/Medium
LL	Implement identified mitigation actions to reduce/prevent damages within the Village from a dam failure at either International Coal/Viper Mine dams.	DF	SP, PI, MP, PP	Reduces	Medium	1, 2, 3, 5, 7	Yes	Yes	Village Board	2-3 years	TBD	Medium/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 93
(Sheet 6 of 7)
Elkhart Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LL	Conduct a study to identify the potential adverse health effects that Village residents may experience as a result of a release of potentially toxic coal slurry from either International Coal/Viper Mine Class I Slurry Impoundment Dam or Class III Freshwater Impoundment Dam southeast of Elkhart. Determine if there are potential actions that can be taken to mitigate any adverse health effects.	DF	S	Reduces	Medium	1, 2	N/A	N/A	Village Board	1 year	TBD	Medium/Medium
LL	Implement identified mitigation actions to reduce/prevent adverse health effects that Village residents may experience as a result of a release of potentially toxic coal slurry from either International Coal/Viper Mine dams.	DF	SP, PI, MP, PP	Reduces	Medium	1, 2	N/A	N/A	Village Board	2-3 years	TBD	Medium/Medium
LM	Make informational materials about the National Flood Insurance Program available to the public.*	F	PI	Reduces	Medium	1, 2, 6, 7	Yes	Yes	Village Board	TBD	Village	Low/High
LM	Make the most recent Flood Insurance Rate Maps available at the Village Clerk's Office to assist the public in considering where to construct new buildings. *	F	RA	Reduces	Medium	1, 2, 6, 7	Yes	Yes	Village Board	TBD	Village	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 93
(Sheet 7 of 7)
Elkhart Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LM	Make Village officials aware of the most recent Flood Insurance Rate Maps and issues related to construction in a floodplain.*	F	RA	Reduces	Medium	1, 2, 3, 5, 6, 7	Yes	Yes	Village Board	TBD	Village	Low/High
LM	Make information materials about the National Flood Insurance Program's voluntary Community Rating System available to the public.*	F	PP	Reduces	Medium	1, 2, 3, 5, 6, 7	Yes	Yes	Village Board	TBD	Village	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 94
Emden Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Purchase and install an automatic emergency backup generator at drinking water pump house to provide uninterrupted power to pump water during prolonged power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	N/A	Yes	Village	TBD	TBD	Medium/High
HM	Clean out and repair storm drains to increase intake/carry capacity and prevent drainage problems within the Village.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	Village	TBD	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 95
Hartsburg Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Clean debris/obstructions out of culverts to maximize carrying capacity and reduce/prevent drainage problems.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Maintenance Dept.	Ongoing	Village	Low/High
LM	Conduct a drainage/hydraulic study to determine the cause(s) and identify the appropriate remedy(s) to alleviate recurring drainage problems within the Village.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	2-3 year	75% Federal 25% Local	Medium/Medium
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the Village.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	2-3 years	75% Federal 25% Local	High/Medium
HM	Purchase portable emergency backup generators for use at designated emergency/storm shelters to provide uninterrupted power during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	N/A	Yes	Village Board	2-3 years	TBD	Medium/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 96
(Sheet 1 of 3)
Lincoln Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Purchase and install a grounding system at City Hall/Fire Station to protect critical systems and improve the building's ability to survive a lightning strike.	SS	MP	Reduces	Small	2, 3, 5	N/A	Yes	City Council	1 year	TBD	Low/High
HM	Purchase and install a new storm siren on the north edge of the City.	SS, T	MP	Reduces	Medium	2	N/A	N/A	City Council / Fire Department	1 year	TBD	Low/High
HM	Purchase and install automatic emergency backup generators at City Hall/Fire Station to provide uninterrupted power to critical systems during power outages.	EQ, EH, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	N/A	Yes	City Council	1 year	TBD	Low/High
HM	Retrofit the City Hall/Fire Station to include a tornado safe shelter for use by staff and City residents.	EH, F, SS, SWS, T	SP	Reduces	Large	2, 3	N/A	Yes	Fire Department	2 years	75% Federal 25% Local	High/High
HM	Clean debris/obstructions out of Brainards Branch to maximize carrying capacity and reduce/prevent drainage problems.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	City Council / Street Department	Ongoing	City	Low/High
HM	Repair/reline sewer line sections where storm water infiltration is occurring to prevent sewage backups.	F, SS, SWS	SP	Eliminates	Small	2, 3, 5	Yes	Yes	City Council	Ongoing	75% Federal 25% Local	Medium/High
HM	Replace/reline 3.25 miles of sewer lines at various locations to separate combined sewer system and eliminate storm water infiltration and prevent sewage backups.	F, SS, SWS	SP	Eliminates	Small	2, 3, 5	Yes	Yes	City Council	1 year	75% Federal 25% Local	Medium/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 96
(Sheet 2 of 3)
Lincoln Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Purchase and install an emergency backup generator with automatic transfer switch at the Union Street sanitary lift station to maintain operations during power outages.	EQ, EH, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	Yes	Yes	City Council / Waste Water Department	1 year	TBD	Low/High
HM	Purchase and install an emergency backup generator with automatic transfer switch at the North Wastewater Treatment Facility sanitary lift station to maintain operations during power outages.	EQ, EH, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	Yes	Yes	City Council / Waste Water Department	1 year	TBD	Low/High
HM	Design and construct a tornado safe shelter (with emergency backup generator) as an addition to the new Street Department maintenance building to serve as a shelter for city employees and individuals in the area.	EH, F, SS, SWS, T	SP	Reduces	Small	2, 3	Yes	NA	Street Department	1 year	75% Federal 25% Local	High/High
LM	Make the most recent Flood Insurance Rate Maps available at the City Clerk's Office to assist the public in considering where to construct new buildings. *	F	RA	Reduces	Medium	1, 2, 3, 5, 6, 7	Yes	Yes	City Council	TBD	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 96
(Sheet 3 of 3)
Lincoln Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LM	Make City officials aware of the most recent Flood Insurance Rate Maps and issues related to construction in a floodplain.*	F	RA	Reduces	Medium	1, 2, 3, 5, 6, 7	Yes	Yes	City Council	TBD	City	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Medium	1, 2, 3, 5, 6, 7	Yes	Yes	City Council	TBD	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 97
Logan, Mason and Menard Counties Regional Office of Education Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Identify and install "hardening" materials (window safety film, etc.) at Logan County schools to make the buildings resistant to natural and man-made hazards.	EQ, MMH, SS, T	SP	Reduces	Medium	2, 3, 5	N/A	Yes	Regional Office of Education & CUSD	3 years	TBD	Medium/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 98
Mount Pulaski Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	City	Ongoing	75% Federal 25% Local	Medium/High
HM	Repair/reline sewer line sections where storm water infiltration is occurring to prevent sewage backups.	F, SS, SWS	SP	Eliminates	Small	2, 3, 5	Yes	Yes	City	Ongoing	75% Federal 25% Local	Medium/High
HM	Purchase and install a new storm siren on the north side of the City.	SS, T	MP	Reduces	Medium	2	N/A	N/A	City	5 years	TBD	Low/High
HM	Purchase emergency backup generators for use at sanitary lift stations to maintain operations during power outages.	EQ, EH, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	Yes	Yes	City	5 years	TBD	Low/High
HM	Replace/upsize storm sewer line(s) near Canadian National railroad to increase capacity and better manage stormwater runoff in an effort to reduce/prevent flooding of railroad viaduct.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	N/A	Yes	City	5 years	75% Federal 25% Local	High/Medium
LM	Make informational materials about the National Flood Insurance Program available to the public.*	F	PI	Reduces	Medium	1, 2, 6, 7	Yes	Yes	City	TBD	City	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Medium	1, 2, 3, 5, 6, 7	Yes	Yes	City	TBD	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 99
Mount Pulaski Rural Fire Protection District #2 (Chestnut) Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Design and construct a tornado safe shelter (with emergency backup generator) as an addition to the future Chestnut fire station that would function as a heating/cooling center and a shelter for those individuals served by the fire protection district, including residents of Chestnut.	EH, F, SS, SWS, T	SP	Reduces	Large	2, 3	Yes	NA	Fire Protection District	1 year	75% Federal 25% Local	High/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

[this page is intentionally left blank]

5.0 RECOMMENDATIONS

5.0 RECOMMENDATIONS

The following recommendations came about as a result of the planning process. These recommendations should be reviewed and discussed periodically by the professional staff and elected officials of each participating jurisdiction to determine if actions should be taken.

GENERAL

Mitigate Repetitive Loss Structures and Critical Facilities. Mitigation is strongly encouraged for all structures in the mapped floodplain, with a higher priority given to repetitive loss structures and critical facilities, as funding or other resources become available.

Drinking Water. Natural hazards can cause drinking water to become contaminated. Flooding is a common natural hazard that can cause chemicals and other contaminants to enter drinking water. An inexpensive way to help protect drinking water involves the adoption of maximum setback zones around community water wells. When a setback zone is established, potential sources of compounds that can contaminate drinking water are prevented from being located close to these wells. Consequently, the probability of a flood or tornado causing the release of contamination near a well is substantially reduced.

Mount Pulaski has adopted a maximum setback zone to protect each of its four community drinking water wells. These setback zones offer an additional level of protection for a community's water supply, especially from man-made hazards. Since the recharge areas for many community drinking water wells in Logan County extend to a radius of several hundred feet beyond the wells, enacting maximum setback zones is the most effective step that municipalities can take to minimize the risk to groundwater. Subsequently, other municipalities should consider adopting setback zones for their community wells too.

Efforts to provide safe drinking water should extend beyond the adoption of setback zones. High priority should be given to resolving problems which place drinking water supplies on the Illinois Environmental Protection Agency's Restricted Status/Critical Review List. Placement on this list indicates an increased vulnerability for drinking water problems. In Logan County there is one water supply that has been placed on the list, the Beason-Chestnut Public Water District.

Emergency Management Plans for Schools. Develop and annually update Emergency Operation Plans for elementary, middle and high schools. These plans should include sections about how to mitigate risks from natural hazards, structural failures, shooters and hostage situations, fires and bombs. A no-match federal grant has been used to develop these plans and conduct tabletop and full-scale exercises involving health, law enforcement, fire, and emergency management personnel. While the grant is not being offered this year, it is expected to resume in the future.

Stormwater Management to Reduce Flooding Problems. Stormwater management practices should be required for new subdivisions and other larger development projects, including

commercial and industrial, to reduce flooding problems associated with excess runoff. Management practices could include the construction and use of retention and detention basins.

Developing and Disseminating Hazard Information. Public information materials should be prepared that will help residents take protective actions prior to natural hazard events. These materials should be based on risk communication principles to improve their effectiveness. In addition to developing printed materials, feedback from Logan County residents indicates that the internet, television and direct mailings should be utilized to disseminate information.

Hazardous Substances. Knowing where hazardous substances are generated, stored and handled can be useful to reduce the impacts that occur as a result of an accident. This All Hazards Mitigation Plan identified the larger facilities throughout the County that generate hazardous substances along with the type and quantity found at each location. Fire departments, other first responders and planners can use this information to better prepare for responding to hazmat incidents.

The types of chemicals transported through the County and the routes taken to move these chemicals would supplement information already gathered about stationary sources. With I-55 connecting the Chicago and St. Louis metropolitan areas and I-155 connecting the Peoria metropolitan area with Lincoln, a considerable amount of truck traffic travels through Logan County each day carrying an array of hazardous substances. Gathering this kind of information can be done through a Commodity Flow Study which is currently funded by the Illinois Emergency Management Agency.

Drainage and Flooding Problems. Alleviating flooding and drainage problems across the County is a major concern repeatedly expressed throughout the planning process. Increasing the capacity of the Elkhart Slough, Brainards Branch, Salt Creek and Kickapoo Creek will help alleviate flood impacts on nearby streets, roads and farm fields.

Tornadoes. Logan County is in the "tornado alley" of Illinois and ranks among the top five counties in the State for tornado frequency. There is a need throughout the County to establish tornado safe shelters for residents who do not have basements and government employees.

JURISDICTION-SPECIFIC

County and municipal officials are encouraged to collaborate in their pursuit of the following actions.

Atlanta

- Repair sewer line sections where storm water infiltration is occurring to prevent sewage backups.
- Upgrade the wastewater treatment system to improve community resilience to problems triggered by high precipitation events and floods.
- Provide a tornado safe room/shelter for municipal employees and residents who do not have basements.

Broadwell

- Provide a tornado safe shelter for use by village residents.

Elkhart

- Upgrade drinking water system to help resolve water pressure problems and assure an adequate supply of water for residential use and fire suppression.
- Implement remedies to reduce flooding and drainage problems, particularly on the near south and west sides of town. Dredging of Elkhart Slough, removing debris and vegetation from culverts and drainage ditches, and construction of detention basins should be considered among the remedies.
- Provide a tornado safe shelter for use by village residents.

Emden

- Drainage and flooding issues can be alleviated by renovating the storm water drainage system. Culverts, drainage ditches, and storm drains are in need of cleaning and repair.

Hartsburg

- A drainage/hydraulic study would be useful to identify the most effective remedies for recurring drainage/flooding issues. Cleaning out debris and obstructions from culverts could begin before a drainage/hydraulic study is conducted.

Lincoln

- The frequency of tornados in the vicinity of Lincoln is among the highest in Illinois. This frequency indicates the need for tornado storm shelters for residents who do not have basements and city employees.
- Minimizing impacts from Brainards Branch flooding and managing storm water runoff at various locations can be accomplished through several mitigation activities including removing debris and obstructions out of the creek, separating the combined sewer system and repairing/relining sewer line sections where storm water is infiltrating the lines.

Mount Pulaski

- Reconnaissance and repair of sewer line sections where storm water infiltration is occurring will prevent sewage backups and reduce the volume of water that the wastewater treatment system must process.
- Repair and replacement of storm sewer lines near the Canadian National railroad should reduce drainage and flooding issues at the railroad viaduct.

6.0 PLAN MAINTENANCE

6.0 PLAN MAINTENANCE

This section focuses on the Federal Emergency Management Agency (FEMA) requirements for maintaining and updating the Plan once it has been approved by FEMA and adopted by the participating jurisdictions. These requirements include:

- establishing the method and schedule for monitoring, evaluating and updating the Plan;
- describing how the mitigation strategy will be incorporated into existing planning processes; and
- detailing how continued public input will be obtained.

These requirements ensure that the Plan remains an effective and relevant document. Provided below is detailed discussion of each requirement.

6.1 MONITORING, EVALUATING & UPDATING THE PLAN

The County must establish a method and schedule for monitoring, evaluating and updating the Plan. This method allows the participating jurisdictions to review and adjust the planning process as needed, make necessary changes and updates to the Plan and track the implementation and results of the mitigation actions that have been undertaken.

6.1.1 Monitoring and Evaluating the Plan

The Plan will be monitored and evaluated by a Plan Maintenance Subcommittee on an annual basis. The Plan Maintenance Subcommittee will be composed of key members from the original Planning Committee, including representatives from all of the participating jurisdictions. The Subcommittee will be chaired by the Logan County Emergency Management Agency (EMA). All meetings held by the Subcommittee will be open to the public. The information gathered at each Subcommittee meeting will be documented and provided to all participating jurisdictions for their review and use in the Plan update.

The Logan County EMA will be responsible for monitoring the status of the mitigation actions identified in the Plan and providing the Illinois Emergency Management Agency (IEMA) with an annual progress report. It will be the responsibility of each participating jurisdiction to provide a progress report on the status of their mitigation actions at each Subcommittee meeting.

Monitoring & Evaluating

- A Plan Maintenance Subcommittee will be formed to monitor and evaluate the Plan.
- The Plan will be monitored and evaluated on an ***annual basis***.
- Each participating jurisdiction will be responsible for providing an annual progress report on the status of their mitigation actions.
- New mitigation actions can be added by participating jurisdictions during the annual evaluation.

The Plan Maintenance Subcommittee will also evaluate the Plan on an annual basis to determine the effectiveness of the planning process and the implemented mitigation actions. In addition, the Subcommittee will decide whether any changes need to be made. As part of the evaluation of the planning process, the Subcommittee will review the goals to determine whether they are still relevant or if new goals need to be added; assess whether other natural hazards need to be addressed or included in the Plan and review any

new hazard data that may affect the Risk Assessment portion of the Plan. The Subcommittee will also evaluate whether other County departments should be invited to participate.

In terms of evaluating the effectiveness of the mitigation actions that have been implemented, the Subcommittee will assess whether a project is on time, in line with the budget and moving ahead as planned; whether the project achieved the goals outlined and had the intended result; and whether losses were avoided as a result of the project. In addition, each of the participating jurisdictions will be given an opportunity to add new mitigation actions to the Plan and modify or discontinue mitigation actions already identified. In some cases a project may need to be removed from the list of mitigation actions because of unforeseen problems with implementation.

6.1.2 Updating the Plan

The Plan must be updated within five years of the date the first participating jurisdiction adopts the Plan. (This date can be found in Section 7, Plan Adoption.) This ensures that all the participating jurisdictions will remain eligible to receive federal grant money to implement those mitigation actions identified in this Plan.

It will be the responsibility of the Plan Maintenance Subcommittee to update the Plan. The update will incorporate all of the information gathered and changes proposed at the previous annual monitoring and evaluation meetings. In addition, any government entity that did not take part in the original planning process that now wishes to participate may be added. It will be the responsibility of these entities to provide all of the information needed to be integrated into the Plan.

Updating

- The Plan Maintenance Subcommittee will be responsible for updating the Plan.
- The Plan ***must be updated within 5 years*** of the date the first participating jurisdiction adopts the Plan.
- Any government entities that did not take part in the original planning process but who now wish to participate may do so.
- Once the updated Plan has received FEMA/IEMA approval, each participating jurisdiction ***must re-adopt the Plan*** to remain eligible to receive federal grant money.

A public forum will be held to present the updated Plan to the public for review and comment. The comments received at the public forum will be reviewed and incorporated into the updated Plan. The Subcommittee will then present the updated Plan to the participating jurisdictions for approval.

Once the Subcommittee has received approval from all of the participating jurisdictions, it will submit the updated Plan to IEMA and FEMA for review. ***Once the updated Plan has received approval, FEMA requires that each of the participating jurisdictions re-adopt the Plan to remain eligible to receive federal grant money to implement identified mitigation actions.***

6.2 Incorporating the Mitigation Strategy into Existing Planning Mechanisms

As part of the planning process, the Planning Committee identified current plans, policies/ordinances and maps that supplement or help support mitigation planning efforts. **Figure 7** identifies the existing planning mechanism available by jurisdiction. It will be the

responsibility of each participating jurisdiction to incorporate, where applicable, the mitigation strategy and other information contained in the Plan into the planning mechanisms identified for their jurisdiction.

6.3 CONTINUED PUBLIC INVOLVEMENT

The County and participating jurisdictions understand the importance of continued public involvement and will seek public input on the Plan throughout the plan maintenance process. A copy of the approved Plan will be maintained and available for review at the Logan County EMA Office. Individuals will be encouraged to provide feedback and submit comments for the Plan update to the Logan County EMA.

The comments received will be compiled and presented at the annual Plan Maintenance Subcommittee meetings where members will consider them for incorporation into the updated Plan. All meetings held by the Plan Maintenance Subcommittee will be noticed and open to the public. A separate public forum will be held prior to updating the Plan to provide the public an opportunity to comment on the updates proposed for the Plan.

7.0 PLAN ADOPTION

7.0 PLAN ADOPTION

The final step in the planning process is the adoption of the approved Plan by each participating jurisdiction. Each jurisdiction must formally adopt the Plan to be eligible for federal grant money to implement mitigation actions identified in this Plan.

7.1 PLAN ADOPTION PROCESS

Before the Plan can be adopted by the participating jurisdictions, it must be made available for public review and comment through a public forum and comment period. Any comments received are incorporated into the Plan and the Plan is then submitted to the Illinois Emergency Management Agency (IEMA) and the Federal Emergency Management Agency (FEMA) for their review and approval.

Once IEMA and FEMA have reviewed and approved the Plan, it will be presented to the County and each participating jurisdiction for adoption. ***Each participating jurisdiction must formally adopt*** the Plan to become eligible to receive federal grant money to implement the mitigation actions identified in this Plan. If any of the jurisdictions choose not to adopt the Plan, their choice will not affect the eligibility of those that do adopt the Plan.

Figure 100 identifies the participating jurisdictions and the date each formally adopted the Plan. Signed copies of the adoption resolutions are located in **Appendix O**.

Figure 100
Plan Adoption Dates

Participating Jurisdiction	Date Adopted
Atlanta, City of	01/21/2014
Lincoln, City of	01/21/2014
Mount Pulaski Rural Fire Protection District #2 (Chestnut)	01/21/2014
Logan, County of	01/22/2014
Hartsburg, Village of	01/27/2014
Elkhart, Village of	02/03/2014
Emden, Village of	03/10/2014
Logan, Mason & Menard Counties Regional Office of Education	03/12/2014
Broadwell, Village of	03/25/2014
Mount Pulaski, City of	04/08/2014

8.0 REFERENCES

8.0 REFERENCES

Provided below is a listing, by section, of the resources utilized to create this document.

1.0 INTRODUCTION

1. Federal Emergency Management Agency. Getting Started: Building Support for Mitigation Planning. FEMA 386-1. September 2002. 15 February 2012 <http://iema.illinois.gov/iema/planning/Documents/Plan_FEMA_ HTG1.pdf>.
2. Illinois Emergency Management Agency. Mitigation. Illinois Presidential Disaster Declarations Since 1965. 11 October 2012 <http://iema.illinois.gov/iema/planning/planning.htm>.

1.2 DEMOGRAPHICS

1. Brosamer, Rosanne. Logan County Supervisor of Assessments. "Assessed values for Hazard Mitigation." Email to Greg R. Michaud. 11 September 2012.
2. Illinois Department of Commerce and Economic Opportunity. Facts & Figures. Population Projections. Projection Summary by County. 12 June 2013 <http://www.ildceo.net/dceo/Bureaus/Facts_Figures/Population_Projections/>.
3. Logan County Regional Planning Commission. Logan County Comprehensive Plan. December, 2006. 12 June 2013 <http://www.co.logan.il.us/zoning/docs/Logan_County_Comprehensive_Plan.pdf>.
4. United States Census Bureau. Geography. Maps & Data. Gazetteer Files. 2010 Census 2010 U.S. Gazetteer Files. 14 August 2012 <http://www.census.gov/geo/maps-data/data/gazetteer2010.html>.
5. United States Census Bureau. American FactFinder. 14 August 2012 <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>.
6. United States Department of Agriculture. National Agricultural Statistics Service. 2007 Census of Agriculture. Online Highlights. State & County Profiles. Logan County – Illinois. 12 June 2013 <http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Illinois/cp17107.pdf>.
7. United States Department of Agriculture. Natural Resources Conservation Service. Soil Survey of Logan County, Illinois. 2008. 9 August 2012 <http://soildatamart.nrcs.usda.gov/manuscripts/IL107/0/Logan_IL.pdf>.

1.3 LAND USE AND DEVELOPMENT TRENDS

1. Illinois Department of Commerce and Economic Opportunity. Facts & Figures. Illinois Census Data. Census 2010 Data. 12 June 2013 <http://www2.illinois.gov/census/Pages/Census2010Data.aspx>.
2. United States Census Bureau. 1990 Census. Selected Historical Decennial Census Population and Housing Counts. Counties, States, United States: 1900 to 1990: Population Census Counts. Illinois. Illinois: Population of Counties by Decennial Census: 1900 to 1990. 1995. 30 March 2011 <http://www.census.gov/population/www/censusdata/cencounts/files/il190090.txt>.

2.0 PUBLIC INVOLVEMENT

1. Federal Emergency Management Agency. Local Mitigation Plan Review Guide. FEMA October 1, 2011. 18 June 2013 <http://www.fema.gov/library/viewRecord.do?id=4859>.

2.4 INCORPORATING EXISTING PLANNING DOCUMENTS

1. Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee. List of Existing Planning Documents Form. Meeting Handout. 9 August 2012.

3.0 RISK ASSESSMENT

1. Changnon, Stanley A., et al. Climate Atlas of Illinois. Champaign, Illinois: Illinois State Water Survey, 2004.
2. Federal Emergency Management Agency. Understanding Your Risks: Identifying Hazards and Estimating Losses. FEMA 386-2. August 2001. 16 February 2012 <http://iema.illinois.gov/iema/planning/Documents/Plan_FEMA_HTG2.pdf>.
3. Illinois Department of Transportation. Division of Traffic Safety. City and County Crash Summaries. Logan County. 3 July 2012 <http://www.dot.state.il.us/trafficsafety/summaries.html>.
4. Illinois Emergency Management Agency. 2010 Illinois Natural Hazard Mitigation Plan. October 2010. 13 October 2010 <http://iema.illinois.gov/iema/planning/Documents/Plan_IllMitigationPlan.pdf>.
5. Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee. Critical Facilities Damaged by Natural Hazard Events Questionnaire. Meeting Handout. 1 November 2012.
6. Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee. Critical Facilities Form. Meeting Handout. 9 August 2012.
7. Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee. Logan County Natural Hazard Events Questionnaire. Meeting Handout. 9 August 2012.
8. Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee. List of Existing Planning Documents Form. Meeting Handout. 9 August 2012.
9. Midwestern Regional Climate Center. Climate of the Midwest. Climate Summaries. Annual Temperature Extremes for the Continental United States. Illinois Temperature Extremes. Database. 23 October 2012 <http://mcc.sws.uiuc.edu/climate_midwest/extremes/il.extremetemps.txt>.
10. Midwestern Regional Climate Center. Climate of the Midwest. Climate Summaries. Illinois. Temperature Summary – 115079 Lincoln, IL. Database. 23 October 2012 <http://mcc.sws.uiuc.edu/climate_midwest/historical/temp/il/115079_tsum.html>.
11. National Oceanic and Atmospheric Administration. National Environmental Satellite, Data, and Information Service. National Climate Data Center. Storm Events Database (1950 to Present). Microsoft Access Database. 19 June 2012 <http://www.ncdc.noaa.gov/oa/about/systemsinfo.html>.

12. National Oceanic and Atmospheric Administration. National Environmental Satellite, Data, and Information Service. National Climate Data Center. Storm Events Database. Oct. 2006 to Present. Database. 20 June 2013 <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=17%2CILLINOIS>.

13. National Oceanic and Atmospheric Administration. National Environmental Satellite, Data, and Information Service. National Climate Data Center. Images and Publication System. COOP Data/Record of Climatological Observations Form. Illinois. Database. 10 October 2012 <http://www7.ncdc.noaa.gov/IPS/coop/coop.html;jsessionid=2B3CFACFCCA1D045070DE5E64D7108D1?foreign=false&_page=0&jsessionid=2B3CFACFCCA1D045070DE5E64D7108D1&state=IL&_target1=Next+%3E>.

3.1 SEVERE STORMS (THUNDERSTORMS, HAIL, LIGHTNING & HEAVY RAIN)

1. Miller, Chris. Warning Coordination Meteorologist. National Weather Service. Weather Forecast Office – Central Illinois. "Re:Flood Questions." Email to Greg R. Michaud. 15 October 2012.

2. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Damaging Winds. Damaging Winds Basics. 14 March 2012 <http://www.nssl.noaa.gov/primer/wind/wind_basics.html>.

3. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Hail. Hail Basics. 14 March 2012 <http://www.nssl.noaa.gov/primer/hail/hail_basics.html>.

4. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Hail. Hail Climatology. 14 March 2012 <http://www.nssl.noaa.gov/primer/hail/hail_climatology.html>.

5. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Hail. Understanding Damages and Impacts. 14 March 2012 <http://www.nssl.noaa.gov/primer/hail/hail_damage.html>.

6. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Lightning. Damage and Impacts. 15 March 2012 <http://www.nssl.noaa.gov/primer/lightning/ltg_damage.html>.

7. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Lightning. Lightning Basics. 15 March 2012 <http://www.nssl.noaa.gov/primer/lightning/ltg_basics.html>.

8. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about

Lightning. Lightning Climatology. 15 March 2012 <http://www.nssl.noaa.gov/primer/lightning/ltg_climatology.html>.

9. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Thunderstorms. Thunderstorm Basics. 14 March 2012 <http://www.nssl.noaa.gov/primer/tstorm/tst_basics.html>.
10. National Oceanic and Atmospheric Administration. National Weather Service. Education/Outreach. National Weather Service Glossary. 14 March 2012 <http://www.nws.noaa.gov/glossary/>.
11. National Oceanic and Atmospheric Administration. National Weather Service. Storm Prediction Center. Frequently Asked Questions. How does the National Weather Service (NWS) define a severe thunderstorm? 14 March 2012 <http://www.spc.ncep.noaa.gov/faq/>.
12. National Oceanic and Atmospheric Administration. National Weather Service. Weather Forecast Office – Central Illinois. Severe Weather Preparedness. 15 March 2012 <www.crh.noaa.gov/ilx/severe/svr-prep.php>.
13. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA's All Hazard Monitor. Severe Weather. 14 March 2012 <http://www.noaawatch.gov/themes/severe.php>.
14. The Tornado and Storm Research Organisation. Hail Scale. 14 March 2012 <http://www.torro.org.uk/site/hscale.php>.

3.2 TORNADOES

1. Illinois Department of Commerce and Economic Opportunity. Facts & Figures. Illinois Census Data. Census 2000 Data for Illinois. 12 June 2013 <http://www2.ildceo.net/2000census/index.html>.
2. Illinois Secretary of State. Illinois State Archives. Illinois Regional Archives Depository System. County Fact Sheets. Logan County. (date) <http://www.cyberdriveillinois.com/departments/archives/IRAD/logan.html>.
3. Miller, Chris. Warning Coordination Meteorologist. National Weather Service. Weather Forecast Office – Central Illinois. "Re: Tornado Info." Emails to Greg R. Michaud. 5 October 2012.
4. National Oceanic and Atmospheric Administration. National Environmental Satellite, Data, and Information Service. National Climate Data Center. Satellite Data. Satellite's Eye Art Galleries. Educational Topics. The Enhanced Fujita Tornado Scale. 28 February 2012 <http://www.ncdc.noaa.gov/oa/satellite/satelliteseye/educational/fujita.html>.
5. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Tornadoes. Tornado Climatology. 29 February 2012 <http://www.nssl.noaa.gov/primer/tornado/tor_climatology.html>.

6. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Tornadoes. Understanding Damage and Impacts. 28 February 2012 <http://www.nssl.noaa.gov/primer/tornado/tor_damage.html>.

7. National Oceanic and Atmospheric Administration. National Weather Service. Weather Forecast Office – Central Illinois. Severe Weather Preparedness. 28 February 2012 <www.crh.noaa.gov/ilx/severe/svr-prep.php>.

8. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA's All Hazard Monitor. Severe Weather. 28 February 2012 <http://www.noaawatch.gov/themes/severe.php>.

9. National Oceanic and Atmospheric Administration. Storm Prediction Center. The Online Tornado FAQ: Frequently Asked Questions about Tornadoes. By Roger Edwards. 28 February 2012 <http://www.spc.noaa.gov/faq/tornado/>.

3.3 SEVERE WINTER STORMS (SNOW, ICE & EXTREME COLD)

1. American Red Cross. Talking About Disaster: Guide for Standard Messages. Presented by the Coalition of Organizations for Disaster Education. Washington, D.C. 2007. 24 February 2012 <http://www.redcross.org/portal/site/en/menuitem.53fabf6cc033f17a2b1ecfbf43181aa0/?vgnextoid=6603f700efade110VgnVCM10000089f0870aRCRD&currPage=2ba68d5f8b6de110VgnVCM10000089f0870aRCRD>.

2. Centers for Disease Control and Prevention. Emergency Response and Preparedness. Specific Hazards. Natural Disasters and Severe Weather. Winter Weather. Related Resources. FAQs. 20 March 2012 <http://www.bt.cdc.gov/disasters/winter/faq.asp>.

3. Illinois Emergency Management Agency. Mitigation. Hazard Information. Winter Storms. 19 March 2012 <http://iema.illinois.gov/iema/planning/HazardInfo.asp#Winter>.

4. Illinois State Water Survey. Illinois Third Consecutive Severe Winter: 1978-1979. By Stanley A. Changnon, Jr., David Changnon and Phillis Stone. Report of Investigation 94. 1980. 21 March 2012 <www.isws.uiuc.edu/pubdoc/RI/ISWSRI-94.pdf>.

5. Illinois State Water Survey. Record Winter Storms in Illinois, 1977-1978. By Stanley A. Changnon, Jr. and David Changnon. Report of Investigation 88. 1978. 8 June 2012 <www.isws.illinois.edu/pubdoc/RI/ISWSRI-88.pdf>.

6. Illinois State Water Survey. The Severe Winter of 1981-1982 in Illinois. By Steven D. Hilberg, Peter G. Vinzani, and Stanley A. Changnon, Jr. Report of Investigation 104. 1983. 11 February 2013 <http://www.isws.illinois.edu/pubdoc/RI/ISWSRI-104.pdf>.

7. Illinois State Water Survey. State Climatologist Office for Illinois. Winter Storms. Glossary of Winter Weather Terms. 19 March 2012 <http://www.isws.illinois.edu/atmos/statecli/Winter/glossary.htm>.

8. Miller, Chris. Warning Coordination Meteorologist. National Weather Service. Weather Forecast Office – Central Illinois. "Re: Logan Co. Disaster Mitigation." Email to Greg R. Michaud. 15 August 2012.

9. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Winter Weather. Winter Weather Basics. 20 March 2012 <http://www.nssl.noaa.gov/primer/winter/ww_basics.html>.

10. National Oceanic and Atmospheric Administration. National Weather Service. Education/Outreach. National Weather Service Glossary. 14 March 2012 <http://www.nws.noaa.gov/glossary/>.

11. National Oceanic and Atmospheric Administration. National Weather Service. Office of Climate, Water and Weather Services. Winter Weather Safety and Awareness. Wind Chill. NWS Windchill Chart. Chart. 1 November 2001. 20 March 2012 <http://www.nws.noaa.gov/os/windchill/index.shtml>.

12. National Oceanic and Atmospheric Administration. National Weather Service. Office of Climate, Water and Weather Services. Winter Weather Safety and Awareness. Wind Chill. Windchill: Frequently Asked Questions, Terms and Definitions. 20 March 2012 <http://www.nws.noaa.gov/os/windchill/windchillfaq.shtml>.

13. National Oceanic and Atmospheric Administration. National Weather Service. Office of Climate, Water and Weather Services. Winter Weather Safety and Awareness. Wind Chill. Wind Chill Temperature Index. 20 March 2012 <http://www.nws.noaa.gov/om/windchill/images/wind-chill-brochure.pdf>.

14. National Oceanic and Atmospheric Administration. National Weather Service. Weather Forecast Office – Central Illinois. Preparedness and Information. Winter Weather Safety. Winter Weather Definitions. 20 March 2012 <http://www.crh.noaa.gov/images/ilx/pdf/winter%20wx%20defn.pdf>.

15. National Oceanic and Atmospheric Administration. National Weather Service. Weather Forecast Office – Omaha/Valley, Nebraska. Weather Safety. Winter Weather Preparedness and Information. Frostbite and Hypothermia. 20 March 2012 <http://www.crh.noaa.gov/oax/safety/frostbite.php>.

16. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA's All Hazard Monitor. Winter Weather. 20 March 2012 <http://www.noaawatch.gov/themes/winter.php>.

3.4 FLOODS

1. Congressional Research Service. National Flood Insurance Program: Background, Challenges, and Financial Status. By Rawle O. King. R40650. March 4, 2011. 8 March 2012 <http://assets.opencrs.com/rpts/R40650_20110304.pdf>.

2. Federal Emergency Management Agency. Disaster Information. Flood. 7 March 2012 <http://www.fema.gov/hazard/flood/index.shtm>.

3. Federal Emergency Management Agency. Disaster Information. Maps. Flood Insurance Rate Maps (FIRMs). 8 March 2012 <http://www.fema.gov/hazard/map/firm.shtm>.

4. Federal Emergency Management Agency. FloodSmart.gov: The official site of the NFIP. Resources. Glossary. 7 March 2012 <http://www.floodsmart.gov/floodsmart/pages/glossary_A-I.jsp>.

5. Federal Emergency Management Agency. FloodSmart.gov: The official site of the NFIP. Resources. Frequently Asked Questions. Flood Zones. 7 March 2012 <http://www.floodsmart.gov/floodsmart/pages/faqs/faqs_flood.jsp>.

6. Federal Emergency Management Agency. FloodSmart.gov: The official site of the NFIP. Resources. Toolkits. Flood Outreach Toolkit. Talking Points: Repetitive Loss. March 2007. 7 March 2012 <http://www.floodsmart.gov/toolkits/flood/downloads/TPsRepetitiveLoss-OT2007.pdf>.

7. Federal Emergency Management Agency. Map Service Center. Definitions of FEMA Flood Zone Designations. 7 March 2012 <http://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=floodZones&title=FEMA Flood Zone Designations>.

8. Federal Emergency Management Agency. National Flood Insurance Program. Flood Hazard Mapping. Online Tutorials. Flood Insurance Rate Map (FIRM) Tutorial. 7 March 2012 <http://www.fema.gov/media/fhm/firm/ot_firm.htm>.

9. Federal Emergency Management Agency. National Flood Insurance Program. Flood Insurance. Flood Insurance Library. Definitions. 7 March 2012 <http://www.fema.gov/business/nfip/19def2.shtm>.

10. Federal Emergency Management Agency. National Flood Insurance Program. Flood Insurance. Flood Insurance Library. Community Status Book. Illinois. 26 July 2013 <http://www.fema.gov/cis/IL.pdf>.

11. Federal Emergency Management Agency. National Flood Insurance Program. Floodplain Management. NFIP Policy Keyword Index. Flood Zones. 7 March 2012 <http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/flood_zones.shtm>.

12. Federal Emergency Management Agency. Publications. FEMA Library. Adoption of Flood Insurance Rate Maps by Participating Communities. FEMA 495. September 2005. 6 March 2012 <http://www.fema.gov/library/viewRecord.do?id=3312>.

13. Federal Emergency Management Agency. Publications. FEMA Library. Answers to Questions About the NFIP. FEMA F-084. March 2011. 6 March 2012 <http://www.fema.gov/library/viewRecord.do?id=1404>.

14. Federal Emergency Management Agency. Publications. FEMA Library. Design Guide for Improving Critical Facility Safety from Flooding and High Winds: Providing Protection to People and Buildings. FEMA 543. January 2007. 8 March 2012 <http://www.fema.gov/library/viewRecord.do?id=2441>.

15. Federal Emergency Management Agency. Publications. FEMA Library. Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials. 8 March 2012 <http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=2165>.

16. Federal Emergency Management Agency. Publications. FEMA Library. Joining the National Flood Insurance Program. FEMA 496. May 2005. 6 March 2012 <http://www.fema.gov/library/viewRecord.do?id=3310>.

17. Federal Emergency Management Agency. Publications. FEMA Library. National Flood Insurance Program Community Rating System: A Local Official's Guide to Saving Lives, Preventing Property Damage, Reducing the Cost of Flood Insurance. FEMA 573. April 2006. 3 March 2012 <http://www.fema.gov/library/viewRecord.do?id=3655>.

18. Harris County Flood Control District – Harris County, Texas. Learning Center. Flood Insurance Rate Maps. 7 March 2012 <http://www.hcfcd.org/firms.html>.

19. Illinois Administrative Code. Title 17: Conservation. Chapter I: Department of Natural Resources. Subchapter h: Water Resources. Part 3706: Regulation of Construction within Flood Plains. 7 March 2012 <http://www.dnr.illinois.gov/adrules/documents/17-3706.pdf>.

20. Illinois Department of Natural Resources. Office of Water Resources. GIS Maps. 100-Year Floodplain in Illinois. Map. 6 August 2009. 7 March 2012 <http://dnr.state.il.us/owr/images/GIS/floodzone09.pdf>.

21. Illinois Department of Natural Resources. Office of Water Resources. Publications. Local Flooplain Administrator's Manual. 2006. 8 March 2012 <http://dnr.state.il.us/owr/Publications/LocalFloodplainAdministratorsManualBlueBook_2006.pdf>.

22. Illinois Department of Natural Resources. Office of Water Resources. Publications. Quick Guide to Floodplain Management in Illinois. 2001. 8 March 2012 <http://dnr.state.il.us/owr/Publications/Resman_ILFPMQuickGuide.pdf>.

23. Illinois State Water Survey. Map Modernization Project. Illinois Floodplain Maps. Logan County. Database. 22 October 2012 <http://www.illinoisfloodmaps.org/>.

24. Louisiana State University – Louisiana Sea Grant Law & Policy Program. Louisiana State University Agriculture Center. Glossary of Frequently Used FEMA/NFIP Terms-Acronyms. 8 March 2012 <http://www.laseagrant.org/pdfs/FEMA_Glossary.pdf>.

25. Miller, Chris. Warning Coordination Meteorologist. National Weather Service. Weather Forecast Office – Central Illinois. "Flooding Information and Hottest Days in Lincoln." Email to Greg R. Michaud. 16 October 2012.

26. Miller, Chris. Warning Coordination Meteorologist. National Weather Service. Weather Forecast Office – Central Illinois. "Re:Flood Questions." Email to Greg R. Michaud. 15 October 2012.

27. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Floods. Flood Basics. 7 March 2012 <http://www.nssl.noaa.gov/primer/flood/fld_basics.html>.

28. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Education. A Severe Weather Primer. Questions and Answers about Floods. Understanding Damage and Impacts. 7 March 2012 <http://www.nssl.noaa.gov/primer/flood/fld_damage.html>.

29. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA's All Hazard Monitor. Severe Weather. 8 March 2012 <http://www.noaawatch.gov/themes/severe.php>.

30. National Oceanic and Atmospheric Administration. National Weather Service. Weather Forecast Office – Central Illinois. Severe Weather Preparedness. 8 March 2012 <www.crh.noaa.gov/ilx/severe/svr-prep.php>.

31. Ohio Department of Natural Resources. Division of Soil and Water Resources. Floodplain Management. About the Floodplain Program. 8 March 2012 <http://www.dnr.state.oh.us/water/tabid/3506/Default.aspx>.

32. U.S. Code. Title 42 – The Public Health and Welfare. Chapter 50 – National Flood Insurance. Subchapter III – Coordination of Flood Insurance with Land-Management Programs in Flood-Prone Areas. Section 4106 – Nonparticipation in Flood Insurance Program. 6 March 2012 <http://uscode.house.gov/search/criteria.shtml>.

3.5 EXTREME HEAT

1. American Red Cross. Talking About Disaster: Guide for Standard Messages. Presented by the Coalition of Organizations for Disaster Education. Washington, D.C. 2007. 24 February 2012 <http://www.redcross.org/portal/site/en/menuitem.53fabf6cc033f17a2b1ecfbf43181aa0/?vgnextoid=6603f700efade110VgnVCM10000089f0870aRCRD&currPage=2ba68d5f8b6de110VgnVCM10000089f0870aRCRD>.

2. Federal Emergency Management Agency. Are You Ready? Extreme Heat. 23 February 2012 <http://www.ready.gov/heat>.

3. Miller, Chris. Warning Coordination Meteorologist. National Weather Service. Weather Forecast Office – Central Illinois. "Flooding Information and Hottest Days in Lincoln." Email to Greg R. Michaud. 16 October 2012.

4. National Oceanic and Atmospheric Administration. Heat Wave: A Major Summer Killer. Brochure. 24 February 2012 <http://www.nws.noaa.gov/om/brochures/heatwave.pdf>.

5. National Oceanic and Atmospheric Administration. National Weather Service. Office of Climate, Water and Weather Services. NOAA's National Weather Service Heat Index. 24 February 2012 <http://www.nws.noaa.gov/om/heat/images/heat_index.png >.

6. National Oceanic and Atmospheric Administration. National Weather Service. Weather Forecast Office – Central Illinois. Summertime Heat and Humidity. 23 October 2012 <www.crh.noaa.gov/ilx/heat.php>.

7. National Oceanic and Atmospheric Administration. National Weather Service. Weather Forecast Office – Chicago, Illinois. Weather Currents: NWS Forecast Office Chicago – Summer 2007 Newsletter. 24 February 2012 <http://www.crh.noaa.gov/images/lot/newsletter/summer2007.pdf>.

8. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA's All Hazard Monitor. Excessive Heat. 24 February 2012 <http://www.noaawatch.gov/index.php>.

9. North Carolina Cooperative Extension Service. Heat Stress Disorders. 24 February 2012 <http://www.ces.ncsu.edu/disaster/factsheets/pdf/heatstress.pdf>.

3.6 DROUGHT

1. National Drought Mitigation Center. Current U.S. Drought Monitor. U.S. Drought Monitor. Map. 16 October 2012. 24 October 2012 <http://droughtmonitor.unl.edu/monitor.html>.

2. National Drought Mitigation Center. Current U.S. Drought Monitor. Classification Scheme. Drought Monitor: State-of-the-Art Blend of Science and Subjectivity. 2 January 2008. 27 February 2012 <http://droughtmonitor.unl.edu/classify.htm>.

3. Illinois State Water Survey. Department of Energy and Natural Resources. The 1988-1989 Drought in Illinois: Causes, Dimensions, and Impacts. Research Report 121. By Peter J. Lamb, Scientific Editor. 1992. 27 February 2012 <http://www.isws.illinois.edu/pubdoc/RR/ISWSRR-121.pdf>.

4. National Integrated Drought Information System. U.S. Drought Portal. Current Drought. Drought Indicators. Drought Monitors. U.S. Drought Monitor. 27 February 2012 <http://www.drought.gov/portal/server.pt/community/drought_indicators/223/drought_monitors/261>.

5. National Oceanic and Atmospheric Administration. National Weather Service. National Centers for Environmental Prediction. Climate Prediction Center. Monitoring and Data. U.S. Climate Data and Maps. Drought Monitoring. Current Palmer Drought Severity& Crop Moisture Indices Tables. Palmer Drought Severity Explanation. 27 February 2012 <http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/palmer_drought/wpdanote.shtml>.

6. National Oceanic and Atmospheric Administration. National Weather Service. National Centers for Environmental Prediction. Climate Prediction Center. Monitoring and Data. U.S. Climate Data and Maps. Drought Monitoring. Current Palmer Drought Severity Index Map by Climate Divisions. Map. 20 October 2012. 24 October 2012 <http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml>.

7. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA's All Hazard Monitor. Droughts. 5 June 2009 <http://www.noaawatch.gov/themes/droughts.php>.

8. United States Department of Agriculture. National Agricultural Statistics Service. Quick Stats 1.0. Database. 3 July 2012 <http://www.nass.usda.gov/Data_and_Statistics/Quick_Stats_1.0/index.asp/>.

9. United States Department of Agriculture. National Agricultural Statistics Service. Quick Stats Lite. Database. 26 July 2013 <http://www.nass.usda.gov/Quick_Stats/>.

10. United States Department of Agriculture. National Agricultural Statistics Service. "Table 1. County Summary Highlights: 2007." 2007 Census of Agriculture. Volume 1, Chapter 2. 11 November 2010 <http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/Illinois/st17_2_001_001.pdf>.

11. University of Nebraska, Lincoln. National Drought Mitigation Center. Planning. Monitoring. Comparison of Major Drought Indices: Introduction. By Dr. Michael J. Hayes. 27 February 2012 <http://drought.unl.edu/Planning/Monitoring/ComparisonofIndicesIntro.aspx>.

12. University of Nebraska, Lincoln. National Drought Mitigation Center. Planning. Monitoring. Comparison of Major Drought Indices: Palmer Drought Severity Index. By Dr. Michael J. Hayes. 27 February 2012 <http://drought.unl.edu/Planning/Monitoring/ComparisonofIndicesIntro.aspx>.

3.7 EARTHQUAKE

1. Atkinson, William. The Next New Madrid Earthquake: A Survival Guide for the Midwest. Carbondale, Illinois: Southern Illinois University Press, 1989.

2. Illinois State Geological Survey. Earthquake Fact Sheets. Wabash Valley Earthquakes: A Dozen Moderate Quakes in a Century. 1996-1. 17 February 2012 <http://www.isgs.illinois.edu/research/earthquake-hazards/pdf-files/eq-fct-wabash.pdf>.

3. Illinois State Geological Survey. Earthquakes In Illinois: 1795 – 2012. Map. 5 May 2013 <http://www.isgs.illinois.edu/research/earthquake-hazards/pdf-files/illinoisquakes-2012.pdf>.

4. Illinois State Geological Survey. Handbook of Illinois Stratigraphy. H. B. Willman, et. al. State of Illinois – Department of Registration and Education. Bulletin 95. 1975.

5. Incorporated Research Institutions for Seismology. Education and Outreach Series – Educational One-Pagers. How Often Do Earthquakes Occur? 17 February 2012 <http://www.iris.washington.edu/hq/files/publications/brochures_onepagers/doc/no3.pdf>.

6. Louie, John N. University of Nevada, Reno. Nevada Seismological Lab. Earthquake Effects in Kobe, Japan. 17 February 2012 <http://crack.seismo.unr.edu/ftp/pub/louie/class/100/effects-kobe.html>.

7. Michigan Technological University. Department of Geological and Mining Engineering and Sciences. UPSeis an educational site for budding seismologists. How are Earthquake Magnitudes Measured? Earthquake Magnitude Classes. 21 February 2012 <http://www.geo.mtu.edu/UPSeis/magnitude.html>.

8. Michigan Technological University. Department of Geological and Mining Engineering and Sciences. UPSeis an educational site for budding seismologists. How are Earthquake Magnitudes Measured? Modified Mercalli Intensity Scale. 16 February 2012 <http://www.geo.mtu.edu/UPSeis/Mercalli.html>.

9. Missouri State Emergency Management Agency. Projected Earthquake Intensities Map. 17 February 2012 <http://sema.dps.mo.gov/EQ%20Map.pdf>.

10. St. Louis University. Department of Earth and Atmospheric Sciences. Earthquake Center. Earthquakes. Central U.S. Earthquake History. Introduction to the New Madrid Seismic Zone. 17 February 2012 <http://www.eas.slu.edu/eqc/eqc_quakes/NewMadridGeneral.html>.

11. U.S. Geological Survey. Earthquake Hazards Program. Earthquakes. 2008 Significant Earthquake and News Headlines Archive. Magnitude 5.4 Illinois April 18, 2008. 17 Februray 2012 <http://earthquake.usgs.gov/eqcenter/eqinthenews/2008/us2008qza6/>.

12. U.S. Geological Survey. Earthquake Hazards Program. Earthquakes. Earthquake Lists & Maps. Historic United States Earthquakes. 1968 11 09 – Southern Illinois – M 5.4. 23 February 2012 <http://earthquake.usgs.gov/earthquakes/states/events/1968_11_09.php>.

13. U.S. Geological Survey. Earthquake Hazards Program. Earthquakes. Earthquake Lists & Maps. Historic United States Earthquakes. 1987 06 10 – Near Olney, Illinois – M 5.1. 17 February 2012 <http://earthquake.usgs.gov/regional/states/events/1987_06_10.php>.

14. U.S. Geological Survey. Earthquake Hazards Program. Earthquakes. Earthquake Lists & Maps. Largest Earthquakes in the United States. 17 February 2012 <http://earthquake.usgs.gov/regional/states/10_largest_us.php>.

15. U.S. Geological Survey. Earthquake Hazards Program. Learn. Earthquake Glossary. fault. 17 February 2012 <http://earthquake.usgs.gov/learning/glossary.php?termID=67>.

16. U.S. Geological Survey. Earthquake Hazards Program. Learn. Earthquake Topics. Magnitude/Intensity Comparison. 17 February 2012 <http://earthquake.usgs.gov/learning/topics/mag_vs_int.php>.

17. U.S. Geological Survey. Earthquake Hazards Program. Learn. Earthquakes For Kids. Learning Links & Earthquake Activities. The Science of Earthquakes. By Lisa Wald. 17 February 2012 <http://earthquake.usgs.gov/learning/kids/eqscience.php>.

18. U.S. Geological Survey. Earthquake Hazards Program. Learn Earthquake Topics. Only USGS Links. The Modified Mercalli Intensity Scale. 17 February 2012 <http://earthquake.usgs.gov/learning/topics/mercalli.php>.

19. U.S. Geological Survey. Earthquake Hazards Program. Learn. FAQs – Earthquakes, Faults, Plate Tectonics, Earth Structure. What is a fault and what are the different types? 21 February 2012 <http://earthquake.usgs.gov/learning/faq/?faqID=55>.

20. U.S. Geological Survey. Earthquake Hazards Program. Learn. FAQs – Historic Earthquakes and Earthquake Statistics. How many earthquakes worldwide occur each day? Each Year? 17 February 2012 <http://earthquake.usgs.gov/learn/faq/?faqID=69>.

21. U.S. Geological Survey. Earthquake Hazards Program. Learn. FAQs – Historic Earthquakes and Statistics. What is the biggest earthquake in the United States? 21 February 2012 <http://earthquake.usgs.gov/learning/faq/?faqID=65>.

22. U. S. Geological Survey. Earthquake Hazards Program. Learn. FAQs – Historic Earthquakes and Statistics. Where do earthquakes occur? 21 February 2012 <http://earthquake.usgs.gov/learning/faq/?categoryID=11&faqID=95>.

23. U.S. Geological Survey. Earthquake Hazards Program. Learn. FAQs – Measuring Earthquakes. What are the different magnitude scales, and why are there so many?. 17 February 2012 <http://earthquake.usgs.gov/learning/faq/?faqID=112>.

24. U.S. Geological Survey. Earthquake Hazards Program. Learn. Publications. Fact Sheets. Earthquake Hazards – A National Threat. Fact Sheet 2006-3016. March 2006. 29 February 2012 <http://pubs.usgs.gov/fs/2006/3016/2006-3016.pdf>.

25. U.S. Geological Survey. Earthquake Hazards Program. Learn. Publications. General Information. The Severity of an Earthquake. 17 February 2012 <http://pubs.usgs.gov/gip/earthq4/severitygip.html>.

26. U.S. Geological Survey. Earthquake Hazards Program. Learn. USGS Earthquake Publications. Fact Sheets. Earthquake Hazard in the Heartland of the Homeland. Fact Sheet 2006-3125. By Joan Gomberg and Eugene Schweig. January 2007. 17 February 2012 <http://pubs.usgs.gov/fs/2006/3125>.

27. U.S. Geological Survey. Earthquake Hazards Program. Learn. USGS Earthquake Publications. Fact Sheets. Earthquake Hazard in the New Madrid Seismic Zone Remains a Concern. Fact Sheet 2009-3071. By A. D. Frankel, et al. August 2009. 17 February 2012 <http://pubs.usgs.gov/fs/2009/3071>.

28. U.S. Geological Survey. Earthquake Hazards Program. Learn. USGS Earthquake Publications. Maps. Earthquakes in the Central United States – 1699 – 2010. Map. General Information Product 115. By Richard L. Dart and Christina M. Volpi. 2010. 17 February 2012 <http://pubs.usgs.gov/gip/115/>.

29. U S. Geological Survey. Earthquakes. By Kay M. Shedlock and Louis C. Pakiser. 1995. 17 February 2012 <http://pubs.usgs.gov/gip/earthq1/index.html>.

30. U.S. Geological Survey. Earthquakes in the Central United States – 1699 – 2002. Map Sheet. Investigations Series I-2812. By Russell L. Wheeler, et al. 2003. 17 February 2012 <http://pubs.usgs.gov/imap/i-2812/>.

31. U.S. Geological Survey. Earthquakes in the Central United States – 1699 – 2002. Earthquake Catalog. Investigations Series I-2812. By Russell L. Wheeler, et al. 2003. 17 February 2012 <http://pubs.usgs.gov/imap/i-2812/catalog.txt>.

32. U.S. Geological Survey. Earthquakes in the Central United States – 1699 – 2010. Map Sheet. General Information Product 115. By Richard L. Dart and Christina M. Volpi. 2010. 17 February 2012 <http://pubs.usgs.gov/gip/115/>.

33. U.S. Geological Survey. Earthquakes in the Central United States – 1699 – 2010. Update Catalog. General Information Product 115. By Richard L. Dart and Christina M. Volpi. 2010. 5 May 2013 <http://pubs.usgs.gov/gip/115/downloads/GIP115_data/Updatecatalog.txt>.

34. U.S. Geological Survey. Uncovering Hidden Hazards in the Mississippi Valley. By Thomas G. Hildenbrand, et al. 1996. 21 February 2012 <http://pubs.usgs.gov/fs/1996/0200/report.pdf>.

3.8 DAMS

1. Association of State Dam Safety Officials. About Dam Safety. Dam Failures and Incidents. 28 February 2012 <http://damsafety.org/news/?p=412f29c8-3fd8-4529-b5c9-8d47364c1f3e>.

2. Diedrichsen, Mike. Acting Manager, Downstate Regulatory Programs. Illinois Department of Natural Resources. Office of Water Resources. List of Inventoried Dams in Logan County. Fax to Greg Michaud. 1 November 2010.

3. Federal Emergency Management Agency. Disaster Information. Dam Failure. Why Dams Fail. 28 February 2012 <http://www.fema.gov/hazard/damfailure/why.shtm>.

4. Federal Emergency Management Agency. Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams. April 2004. 16 February 2012 <http://www.fema.gov/library/viewRecord.do?id=1830&fromSearch=fromsearch>.

5. Federal Emergency Management Agency. Multi Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy. 1997. 16 February 2012 <http://www.fema.gov/library/viewRecord.do?id=2214>.

6. Federal Emergency Management Agency. Risk Prioritization Tools for Dams: Users Manual. By URS Group, Inc. 3 March 2008. 16 February 2012 <http://www.fema.gov/library/viewRecord.do?id=3296>.

7. Illinois Administrative Code. Title 17: Conservation. Chapter I: Department of Natural Resources. Subchapter h: Water Resources. Part 3702: Construction and Maintenance of Dams. Section 3702.30 Applicability. 16 February 2012 <http://www.ilga.gov/commission/jcar/admincode/017/017037020000300R.html>.

8. National Performance of Dams Program. Stanford University. Department of Civil and Environmental Engineering. NPDP Dam Incidents Query. Illinois. Database. 28 February 2012 <http://npdp.stanford.edu/DamDirectory/DamIncidentQuery/IncidentForm.jsp>.

9. U.S. Army Corps of Engineers. National Inventory of Dams. Illinois. 16 February 2012 <http://geo.usace.army.mil/pgis/f?p=397:3:3599878675111736::NO::P3_STATES:IL>.

10. U.S. Army Corps of Engineers. National Inventory of Dams. National. 16 February 2012 <http://geo.usace.army.mil/pgis/f?p=397:3:3599878675111736 ::NO>.

11. U.S. Army Corps of Engineers. National Inventory of Dams. Introduction. 16 February 2012 <http://geo.usace.army.mil/pgis/f?p=397:1:3344144578410039::NO>.

12. U.S. Army Corps of Engineers. National Inventory of Dams Interactive Report. Illinois. Logan County. Database. 19 December 2011 <http://geo.usace.army.mil/pgis/f?p=397:4:2345849302773996::NO>.

3.9 MAN-MADE HAZARDS

1. Bickel, Jill. Environmental Protection Agency. "Illinois EPA FOIA Response." Email to J. Paul Biggers. 16 April 2012.

2. Federal Bureau of Investigation. Reports & Publications. 2007 Report on Terrorism. April 2008. 13 August 2012 <http://www.fbi.gov/stats-services/publications/terror_07.pdf>.

3. Federal Bureau of Investigation. Reports & Publications. 2008 Report on Terrorism. April 2009. 13 August 2012 <http://www.fbi.gov/stats-services/publications/terror_08.pdf>.

4. Federal Bureau of Investigation. Reports & Publications. 2011 Report on Terrorism. March 2012. 13 August 2012 <http://www.nctc.gov/docs/2011_NCTC_Annual_Report_Final.pdf>.

5. Federal Bureau of Investigation. Reports & Publications. Report on Terrorist Incidents - 2006. April 2007. 13 August 2012 <http://www.fbi.gov/stats-services/publications/terror_06.pdf>.

6. Federal Bureau of Investigation. Reports & Publications. Terrorism 2002 – 2005. 13 August 2012 <http://www.fbi.gov/stats-services/publications/terrorism-2002-2005/terror02_05.pdf/view>.

7. Illinois Commerce Commission. 2003 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. May 2004. 13 May 2010 <http://www.icc.illinois.gov/reports/report.aspx?rt=19>.

8. Illinois Commerce Commission. 2004 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. May 2005. 13 May 2010 <http://www.icc.illinois.gov/reports/report.aspx?rt=19>.

9. Illinois Commerce Commission. 2005 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. May 2006. 13 May 2010 <http://www.icc.illinois.gov/reports/report.aspx?rt=19>.

10. Illinois Commerce Commission. 2006 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. May 2007. 13 May 2010 <http://www.icc.illinois.gov/reports/report.aspx?rt=19>.

11. Illinois Commerce Commission. 2007 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. April 2008. 13 May 2010 <http://www.icc.illinois.gov/reports/report.aspx?rt=19>.

12. Illinois Commerce Commission. 2008 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. April 2009. 13 May 2010 <http://www.icc.illinois.gov/reports/report.aspx?rt=19>.

13. Illinois Commerce Commission. 2009 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. April 2010. 13 May 2010 <http://www.icc.illinois.gov/reports/report.aspx?rt=19>.

14. Illinois Commerce Commission. 2010 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. April 2011. 9 February 2011 <http://www.icc.illinois.gov/reports/report.aspx?rt=19>.

15. Illinois Commerce Commission. 2011 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. April 2012. 9 April 2012 <http://www.icc.illinois.gov/reports/report.aspx?rt=19>.

16. Illinois Commerce Commission. Transportation Division. Railroad Safety Section. 2001 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. July 2002. 17 May 2010 <http://www.icc.illinois.gov/reports/Results.aspx?t=17>.

17. Illinois Commerce Commission. Transportation Division. Railroad Safety Section. 2002 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. 2003. 13 May 2010 <http://www.icc.illinois.gov/reports/Results.aspx?t=17>.

18. Illinois Emergency Management Agency. Freedom of Information Act. Hazardous Materials Incident Reports. Database. 24 October 2012 <http://tier2.iema.state.il.us/FOIAHazmatSearch/>.

19. Illinois Environmental Protection Agency. Bureau of Land. Databases. Leaking Underground Storage Tank Incident Tracking. Database. 24 October 2012 <http://epadata.epa.state.il.us/land/ust/>.

20. Illinois Environmental Protection Agency. Bureau of Land. Databases. Site Remediation Program Database Search Page. Database. 24 October 2012 <http://epadata.epa.state.il.us/land/srp/>.

21. Illinois Environmental Protection Agency. Bureau of Land. Databases. Site Response Action Program Database Search. Database. 24 October 2012 <http://epadata.epa.state.il.us/land/ssu/>.

22. Illinois Environmental Protection Agency. Bureau of Land. Publications. Generators and Managers of Hazardous Waste in Illinois: 2010: Types and Tons of Wastes Generated, Stored, Treated and Disposed. February 2012. 24 October 2012 <http://www.epa.state.il.us/land/hazardous-waste/reports/2010/report.pdf >.

23. Illinois Environmental Protection Agency. Bureau of Land. Publications. Nonhazardous Solid Waste Management and Landfill Capacity in Illinois: 2010. August 2011. 13 August 2012 <http://www.epa.state.il.us/land/landfill-capacity/2010/report.pdf>.

24. National Consortium for the Study of Terrorism and Responses to Terrorism. Global Terrorism Database. Database. 13 August 2012 <http://www.start.umd.edu/gtd/>.

25. Pipeline and Hazardous Materials Safety Administration. National Pipeline Mapping System. NPMS Public Map Viewer. Illinios. Logan. Map. 13 August 2012 <https://www.npms.phmsa.dot.gov/PublicViewer/>.

COUNTY RESOLUTION AUTHORIZING THE DEVELOPMENT OF THE PLAN

APPENDIX A

RESOLUTION FOR PURSUIT OF THE PREPARATION OF AN ALL HAZARD MITIGATION PLAN

WHEREAS; Logan County, Illinois would like to obtain grant money through the Disaster Mitigation Act of 2000, as money is available for Planning and Projects that can reduce or eliminate the damages caused by natural and man-made hazards such as rain, snow, wind, ice storms, floods, drought and earthquakes; and

WHEREAS; Logan County, Illinois must prepare an All Hazard Mitigation Plan before money can be released for projects and activities; and

WHEREAS; this plan will include a listing of potential projects and activities that can help reduce the damages caused by these storms; and

WHEREAS; Logan County will follow the next step in this process, which will be to prepare a grant application through Johnson, Depp & Quisenberry, an environmental and engineering consulting firm, for the preparation of this plan.

NOW THEREFORE, BE IT RESOLVED; that the LOGAN COUNTY BOARD does Hereby pass this resolution to pursue the preparation of an All Hazard Mitigation Plan.

Passed this 17th day of March, 2009

County Board Chairman

ATTEST:

County Clerk and Recorder

PLANNING COMMITTEE MEETING ATTENDANCE SHEETS

APPENDIX B

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

August 9, 2012

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	GREG R. MICHAUD	JOHNSON, DEPP & QUISENBERRY
2.	Ivan Rademaker	EMDEN, IL. VILLAGE
3.	TOM ANDERSON	HARTSBURG, IL
4.	WILL DANDREA	LOGAN COUNTY GIS
5.	Sally Litterly	Logan County Clerk
6.	Jim Dicus	Farm Bureau
7.	Diane Hosts	CMS, State
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		

Apppendix B

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

August 9, 2012

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	Andrea Bostwick	JDC
2.	Kirby Rodgers	Public
3.	William H. Kennett	Broadwell
4.	Terry L Storer	Logan EMA
5.	Peggy Lee	Elkhart
6.	Bucky WASHAM	LOGAN EMA
7.	Rosanne Brosamer	Logan Co Supv of Assessments
8.	DAN FISCHER	LOGAN CO EMA
9.	Mark W. Miller	Lincoln Fire Dept
10.	Fred Tinker	City of Atlanta
11.	MIKE HARRIS	CITY OF ATLANTA
12.	Shawna Bean	Logan Cty Dept Public Health
13.	Kaleena Wright	American Red Cross
14.	Cheryl Hedrick	Logan EMA/911
15.	JOE RYAN	COUNTY EMERGENCY
16.	Nana Sorentino	Logan Cnty EMA
17.	Bret Avkamp	Logan County Highway
18.		

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

November 1, 2012

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	Andrea Bostwick	HDR
2.	Greg Michaud	JDQ
3.	Willie Kunnett	Broadwell
4.	Joan Rademaker	EM DEN
5.	Peggy Lee	City Khart
6.	[illegible]	Logan Co
7.	Shana Altman (Bean)	CDPH
8.	Dan Fulscher	LC. EMA
9.	Cheryl Hedrick	LC EMA/911
10.	Joe Ryan	County
11.	Kateena Wright	American Red Cross
12.	Channel 17 News Crew	
13.		
14.		
15.		
16.		
17.		
18.		

Apppendix B

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

November 1, 2012

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	MIKE PATRIDGE	MT. PULASKI
2.	TERRY STORER	Logan Co. EMA
3.	Diane Hoots	CMS
4.	JON ANDERSON	HAYDEN
5.	ANITA FRIZZELL	LINCOLN
6.	Alana Sorrentino	EMA
7.	Kirby Rodges	EMA / Public Rep.
8.	Roann Brosmer	Logan Co Supv of Assessments
9.	Barb Klene	ALMH
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		

Apppendix B

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

January 17, 2013

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	GREG MICHAUD	JLQ
2.	Bucky WASHAM	LCEMA
3.	Diane Hoots	CMS
4.	MIKE PATRIDGE	MT. PULASKI
5.	William Kennett	Broadwell
6.	JON ANDERSON	HARTSBURG
7.	ARNOLD COLLIER	EMDEN
8.	REYNOLD GOFF	Chestnut Fire
9.		Atlanta
10.		Logan Co
11.	WILL D'ANDREA	LOGAN Co.
12.		Lo. Co. S. O.
13.	Shana Altman	LCDPH
14.	JOE RYAN	COUNTY
15.	Derek Hurley	Lincoln Daily News
16.	Marla Blair	Logan County Herald
17.		
18.		

Apppendix B

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

January 17, 2013

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	TERRY STORER	Logan County EMA
2.	Andrea Bostwick	IDOT
3.	Rick Aylesworth	LOGAN COUNTY BOARD
4.	Mark Miller	Lincoln Fire Dept.
5.	GENE ROHLFS	Lo Co Board
6.	Joan Rademaker	EMDEW, IL,
7.	Cheryl Hedrick	LoEMA/911
8.	Jim Drew	Logan Co Farm Bureau
9.	Alana Sweetin	Logan Co. EMA
10.	Margaret R Lee	Elkhart
11.	Roanne Brosamer	Logan Co SoA
12.	Barb Kline	ALMH
13.	Amy Eden	American Red Cross
14.	Bret Arkamp	Logan County Hwy.
15.		
16.		
17.		
18.		

Apppendix B

Apppendix B

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

June 13, 2013

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	Cheryl Hedrick	Logan County EMA/911
2.	John Bunner	Logan County Sheriff
3.	Greg Michaud	Johnson, Depp & Quisenberry
4.	Willie Kennett	Broadwell ±1.
5.	Anita Trujillo	General Public
6.	Byrd Gibbs	City of Atlanta
7.	Sally Litton	Logan Co Clk.
8.	Dean Luesman	Wartburg
9.	Jean Anderson	Reg. Office of Education
10.	Mark Miller	Lincoln Fire Dept
11.	Barb Klaus	AHMH
12.	Bret Ashcraft	Logan Highway
13.		
14.		
15.		
16.		
17.		
18.		

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

June 13, 2013

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	Terry Storer	Logan EMA
2.	Bucky WASHAM	LOGAN EMA
3.	Andrea Bostwick	JDC
4.	REYNOLD GOFF	CHESTNUT FIRE
5.	ARNOLD COLLIER	EMDEN VILLAGE
6.	MIKE HARRISON	ATLANTA
7.	Shana Altman	LCDPH
8.	Eddie Schaffenacker	Assessor office
9.	Dave Rohlfs	LOGBD / LO CO AIRPORT
10.	Diane Hoots	State of IL
11.	Will D'ANDREA	GIS
12.	DAN FUSCO	LOGAN CO EMA.
13.		
14.		
15.		
16.		
17.		
18.		

Apppendix B

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting
Public Forum

October 17, 2013

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	Cheryl Hedrick	Logan County EMA-911
2.	William K. Emmitt	Broadwell
3.	Andrea Bostwick	NDS
4.	Tom Overmyer for Lyle Fout	Elkhart / Phoenix Consulting Engineers
5.	ARNOLD COLLIER	EMDEN
6.	Jan Youngquist	Lincoln Daily News
7.	Alano Sarentino	Logan Co. EMA
8.	Fred Tinsley	City of Atlanta
9.	Barb Klene	Abraham Lincoln Memorial Hospital
10.	[illegible]	Logan Co. Sheriff Office
11.	Bret Aukamp	Logan County Hwy. Dept
12.	Kirby Rodgers	Logan Co. / Retirement Office of Educ.
13.	Roann Brixamer	Logan Co Supervisor of Assessment
14.	Mark Miller	Lincoln Fire Dept
15.	Jim Dreen	Farm Bureau
16.	Vic MARTINEK	LINCOLN
17.		

Attendance Sheet

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting
Public Forum

October 17, 2013

	Name (Please Print)	Representing (Jurisdiction/Organization)
1.	REYNOLD GOFF	CHESTNUT FIRE
2.	TERRY STORER	LOGAN CO. EMA
3.	GREG MICHALKO	JDQ
4.	Bucky WARHAM	LOGAN CO EMA
5.	GENE ROHLFS	LOGAN CO. BD & AIRPORT
6.	Shana Altman	Logan Co. DPH
7.	Daniel Fulscher	
8.	Mike Harris	ATLANTA
9.	Terry Carlton	Logan County Board
10.	Dean Reesman	Wartburg
11.	Alyssa Schmidt	ALMH
12.		
13.		
14.		
15.		
16.		
17.		

[this page is intentionally left blank]

PLANNING COMMITTEE MEETING MINUTES

APPENDIX C

Meeting Minutes

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

August 9, 2012
Logan County Public Safety Complex
911 Pekin St., Lincoln
4:00 p.m.

Committee Members:

American Red Cross
Atlanta, City of
Broadwell, Village of
Country Financial Insurance
Elkhart, Village of
Emden, Village of
Hartsburg, Village of
Illinois Central Management Services
Lincoln, City of
Logan County Offices
- Assessor
- Clerk & Recorder
- Emergency Management Agency
- GIS/Zoning
- Highway Dept.
- 911
- Public Health

Logan County Farm Bureau
Mitigation Planning Consultants
- Johnson, Depp & Quisenberry

Public Representative
- Kirby Rodgers

Welcome and Introductions

Dan Fulscher, Logan County EMA Director, welcomed attendees. He thanked attendees for agreeing to serve on this Committee and he noted that through their attendance they will help make the municipalities they represent and Logan County eligible for grant money to help with projects and activities aimed at reducing damages caused by natural hazards. Dan asked the Committee members to introduce themselves by providing their name and who they represent.

Dan introduced Terry Storer, Logan County EMA Deputy Director, as the chairperson for the Committee.

Binders and handout materials were distributed to each member.

What Is A Natural Hazard Mitigation Plan and Why Should We Prepare It?

Greg Michaud, Johnson, Depp & Quisenberry, described why mitigation planning is needed and how participating jurisdictions can benefit.

Although Logan County has an emergency response plan with strong protocols and working relationships established, the purpose for a natural hazard mitigation plan is to prevent or reduce the damages caused by severe storms and other natural hazards. Since the early 1990's damages

caused by weather extremes have risen substantially. In 2011, the United States experienced $52 billion in severe storm damages.

As damages from severe storms and other natural hazards continue to rise, the Federal Emergency Management Agency (FEMA) is encouraging counties throughout the United States to prepare natural hazard mitigation plans. Natural hazard refers to floods, tornadoes, severe summer storms (including thunderstorms, hail and lightning events), severe winter storms (including ice and snow storms), extreme heat, drought, earthquakes, and dam failures.

From the damages caused by natural disasters, FEMA has calculated that for every dollar spent on mitigation, $3 to $4 dollars can be reaped in savings.

Developing this plan provides three major benefits:

(1) When the next federally-declared natural disaster occurs, Logan County and all impacted municipalities who participate in the planning process will receive the full amount of money that they are eligible for from FEMA.

(2) Specific projects and recommendations will be developed through the planning process to help each participating jurisdiction reduce damages. By including these projects in this Plan, the participating jurisdictions will have an opportunity to receive state and federal funds to complete projects that might not otherwise be realized.

(3) Verifiable information about the natural hazards that occur in Logan County will be gathered that will help participants in municipal and county meetings make decisions about how to better protect citizens and property from storm damages.

The Planning Process

The goal of the Committee meetings is to develop a Plan that will be approved by the Illinois Emergency Management Agency (IEMA) and FEMA. A five meeting process has been developed to achieve this goal. Specific activities for the Committee meetings include:

1st Committee meeting	Orientation to the Planning Process Begin identifying Critical Facilities & Existing Planning Documents
2nd Committee meeting	Discuss the Risk Assessment Approve Mission Statement & Goals Committee returns the Critical Facilities List and the Existing Planning Documents List
3rd Committee meeting	Begin discussing Mitigation Projects and Activities Develop a Mitigation Strategy Committee returns list of Mitigation Projects and Activities
4th Committee meeting	Finish discussing Mitigation Projects and Activities Committee discusses approval/adoption of the Plan

5th Committee meeting	Present the Revised Plan for public review
(Public Forum)	Committee helps answer questions from the public

Andrea Bostwick, JDQ, is a certified risk assessor who will work with Greg to prepare the Risk Assessment. Critical Facilities for each participating municipality and the County must be identified. Andrea distributed the Critical Facilities form for each municipality and the County to be completed and returned no later than the next Committee meeting.

Andrea also distributed the Existing Planning Documents List. This list includes land use plans, flood ordinances, and related documents. If comprehensive municipal plans have been developed, copies these of these documents should be sent to Andrea or Greg so that these documents can be evaluated and described in the Plan.

The fifth Committee meeting, listed as a public forum, provides the rest of Logan County with an opportunity to review the draft Plan. Other opportunities for public comment include: a kiosk set up at the County Courthouse, County web-site posting, and a two week public comment period following the public forum. This is the only committee meeting that will be conducted in the evening.

Other highlights of this discussion included:

- Submitting a list of mitigation projects does not commit any municipality or the County to obligate funds. These lists help assure eligibility for funding. All mitigation projects and activities for which federal funding will be sought, must be included in the Plan.
- This is not a competition between municipalities or the County. Each participating jurisdiction picks the mitigation projects that they feel will best protect their residents and property. While water supply may be most important for one community, protection from tornado or flood may be more important to another community.
- FEMA's intent is to encourage mitigation. FEMA has not used these Plans to "penalize" municipalities or counties who do not implement mitigation projects included in their Plans.

Mission Statement & Goals

A draft of a proposed mission statement and goals was distributed. The goals were drafted in a manner that should help cover most, if not all, mitigation projects that are anticipated to be submitted. However, specific goals related to where you live can be added to this list. Every project included in the Plan should be aimed at one or more of the goals developed by this Committee. Committee Members were asked to review and discuss this draft at the next meeting.

Since the mission statement and goals are related to natural hazards, Committee members were asked to recount some natural hazards that were particularly vivid. A Hazard Event Questionnaire was distributed so that Committee members could record events, their date of occurrence, and any damages that resulted from the event. Information from these Questionnaires will be used to supplement the Plan.

Among the events described by Committee members were the following:

- ❖ Countywide ice storm on March 24, 1978, that caused prolonged power outages for over a week in some areas of the county. At some grocery stores, food was moved into refrigerated trucks to keep perishable items from spoiling. Mount Pulaski schools were closed for a week.
- ❖ A group of three tornadoes in the vicinity of Elkhart on May 8, 1995.
- ❖ Severe winter storm on November 30, 2006 that resulted in over 400 people being evacuated from Amtrak trains. Temporary housing was provided in a local hospital, travel plaza & safety center.
- ❖ A tornado that began in the Williamsville vicinity in 2009 moved through Logan County causing extensive damage to homes, outbuildings and crops.
- ❖ Flooding in Emden in 1995 and 1996 that resulted in a boil order to ensure that residents would receive safe drinking water.
- ❖ Lightning strike in August, 1990 in Lincoln that damaged radio equipment, a tower, and injured Dan Fulscher, EMA Director.

Community Participation

In addition to the requirement that members attend Committee meetings to help assure that the Plan can be approved by IEMA and FEMA, Greg added that substitute representatives are acceptable. When unforeseen obligation arises, a substitute can be designated and they do not have to be an official or employee of the municipality. For the county representatives, participation is important because it helps the county meet the local match for this grant through in-kind service.

What Happens Next?

The risk assessment, goal setting, and the mission statement will be the main topics of the next committee meeting.

Committee members were asked to complete a citizen survey before they left, and to make copies of this survey available in their jurisdictions.

Paper copies of this survey and a fact sheet titled "Frequently Asked Questions," are available for participating municipalities to make available to the public from their offices. Andrea can provide paper or electronic copies.

Photographs of storm damages are needed for this Plan. Photographs should be provided to Andrea or Greg.

The second meeting of the Committee was set for:

Thursday, November 1
Logan County Public Safety Complex
911 Pekin Street
4 p.m.

Public Comment

With no further comments or questions, Terry Storer thanked the Committee members for their attendance. He encouraged Committee members to bring information about storm damages so that it can be added to the Plan.

Meeting Minutes

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

November 1, 2012
Logan County Public Safety Complex
911 Pekin St., Lincoln
4:00 p.m.

Committee Members:

Abraham Lincoln Memorial Hospital
American Red Cross
Broadwell, Village of
Country Financial Insurance
Elkhart, Village of
Emden, Village of
Hartsburg, Village of
Illinois Central Management Services
Logan County Offices
- Assessor
- Clerk & Recorder
- Emergency Management Agency
- 911 Dispatch
- Public Health

Mitigation Planning Consultants
- Johnson, Depp & Quisenberry

Mount Pulaski, City of
Public Representatives
- Anita Frizzell
- Kirby Rodgers

Other
- WAND-TV, Decatur

Welcome and Introductions

Dan Fulscher, Logan County EMA Director, welcomed attendees. He announced that WAND-TV, Decatur, was covering this meeting. He noted that in the short time that this Committee has been meeting, a wide array of severe weather has occurred ranging from drought to severe thunderstorms and in other parts of the nation severe snow and hurricanes. Terry Storer, Logan County EMA Deputy Director, thanked members for attending.

Handout materials were distributed to each member.

Risk Assessment

Greg Michaud, JDQ, began the presentation by reminding Committee members that at the previous meeting were discussed cumulative storm damages nationwide, but we did not know how much storm damage occurred in Logan County. With the completion of the Risk Assessment we now have verifiable information to share.

Natural Hazards
An overview of the 133 page Risk Assessment contained in the handout materials was provided. The frequency, magnitude and property damages for each category of natural hazard were described. Logan County has had 8 Federal disaster declarations since 1965. Documented damages from severe storms and other natural hazards in Logan County reveal dollar losses

exceeding $71.6 million with at least 352 injuries and 9 deaths. Multiple severe weather events have occurred during every decade since 1950.

Severe Storms

Over $28.5 million in damages has resulted from severe thunderstorms, hail, and high wind events since 1955. Severe storms are the most frequently occurring natural hazard in Logan County. At least 136 injuries and 1 fatality can be attributed to severe storms.

Dan Fulscher added that severe wind and lightning damage is more likely in Logan County than in other parts of Illinois.

Tornadoes

Since 1950, 59 tornadoes have been verified in Logan County. Only three other Illinois counties have had more tornadoes during this same time period. Logan County is located in the "tornado alley" of Illinois. Damages have exceeded $39.5 million including 75 injuries and 1 fatality. Logan County is located in the "tornado alley" of Illinois.

Thirty-three of these tornadoes caused property damage. Eleven of these tornadoes caused over $1 million in damages during each event.

The average tornado in Logan County is approximately 3 miles long and 145 yards wide. There have been one F4, five F3, six F2, nine F1, thirty-five F0, 1 EF3, and 2 EF0 tornadoes.

The worst tornadoes in the county occurred in August, 2009, and May, 1995. The 2009 tornado caused $7.2 million in property damage and $1 million in crop damage. Seven homes were destroyed among 22 homes which suffered severe damage. Numerous grain bins and outbuildings were also damaged. Two persons were injured. The 1995 tornado caused $8 million in property damage to approximately 100 homes. Six persons were injured.

Floods

Floods contributed to four of the eight Federal disaster declarations. Although no major rivers cross the County, at least 46 floods have been documented since 1951 causing approximately $3.5 million in property and crop damage.

Severe Winter Storms

Forty-six events involving excessive snow, ice, or extreme cold have been verified since 1951. At least 141 injuries and 5 deaths can be attributed to severe winter storms and this number is likely to be much higher since National Weather Service records tend to not have severe winter storm information earlier than the mid-1990's.

Extreme Heat

Nine extreme heat events have been reported since 1997. Road buckling and crop damage often occur, but crop damage is usually not measurable unless drought occurs. Two deaths are attributed to these events.

Drought

Three major droughts have occurred during the last three decades—1983, 1988 and 2012. Following each drought, crop yield reductions were substantial.

	Corn	Soybeans
1983	29%	15%
1988	51%	29%
2012	Deficit yields will be reported when numbers are available	

Dams

There are three dams with state permits in Logan County. All three dams are privately owned. All three dams have been constructed within the past 50 years. Two of the dams are on the Viper Mine property south of Elkhart. The third dam is on Hickory Lake.

Earthquakes

Earthquakes have been felt in Logan County but no damages have been reported. There are no geologic faults in the county.

Greg added that Chris Miller, National Weather Service, in Lincoln helped provide some of the data used in this assessment. Committee members were asked to provide information on events not included in the tables in the Risk Assessment handout.

Man-Made Hazards

While the focus of this planning effort is directed at natural hazards, FEMA allows a small portion of the planning process to be devoted to an overview of selected man-made hazards. Although this overview does not have the same depth as the assessment of natural hazards, it provides useful information to place various man-made hazards in perspective.

Chemical Generators

There are four companies in Logan County who report the quantities of chemicals they generate. The Viper Mine operation south of Elkhart is the only one that might be considered a "major" generator of hazardous substances and these are mostly metals associated with mining activity.

Transportation

Roads & HazMat Incidents: Since HazMat incidents include responses to chemical releases while they are transported as well as responses to releases from stationary facilities, the number of HazMat incidents and roadway problems were discussed together. Logan County averages about eight HazMat incidents a year. This number is similar to other rural counties in Illinois. In most cases, diesel fuel, gas, motor oil and anhydrous ammonia are the most frequently released substances.

Rail: Logan County is crossed by three railroads. Rail incidents involving hazardous substances were reviewed from 2001 through 2011. During this time period, no rail incidents involving hazardous substances occurred in Logan County.

Pipelines: Two incidents involving releases from pipelines occurred in Logan County, both near Lincoln. Greg emphasized that while the number of pipeline breaks and the magnitude of these events were relatively small in Logan County, there is a need for constant readiness. With the age of these pipelines, the risk increases. This fact was illustrated by the recent major pipeline breaks in California, in Will County, Illinois, and in Michigan.

Disposal

No active solid waste landfills are operating in Logan County. There are no on-site or off-site chemical treatment or disposal facilities in Logan County.

Sally Litterly noted that there is one closed landfill. This landfill is not causing leachate problems or contaminating nearby drinking water wells.

Remediation

Superfund/CERCLIS: There are no Superfund sites or candidate sites in Logan County. (The CERLCIS is an inventory of candidate sites being considered for Superfund listing.)

Illinois Site Remediation Program (SRP): Illinois has an active program to eliminate risks to public health and the environment from sites where chemical contamination exists. Eight sites in Logan County are enrolled in this program. Two have received No Further Remediation Letters. Six others are in varying stages of remediation, but none of these six pose an imminent threat to residents.

Leaking Underground Storage Tanks (LUST): Sixty-five incidents involving leaking underground storage tanks have been documented in Logan County. Forty-eight of these incidents have received No Further Remediation Letters. Thirteen are in varying stages of remediation. At four sites, little activity has occurred, but none of the seventeen remaining sites are classified as "high priority."

Peggy Lee requested a copy of the entire list of LUST sites since it was not included in the packet of handout materials.

Terrorism

Terrorism includes domestic activity in addition to foreign directed activity. In downstate Illinois, terrorism activity has occurred in counties around Logan County including Sangamon, Peoria, McDonough, Douglas, and Champaign. The focus on domestic terrorism is shifting to schools as high schools and colleges in Illinois have recently experienced threats and actions.

The two page handout titled "**Critical Facilities,**" the one page handout **"List of Existing Planning Documents,"** and the **"Hazard Event Questionnaire"** distributed at the previous Committee meeting were collected from the Committee members.

To help better identify storm damages to critical facilities, Andrea distributed a **Critical Facilities Damage Questionnaire.** Committee members were requested to provide information on this form about dates, type of hazard event, critical facility damaged, and, if available, the amount of damages incurred. Information provided by the Committee will be used to supplement other information to complete the Vulnerability Assessment for each participating jurisdiction.

Mission Statement & Goals

Andrea Bostwick reminded members that a draft mission statement and goals were provided at the previous committee meeting.

She asked if any revisions were needed for the mission statement. No revisions were proposed.

She then asked if any additions were needed to the draft goals to reflect any specific situation in Logan County. The reference to "rivers" will be replaced by "streams."

Mitigation

Greg reminded Committee Members that the purpose of the next meeting is to bring ideas for mitigation projects.

He referred everyone to the two handouts that list examples of mitigation projects for the County and municipalities. The following categories of projects were described.

Studies may be needed to identify the cause of the problem. A drainage problem may exist, but the most effective remedy may be uncertain. Debris in culverts, undersized culverts, and changes in land use all contribute to drainage problems. A drainage study may be needed to determine the cause or group of causes for a recurring drainage problem.

Structural projects typically are the most frequently mentioned category of mitigation projects. Examples of structural projects are included in the handout material.

Projects underway should be included too. Funding can disappear. If a project is not listed in this Plan, your jurisdiction will be unable to seek IEMA/FEMA funds for it.

While lower on the priority scale, but important to prevent damages are ***Public information/education activities.*** These activities have been proven to be useful to alert people about how to protect themselves and their property.

Long-term and ***permanent*** are the key characteristics FEMA considers when determining whether a project is fundable. However, the Committee may also want to include other types of mitigation action. Tree trimming is helpful in reducing downed power lines during an ice storm, but because trees will often continue to grow new limbs, FEMA will not fund this activity. Ameren will trim trees along roads and main power lines, but not along the service lines which extend to each residence and business.

Andrea distributed paper copies of the **"Hazard Mitigation Project Form"** that should be used to submit projects and activities. She described several problems to avoid when completing these forms. For clarity, often just one additional word is needed. When mentioning towers, are you referring to a water tower or a communication tower? She emphasized that submitting a project does not obligate any jurisdiction to complete the project. FEMA is trying to stimulate mitigation to reduce the extraordinary amount of money being expended on storm damages.

In response to a request, she will also make this form available electronically.

What Happens Next?

The Committee set Thursday, January 17, as the date for its next meeting. The starting time will remain at 4 p.m. and the location remains the same.

Public Comment

With no additional questions or comments, Terry Storer adjourned the meeting.

Meeting Minutes

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

January 17, 2013
Logan County Public Safety Complex
911 Pekin St., Lincoln
4:00 p.m.

Committee Members

Abraham Lincoln Memorial Hospital
American Red Cross
Atlanta, City of
Broadwell, Village of
Chestnut Fire Protection District
Country Financial Insurance
Elkhart, Village of
Emden, Village of
Hartsburg, Village of
Illinois Central Management Services
Lincoln, City of
Logan County Farm Bureau
Logan County Offices
- Assessor
- Board
- Clerk
- Emergency Management Agency
- 911 Dispatch
- Public Health
- Highway Department
- Sheriff's Office
- Zoning & GIS

Mitigation Planning Consultants
- Johnson, Depp & Quisenberry

Mount Pulaski, City of
Other
- Lincoln Daily News
- Logan County Herald

Welcome and Introductions

Terry Storer, Logan County EMA, welcomed committee members. He asked members to send any comments on the meeting minutes to Andrea or Greg. He noted that there were some first-time attendees at this meeting and expressed his appreciation for their participation.

Vulnerability Assessment

Greg provided a brief recap to help reorient Committee members as to what has been accomplished and what will be covered at this meeting. He noted that the Committee has accomplished all of its objectives up to this point and are ahead of schedule.

Greg asked the Committee to provide information on damages to critical facilities on the form, "**Damages To Critical Facilities**," which was distributed at the previous Committee meeting.

Before presenting the estimated potential damages to each participating municipality caused by floods and tornadoes, he thanked Rosanne Brosamer for providing tax assessment figures.

Tornadoes
Logan County is located in the area of Illinois where the most tornadoes occur. Damages were based on an "average" tornado for Logan County by taking tornado impact information for the past 60 years. In Logan County, an average tornado is approximately 3 ¼ miles long and 145 yards wide. Housing densities were calculated from U.S. Census Bureau information for each of the participating jurisdictions.

Potential dollar losses for residences and contents would be expected to exceed at least $5 million in any of the participating municipalities. Potential damages in five of the participating municipalities are estimated to exceed $10 million.

Floods
Approximately 15% of the land area in Logan County is in the floodplain and thus susceptible to flooding from creeks and streams. Atlanta, Broadwell, Emden, Hartsburg and Mount Pulaski would not experience this kind of riverine flooding since there are no streams or creeks with floodplains within their municipal limits. Using tax assessment values for residential structures from 2011, riverine flood damages were calculated for structures and contents. Potential dollar losses caused by riverine flooding to vulnerable residences within the participating municipalities would be expected to range from approximately $269,934 in Lincoln to $481,278 in Elkhart.

Flash flooding is harder to calculate, but it has impacted every municipality in Logan County. Since 1995, Logan County has experienced several major flash flood events that have caused over $3.5 million in damages.

Project Prioritization Method
A Project Prioritization Method is required by FEMA in the Plan. The term Project Prioritization Method actually refers to a method to classify each project.

Greg identified the two primary factors in the development of this strategy:

1) Frequency of hazard—severe storms occur more frequently than drought.
2) Degree of mitigation—some projects will ***eliminate*** damages while most projects will ***reduce***, but not eliminate damages.

Greg acknowledged that while this methodology does not take cost or politics into consideration, these factors may affect the order in which projects are implemented.

Mitigation Projects
Committee members were asked to submit their Mitigation Projects forms. Andrea Bostwick then proceeded to illustrate how the Project Prioritization Method, the lists of Mitigation Projects, and other information will be presented for Committee review.

Andrea chose a mitigation project from Elkhart's list, a storm safe shelter, as an example to show how a typical project is prioritized and entered into the Plan on a Mitigation Table. A sufficiently large-size chart was placed on the wall so that everyone in the room could read it from where they sat. Andrea entered information about each category describing various factors that will be used to make determinations about each project and activity.

She explained that all mitigation projects submitted will be organized by participating jurisdiction.

Andrea noted that each municipality should have at least one mitigation project in the Plan before it is submitted to IEMA/FEMA. Mitigation projects can be added to the Plan after it is adopted because this Plan is a living document that will be periodically updated.

What Happens Next?

After several questions about mitigation projects were discussed, the Committee chose a date for the next meeting. With the planning process ahead of schedule, additional time will be allotted for Committee members to complete their lists of mitigation projects. The Committee agreed to schedule the next meeting on:

Thursday, June 13
Logan County Public Safety Complex
4 p.m.

Public Comment

Terry Storer encouraged Committee members to "think outside the box" when assembling their lists of mitigation projects. He used auxiliary power as one example to describe how jurisdictions might use variations of the mitigation project examples that were previously distributed to assemble their list.

With no additional questions or comments, Terry adjourned the meeting.

Meeting Minutes

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

June 13, 2013
Logan County Public Safety Complex
911 Pekin St., Lincoln
4:00 p.m.

Committee Members

Abraham Lincoln Memorial Hospital
Atlanta, City of
Broadwell, Village of
Emden, Village of
Hartsburg, Village of
Illinois Central Management Services
Lincoln, City of
Logan County Offices
- Assessments Office
- Board
- Clerk
- Emergency Management Agency
- 911 Dispatch
- Highway Department
- Public Health
- Sheriff's Office
- Zoning/GIS

Logan, Mason, Menard Counties Regional Office of Education
Mitigation Planning Consultants
- Johnson, Depp & Quisenberry

Mount Pulaski Rural Fire Protection District #2 (Chestnut)
Public Representatives
- Anita Frizzell

Welcome and Introductions

Terry Storer, Deputy Director Logan County EMA, welcomed committee members. He noted that there were some first-time attendees at this meeting with new representatives from the villages of Emden and Hartsburg. He asked each attendee to introduce themself.

Mitigation Project Submittal & Action Tables

Before beginning this presentation, Greg Michaud provided a brief recap to help reorient Committee members as to what has been accomplished and what will be covered at this meeting.

Since the previous committee meeting, over 20 counties in Illinois have been federally declared disaster areas as a result of heavy rain and flooding. Flooding in Germany last week caused at least $4 billion in damages and the recent tornadoes in Kansas, Oklahoma, and elsewhere also illustrate the need for mitigation planning if we are to reduce property damages, deaths, and injuries from severe weather.

Greg commended the Committee Members for assembling their lists of mitigation projects and activities. One hundred and fifty-six mitigation projects and activities were described and prioritized in the Action Tables.

Committee members were provided approximately 20 minutes during the meeting to review the Action Tables containing the descriptions of mitigation projects and activities. Andrea Bostwick and Greg moved throughout the room to discuss questions with each member. Some additional mitigation projects were provided and will be added to these tables.

Risk/Vulnerability Assessment

An analysis of potential residential damages to each participating jurisdiction that might be caused by tornado and flood events was presented to the Committee at the previous meeting in January. This information will be included in the Plan.

Differences in severe weather frequency within Illinois were summarized to highlight key concerns for Logan County. For example, Logan County is in the top five counties for tornado frequency. Logan County is in the "tornado alley" of Illinois. In contrast, the number of tornadoes in Carroll and Jo Daviess Counties combined is less than half the number of tornadoes verified in Logan County. Consequently, high wind and tornado damage should be of greater concern in Logan County than flooding.

Plan Maintenance and Update

Andrea described the Plan maintenance and update commitments that are described in the Plan. A subgroup of the All Hazard Mitigation Planning Committee will meet annually under the direction of the Logan County EMA to report on the progress of their projects and make any additions or edits to their list of projects. There is no penalty for not building any project. The intent of the planning process is to encourage mitigation, not to penalize municipalities or counties.

Every five years, the Plan is formally updated and resubmitted to IEMA/FEMA. At the five year update, any jurisdiction who wants to become part of the Plan may do so. Any new jurisdiction must supply the same information that all of the current jurisdictions supplied.

The first jurisdiction to formally adopt the Plan begins the five year clock. If a jurisdiction decides not to adopt the Plan, FEMA will still approve the Plan and those jurisdictions who adopt the Plan become eligible for state/federal funds.

She cautioned all of the jurisdictions not to adopt the Plan until after FEMA provides preliminary approval. An e-mail will be issued notifying the Committee members that the Plan has received approval.

What Happens Next?

Although much of today's meeting has focused on mitigation projects and activities, the primary purpose for preparing this Plan is to make sure the participating jurisdictions can be better prepared for natural hazards and in a position to receive all of the money that is due when the next federal declaration occurs.

The final Committee meeting will be conducted in the early evening as an open-house style public forum where the draft Plan will be presented for review and comment. Contrary to

conventional public meetings, at an open-house style public forum the public can come and go at their convenience.

After this public forum, there are three important milestones:

1. **Public Comment Period of two weeks for residents** to submit comments before the Plan is submitted to IEMA and FEMA for their approval;
2. **Adopting the Approved Plan** by each participating jurisdiction through a resolution (Attendees were cautioned to not adopt the Plan before FEMA issues "tentative approval"); and
3. **Submitting the resolutions to JDQ** so that each participating jurisdiction is eligible for state/federal funding.

Committee members were asked where copies of the draft Plan should be made available for public comment. Lincoln, Atlanta, Hartsburg, Emden, the County Clerk and the Public Health Department requested electronic copies of the Plan. Other participants were asked to let Andrea or Greg know so that the proper arrangements can be made before the public comment period begins on October 17.

What Happens Next?

The Committee agreed to schedule the next meeting on:

Thursday, October 17
Lincoln Park District
1400 Primm Road
5 p.m. to 7 p.m.

Public Comment

Committee members questioned why a municipality might not want to adopt the Plan. Adopting the Plan does not obligate a municipality or county to implement any of the mitigation projects. Sometimes a change in municipal administration results in misperceptions that can result in a Plan not being adopted. A public representative noted that she observed several municipalities in Minnesota that decided not to adopt their Plans.

With no additional questions or comments, Terry thanked the attendees for their participation and he adjourned the meeting.

CITIZEN QUESTIONNAIRE

APPENDIX D

QUESTIONNAIRE

Logan County Multi-Jurisdictional All Hazards Mitigation Plan

You can help protect lives and property from storm damage in Logan County by taking a few moments to complete this questionnaire.

1. Please indicate where you live in Logan County:

_____ Atlanta
_____ Beason
_____ Broadwell
_____ Burton View
_____ Chestervale
_____ Chestnut
_____ Cornland
_____ Elkhart
_____ Emden
_____ Hartsburg
_____ Lake Fork
_____ Latham
_____ Lincoln
_____ Lawndale
_____ Middletown
_____ Mount Pulaski
_____ New Holland
_____ San Jose
_____ Union
_____ Unincorporated Logan County

_____ Other (please specify): _____

2. Please place a check mark next to each of the natural hazards listed below that you have experienced in Logan County. (Please check all that apply.)

_____ Severe Summer Storms (thunderstorms, hail and/or lightning strikes)
_____ Floods
_____ Severe Winter Storms (snow, sleet, ice and/or extreme cold)
_____ Extreme Heat
_____ Tornadoes
_____ Earthquakes
_____ Drought
_____ Other (please specify): _____

3. Which of the natural hazards above have you encountered most frequently?

_____

4. Rank the natural hazards listed below in sequential order from 1 to 7 based on which hazard you feel poses the greatest threat. (1 = greatest threat and 7 = least threat). *Each number should only be used once.*

_____ Severe Summer Storms (thunderstorms, hail and/or lightning strikes)
_____ Floods
_____ Severe Winter Storms (snow, sleet, ice and/or extreme cold)
_____ Extreme Heat
_____ Tornadoes
_____ Earthquakes
_____ Drought
_____ Other (please specify): _____

5. What types of mitigation projects or activities are most needed in Logan County? (Please check the ***five*** you feel are most important.)

_____ Public information fact sheets and brochures describing actions residents can take to protect themselves and their property against natural hazard impacts

_____ Floodplain Ordinances

_____ Building Codes and Enforcement

_____ Sirens or other Alert Systems

_____ Flood or Drainage Protection (If selected, please check the type of flood or drainage activity that is needed below.)

____ Culvert and drainage ditch maintenance
____ Retention pond construction
____ Dam or levee construction/maintenance
____ Hydraulic studies to determine cause of drainage problems

_____ Maintain power during storms by burying power lines, trimming trees and/or purchasing a back-up generator

_____ Tornado Safe Shelters

_____ Maintain roadway passage during snow storms and heavy rains

_____ Provide sufficient water supply during drought

_____ Identify residents with special needs in order to provide assistance during a natural hazard event

_____ Retrofit critical infrastructure(public water supplies, schools, sewage treatment facilities, bridges, hospitals and other important services) to reduce potential damages

_____ Other (please specify): _____

6. What are the most effective ways ***for you*** to receive information about how to make your household and property safer from natural disasters? (Please check all that apply.)

_____ Newspapers
_____ Television
_____ Radio
_____ Internet
_____ Schools
_____ Mail
_____ Fact Sheet/Brochure
_____ Extension Service
_____ Public Workshops/Meeting
_____ Fire Department/Law Enforcement
_____ Public Health Department
_____ Municipal/County Government
_____ Other (please specify): _____

Thank you for your time in assisting with the development of the County's All Hazards Mitigation Plan.

Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee

[this page is intentionally left blank]

FREQUENTLY ASKED QUESTIONS FACT SHEET

APPENDIX E

Frequently Asked Questions

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee

1) What is the Logan County All Hazard Mitigation Plan?

The Logan County All Hazard Mitigation Plan evaluates damage to life and property from storms and other natural hazards, including man-made hazards, in this county and identifies projects and activities that can reduce these damages. The Plan is considered to be multi-jurisdictional because it includes municipalities and institutions who want to participate.

2) What is hazard mitigation?

Hazard mitigation is any action taken to reduce or eliminate long-term risk to life and property from a natural or man-made hazard.

3) Why is this Plan being developed?

The Plan fulfills federal planning requirements of Section 104 of the Disaster Mitigation Act of 2000 and the Stafford Act. Three key benefits this plan will provide Logan County are:

a) Funding following declared disasters.

b) Funding for mitigation projects and activities before disasters occur.

c) Increased awareness about natural and man-made hazards and closer cooperation among the various organizations and political jurisdictions involved with emergency planning and response.

4) Who is developing this Plan?

The Logan County All Hazards Mitigation Planning Committee is preparing the Plan with assistance from technical experts in emergency planning, environmental matters, and infrastructure. The Committee includes members from agriculture, business and economic development, emergency services, municipal, county and state government, health care, insurance, law enforcement, and institutions such as the American Red Cross.

5) How can I participate?

You are invited to attend public meetings of the Logan County All Hazards Mitigation Planning Committee. In addition you are encouraged to provide photographs, other documentation, and anecdotal information about damages you experienced with natural and man-made hazards in Logan County. Surveys will be available at participating municipalities and through Logan County to help gather specific information from residents. All of this information will be used to draft the Plan. The draft Plan will be presented in a public forum for further public input.

More information can be obtained by contacting:

Terry Storer
Logan County Emergency Management Agency
911 Pekin Street
Lincoln, Illinois 62656
(217) 732-9491
loganema@lincolnil.us

THE ELKHART ECHO NEWSLETTER
SEPTEMBER 2012 EDITION

APPENDIX F

ELKHART ILLINOIS 1855

The Elkhart Echo

September 2012 www.elkhartillinois.us Vol. 27 Issue 9

VILLAGE BOARD NEWS

Mayor Steve Anderson called the meeting to order on September 10, 2012 at 6:30 P.M. in the Elkhart Village Hall. The meeting was opened with the Pledge of Allegiance. Roll call was taken. Answering present: Dave Barker, Lyle Fout, Brian Hinds, Peggy Lee, Lynnette Maske, and Nancy Moore. Clerk Ann Curry, Treasure Edie Fairchild, and attorney Don Behle were also present. Visitors present were Joe Olson and Irwin Sass of ICG Illinois and Curt and Dana Hudson.

Motion by Lyle Fout, second by Nancy Moore to approve the minutes of the August 6, 2012 meeting. Roll call vote. All yeas. No nay. Motion carried.

Motion by Brian Hinds, second by Lyle Fout to approve the executive session minutes of the August 6, 2012 meeting. Roll call vote. All yeas. No nay. Motion carried.

Motion by Brian Hinds, second by Nancy Moore to authorize expenditures. Roll call vote. All yeas. No nay. Motion carried.

Joe Olson from ICG Illinois reported that the coal mine will be getting rid of the oldest parts of the mine. They will need to run a new water line that will go out from the coal mine entrance and under the road. This new line will run along at the side of the overland belt to the Williamsville mine. There was a discussion about the casing needed for this underground pipe. Joe said that it will be steel casing and not plastic if that's what the board wants. Joe also said the mine will not be using any more water than they are currently using. They will be monitoring the usage. Joe was also questioned about what is our assurance that they won't be using more water? Joe gave his word that they will not be using more water.

It was stated that the sales tax is no longer going to Elkhart and now going to Williamsville, is there anything in this for Elkhart? The mine is going to donate $10,000.00 to Elkhart. They will be making an annual donation to the village to help offset the loss of the sales tax revenue.

Motion by Dave Barker, second by Lyle Fout to approve the Highway Right-of Way Permit for ICG Illinois, LLC. Roll call vote. Five yeas. No nay. One present. Motion carried.

Curt and Dana Hudson from Hudson's Talk of the Town stated that the state has changed the gambling rules and have closed down the gambling machines in the state. They would like to have these machines in their bar but our liquor ordinance currently says no gaming in it. We would need to amend this ordinance to take the no gaming out. The village would get 5% income from the profit on these machines. A company would come in and set up the machines for them. You have to be 21 to play. The most machines each liquor license can have are 5. The village will amend the ordinance to allow for gaming.

Steve met with Sam McLean from the railroad concerning the high speed rail. They will be putting in a new line next to the current line. This could interfere with the new water line that would be put in. The water line will be up to the railroads specifications. The railroad will help out if we need to replace the water line that was just put in 5 years ago. There is raw sewage in the ditch next to the railroad tracts. This problem would have to be fixed before the new rail is put in. They would find out who is doing this by putting die in the homes and seeing where it comes out.

There has been a problem with people pulling up the JULIE flags. These flags are not to be moved until 14 days after they have been set. If they are removed and something is hit in the dig you are liable for it.

The fiber optic company that had the JULIE locate along Kennedy Road can't decide where they want their lines to go so they want another JULIE locate. Steve said the village will not be doing another locate just because they can't figure out what they are doing.

POLICE
There were 41 traffic stops, 1 motorist assist, and 1 arrest.
Joe would like for the village to be able to get things from the federal surplus. There is a $150.00 annual fee for this. They might have a wider variety of things. We will first check out what kind of things they have and if we see that it is worth it we will pay the annual fee to join.

ATTORNEY
No report.

LIQUOR
No report.

TIF REPORT
No report.

WATER/SEWER DEPARTMENT
There was a problem with the relay on the hill but it has been fixed.
Some residents had questioned their high water bills.

STREETS/ALLEYS
No report.

BUILDINGS/VILLAGE PROPERTIES/EQUIPMENT
No report.

VILLAGE PARK
No report.

SOLID WASTE
No report.

PUBLIC HEALTH AND SAFETY
Pat Fry property still needs to be addressed.

FINANCE
Dave will check with Edie on the new accounting structure.

LOCAL EVENTS LIAISON
The signs are up on I-55. The mine will pay the annual rental fee for this.

OLD BUSINESS
We had told NAG that we would help pay for new Christmas decorations. We will give $500.00 to NAG for this.

NEW BUSINESS
The December meeting will need to be changed due to the caucus being on December 3, 2012.
Motion by Lyle Fout, second by Nancy Moore to change the December board meeting to December 10, 2012 at 6:30 p.m. Roll call vote. All yeas. No nay. Motion carried.

RESOLUTIONS
None

ORDINANCE
None

ADJOURNMENT
Motion by Brian Hinds, second by Lynnette Maske to adjourn at 7:59 p.m. Voice vote. All yeas. No nay. Motion carried.

Submitted By
Ann Curry
Village Clerk

If anyone wants to reserve the park pavilion or apply for a building permit, they are to contact Ann Curry at 737-4982.

Village Board Help needed

The Village Board is looking for a substitute part-time treasurer. They would perform all the treasurer's duties when she is absent. Please send a letter to the village if interested, or call Steve Anderson. 217-871-9288.

RECYCLING NEWS

Household Hazardous Waste Collection

Date: Sept. 22, 2012
Hours: 8 am to 3 pm
Place: IL State Fairgrounds, Lot 21. Enter Gate 11 off Sangamon Ave.

The following items **will be accepted** – Paints (not latex), thinners, chemical cleaners, unwanted pharmaceuticals, mercury and mercury-containing items, antifreeze, motor oil, gasoline, kerosene, weed killers, insecticides, pesticides, adhesives, hobby chemicals, household batteries (not lead acid batteries), fluorescent and other high-intensity discharge lamps.
The following items **will NOT be accepted** – Explosives, fire extinguishers, smoke detectors, medical waste, sharps, controlled substances, agricultural chemicals, business wastes, propane tanks, lead acid batteries.

For more information, visit www.epa.state.il.us/land/hazardous-waste

****



Do You Have Storm Stories or Photos?

Remember the ice storm of March 1978? Remember the flood of July 1981? And who can forget the tornadoes in 1995 and again in 2009?

The Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee is putting together information on natural disasters in Logan County. They are going to draft a plan for Logan County disaster preparedness. The plan will identify projects and activities that can help reduce disaster damage. They need our help in documenting natural disasters in Elkhart since 1978!

Please share your stories and/or photos of Elkhart weather-related disasters. If you have the information, please include dates and any known dollar amounts of damages. You can email it to Peggy Lee peg.lee1@gmail.com or mail it to: Peggy Lee, 8 Governor's Drive, Elkhart. We'll get everything to the committee so Elkhart is included in the documentation for this important project.

The program is also asking for help in completing a Questionnaire. It is included in this ECHO for your convenience. Please take a moment to complete the questionnaire and mail it to: Andrea Bostwick, Johnson, Depp & Quisenberry, 6450 S. 6th Street Rd., Ste. B, Springfield, IL 62712. A description of the Logan County All Hazard Mitigation Plan is also included in this issue of the EHCO.

For more copies or information, contact Peggy Lee. It is beneficial to Elkhart that we provide the program with as much information as possible, in case of a natural disaster in the future.

Frequently Asked Questions

Logan County Multi-Jurisdictional
All Hazards Mitigation Planning Committee

1) **What is the Logan County All Hazard Mitigation Plan?**
The Logan County All Hazard Mitigation Plan evaluates damage to life and property from storms and other natural hazards, including man-made hazards, in this county and identifies projects and activities that can reduce these damages. The Plan is considered to be multi-jurisdictional because it includes municipalities and institutions who want to participate.

2) **What is hazard mitigation?**
Hazard mitigation is any action taken to reduce or eliminate long-term risk to life and property from a natural or man-made hazard.

3) **Why is this Plan being developed?**
The Plan fulfills federal planning requirements of Section 104 of the Disaster Mitigation Act of 2000 and the Stafford Act. Three key benefits this plan will provide Logan County are:

   a) Funding following declared disasters.
   b) Funding for mitigation projects and activities before disasters occur.
   c) Increased awareness about natural and man-made hazards and closer cooperation among the various organizations and political jurisdictions involved with emergency planning and response.

4) **Who is developing this Plan?**
The Logan County All Hazards Mitigation Planning Committee is preparing the Plan with assistance from technical experts in emergency planning, environmental matters, and infrastructure. The Committee includes members from agriculture, business and economic development, emergency services, municipal, county and state government, health care, insurance, law enforcement, and institutions such as the American Red Cross.

5) **How can I participate?**
You are invited to attend public meetings of the Logan County All Hazards Mitigation Planning Committee. In addition you are encouraged to provide photographs, other documentation, and anecdotal information about damages you experienced with natural and man-made hazards in Logan County. Surveys will be available at participating municipalities and through Logan County to help gather specific information from residents. All of this information will be used to draft the Plan. The draft Plan will be presented in a public forum for further public input.

More information can be obtained by contacting:

Terry Storer
Logan County Emergency Management Agency
911 Pekin Street
Lincoln, Illinois 62656
(217) 732-9491
loganema@lincolnil.us

QUESTIONNAIRE

Logan County Multi-Jurisdictional All Hazards Mitigation Plan

You can help protect lives and property from storm damage in Logan County by taking a few moments to complete this questionnaire.

1. Please indicate where you live in Logan County:

_____ Atlanta
_____ Beason
_____ Broadwell
_____ Burton View
_____ Chestervale
_____ Chestnut
_____ Cornland
_____ Elkhart
_____ Emden
_____ Hartsburg
_____ Lake Fork
_____ Latham
_____ Lincoln
_____ Lawndale
_____ Middletown
_____ Mount Pulaski
_____ New Holland
_____ San Jose
_____ Union
_____ Unincorporated Logan County

_____ Other (please specify): _____

2. Please place a check mark next to each of the natural hazards listed below that you have experienced in Logan County. (Please check all that apply.)

_____ Severe Summer Storms (thunderstorms, hail and/or lightning strikes)
_____ Floods
_____ Severe Winter Storms (snow, sleet, ice and/or extreme cold)
_____ Extreme Heat
_____ Tornadoes
_____ Earthquakes
_____ Drought
_____ Other (please specify): _____

3. Which of the natural hazards above have you encountered most frequently?

_____

4. Rank the natural hazards listed below in sequential order from 1 to 7 based on which hazard you feel poses the greatest threat. (1 = greatest threat and 7 = least threat). *Each number should only be used once.*

_____ Severe Summer Storms (thunderstorms, hail and/or lightning strikes)
_____ Floods
_____ Severe Winter Storms (snow, sleet, ice and/or extreme cold)
_____ Extreme Heat
_____ Tornadoes
_____ Earthquakes
_____ Drought
_____ Other (please specify): _____

5. What types of mitigation projects or activities are most needed in Logan County? (Please check the ***five*** you feel are most important.)

_____ Public information fact sheets and brochures describing actions residents can take to protect themselves and their property against natural hazard impacts

_____ Floodplain Ordinances

_____ Building Codes and Enforcement

_____ Sirens or other Alert Systems

_____ Flood or Drainage Protection (If selected, please check the type of flood or drainage activity that is needed below.)

____ Culvert and drainage ditch maintenance
____ Retention pond construction
____ Dam or levee construction/maintenance
____ Hydraulic studies to determine cause of drainage problems

_____ Maintain power during storms by burying power lines, trimming trees and/or purchasing a back-up generator

_____ Tornado Safe Shelters

_____ Maintain roadway passage during snow storms and heavy rains

_____ Provide sufficient water supply during drought

_____ Identify residents with special needs in order to provide assistance during a natural hazard event

_____ Retrofit critical infrastructure(public water supplies, schools, sewage treatment facilities, bridges, hospitals and other important services) to reduce potential damages

_____ Other (please specify): _____

6. What are the most effective ways ***for you*** to receive information about how to make your household and property safer from natural disasters? (Please check all that apply.)

_____ Newspapers
_____ Television
_____ Radio
_____ Internet
_____ Schools
_____ Mail
_____ Fact Sheet/Brochure
_____ Extension Service
_____ Public Workshops/Meeting
_____ Fire Department/Law Enforcement
_____ Public Health Department
_____ Municipal/County Government
_____ Other (please specify): _____

Thank you for your time in assisting with the development of the County's All Hazards Mitigation Plan.

Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee

[this page is intentionally left blank]

MEDIA OUTLETS SERVING LOGAN COUNTY AND NEWS ARTICLES

APPENDIX G

Print Media Serving Logan County

Bloomington Pantagraph (daily)
301 W. Washington St.
Bloomington, IL 61702
(309) 829-9000
newsroom@pantagraph.com
www.pantagraph.com

Decatur Herald Review (daily)
601 E. William St.
Decatur, IL 62523
(217) 421-6979
ddawson@herald-reivew.com
herald-review.com

Lincoln Courier (daily)
2201 Woodlawn Rd., Suite 350
Lincoln, IL 62656
(217) 732-2101
courier@lincolncourier.com
www.lincolncourier.com

Lincoln Daily News (daily online)
601 Keokuk St.
Lincoln, IL 62656
(217) 737-3613
ldneditor@lincolndailynews.com
www.lincolndailynews.com

Logan County Herald (daily online)
509 Pulaski St.
Lincoln, IL 62656
(217) 651-8687
marlablair@logancountyherald.com
logancountyherald.com

Mt. Pulaski-Times (semi-monthly)
PO Box 114
Mt. Pulaski, IL 62548
(217) 792-5557
times@frontiernet.net

State Journal Register
One Copley Plaza
Springfield, IL 62701
(217) 788-1300
sjr@sj-r.com
www.sj-r.com

The Lincoln Courier
July 31, 2012

Daybook

TODAY'S HIGHLIGHT IN HISTORY

JULY 31, 1942, Oxfam International had its beginnings as the Oxford Committee for Famine Relief was founded in England.

TODAY IS Tuesday, July 31, the 213th day of 2012. There are 153 days left in the year.

LOGAN COUNTY

Appendix G

EMA to forge plan to lessen damage from disasters

THE COURIER

Logan County will begin preparing a county-wide plan that will identify activities and projects to reduce the damages caused by natural hazards such as floods, snowstorms, thunderstorms, tornadoes and ice storms among others.

The plan is called a Natural Hazard Mitigation Plan and will be funded through a grant from the Federal Emergency Management Agency.

Logan County is vulnerable to severe storms and flooding, said Terry Storer, deputy director of the county EMA. Since 1965, Logan County has had 10 federal-declared disasters with flooding occurring during five of these 10disasters. These disasters occurred in 1968, 1973, 1974, 1990, 1999, 2002, 2005, 2006, 2007 and 2011.

All Logan County municipalities are invited to participate in this planning process, Storer said. Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln, Mount Pulaski, and San Jose have already committed to participate.

"There is still time for other municipalities to join the process," said Storer. "This is a 'living plan,' which will be updated annually allowing participants to add projects to the plan; however, municipalities who do not participate during the formation of the plan must wait five years before they will have the opportunity to participate again.

"Developing this plan will help us be better prepared before storms hit," Storer said. "The focus of this plan is to reduce the harm to property and residents. We have an emergency response plan. The mitigation plan is aimed at prevention so it will complement our response plan. The county and each participating municipality who adopts the plan will become eligible for federal funds for projects that might not otherwise be constructed."

A Logan County Hazard Mitigation Planning Committee has been created with representatives from each participating municipality along with technical partners and other stakeholders. Meetings of this committee will be conducted as working sessions so any interested resident can attend and ask questions. The purpose of these working sessions is to gather and discuss information that will be used to prepare the plan.

The first meeting of the committee will be held at 4 p.m. Aug. 9 at the Logan County Public Safety Complex, 911 Pekin St. The committee will meet periodically through the next several months to develop a draft plan.

"Typically plans are developed and then the public is asked to comment. With this hazard mitigation plan, input from the public will be gathered before and during its development. We will also hold a public forum after the plan is drafted, but our focus will be to gather input before the draft is completed," said Storer.

Lincoln Daily News
August 1, 2012

Wednesday, August 01, 2012

sponsored by 



Logan County EMA to begin preparing countywide plan for natural disasters

Send a link to a friend

[August 01, 2012] Logan County will begin preparing a countywide plan that will identify activities and projects to reduce the damage caused by natural hazards such as floods, snowstorms, thunderstorms, tornadoes and ice storms, among others. The plan is called a Natural Hazard Mitigation Plan and will be funded through a grant from the Federal Emergency Management Agency.



Logan County is vulnerable to severe storms and flooding. Since 1965, Logan County has had 10 federal-declared disasters, with flooding occurring during five of those 10. These disasters occurred in 1968, 1973, 1974, 1990, 1999, 2002, 2005, 2006, 2007 and 2011.

All Logan County municipalities are invited to participate in the planning process. Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln, Mount Pulaski and San Jose have already committed to participate. There is still time for other municipalities to join the process. This is a "living plan" that will be updated annually, allowing participants to add projects to the plan; however, municipalities that do not participate during the formation of the plan must wait five years before they will have the opportunity to participate again.





The first meeting of this committee will be on Aug. 9, beginning at 4 p.m., at the Logan County Public Safety Complex, 911 Pekin St. in Lincoln. The committee will meet periodically through the next several months to develop a draft plan.

"Typically plans are developed and then the public is asked to comment. With this Hazard Mitigation Plan, input from the public will be gathered before and during its development. We will also hold a public forum after the plan

"Developing this plan will help us be better prepared before storms hit. The focus of this plan is to reduce the harm to property and residents," said Terry Storer, deputy director of the Logan County Emergency Management Agency. "We have an emergency response plan. The mitigation plan is aimed at prevention, so it will complement our response plan. The county and each participating municipality who adopts the plan will become eligible for federal funds for projects that might not otherwise be constructed."

A Logan County Hazard Mitigation Planning Committee has been created with representatives from each participating municipality along with technical partners and other stakeholders. Meetings of the committee will be conducted as working sessions so that any interested resident can attend and ask questions. The purpose of the working sessions is to gather and discuss information that will be used to prepare the plan.

[to top of second column]

is drafted, but our focus will be to gather input before the draft is completed," added Storer.

[Text from file received from the Logan County Emergency Management Agency]







< Top Stories index ***Back to top***

News | Sports | Business | Rural Review | Teaching and Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law and Courts | Leisure Time | Spiritual Life | Health and Fitness | Teen Scene
Calendar | Letters to the Editor

PANTAGRAPH.COM

Bloomington Pantagraph
November 28, 2012

Logan Co. leaders creating plan to prepare area for natural disasters

NOVEMBER 28, 2012 6:00 AM • BY KEVIN BARLOW | KBARLOW@PANTAGRAPH.COM

LINCOLN — Logan County leaders know there isn't much you can do about floods, tornadoes and droughts. They also know that preparation is key to handling what happens afterward.

The Logan County Hazard Mitigation Committee will meet through the next several months to prepare a plan to reduce damages caused by natural hazards, said Terry Storer, deputy director of the Logan County Emergency Management Agency.

"We are in the process of gathering basic data right now, and then take that information and come up with a wish list of projects that would be worthwhile," Storer said.

Those projects could include building storm shelters, designing roads and bridges that are able to withstand natural disasters, developing water supplies and public information material.

The group would look for state and federal grant money to pay for the projects.

Leaders from Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are participating with Logan County in the planning process.

"The plan should become our best resource to help county and municipal officials decide what steps to take to prepare for storms and other natural hazards," said Logan County EMA Director Dan Fulscher. "After this plan is completed, comprehensive information will be available in one document to help guide those who are making decisions about how to better protect Logan County residents. We already have an emergency response plan. The mitigation plan we are developing is aimed at reducing damages before these storms hit."

The public will be asked to develop a draft plan, Storer said, and it would be presented at a public forum for review and comment. The final plan would be presented for adoption by the county and with each of the participating communities.

"It's really about identifying our weaknesses before we have something major happen so that we can address that now, instead of when it's too late," Storer said.

The committee will meet regularly, once every few months. The next meeting will likely be in January.

Decatur Herald Review
November 30, 2012

Logan County leaders fashioning emergency preparation plan

NOVEMBER 30, 2012 12:01 AM • BY KEVIN BARLOW - LEE NEWS SERVICE WRITER

LINCOLN — Logan County leaders know there isn't much you can do about floods, tornadoes and droughts. They also know that preparation is key to handling what happens afterward.

The Logan County Hazard Mitigation Committee will meet through the next several months to prepare a plan to reduce damage caused by natural hazards, said Terry Storer, deputy director of the Logan County Emergency Management Agency.

"We are in the process of gathering basic data right now, and then take that information and come up with a wish list of projects that would be worthwhile," Storer said.

Those projects could include building storm shelters, designing roads and bridges that are able to withstand natural disasters, developing water supplies and public information material.

The group would look for state and federal grant money to pay for the projects.

Leaders from Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are participating with Logan County in the planning process.

"The plan should become our best resource to help county and municipal officials decide what steps to take to prepare for storms and other natural hazards," said Logan County EMA Director Dan Fulscher. "After this plan is completed, comprehensive information will be available in one document to help guide those who are making decisions about how to better protect Logan County residents. We already have an emergency response plan. The mitigation plan we are developing is aimed at reducing damages before these storms hit."

The public will be asked to develop a draft plan, Storer said, and it would be presented at a public forum for review and comment. The final plan would be presented for adoption by the county and with each of the participating communities.

"It's really about identifying our weaknesses before we have something major happen so that we can address that now, instead of when it's too late," Storer said.

The committee will meet regularly, once every few months. The next meeting will likely be in January.

kbarlow@pantagraph.com

Logan County Herald
October 23, 2012

Tuesday, Oct 23, 2012

Go







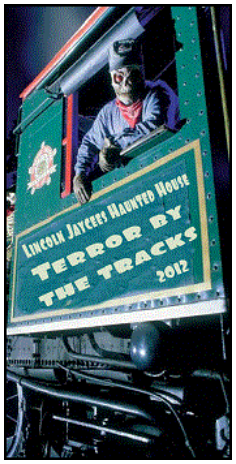




Neighborhood News
Obituaries Updated!
Contact Us
Communities
Civic Organizations
Events and Activities
Classifieds
Flyers and Coupons
Local Sports Updated!
School Beat
The Movie Man
Archives







Preventing damages caused by severe weather

Share Like 0

October 23, 2012, By Logan County EMA, The severe drought of 2012 raises important questions. How vulnerable are Logan County residents to drought and other natural hazards such as floods and tornadoes? What are the most frequently occurring natural hazards in Logan County? How much damage is caused to human health and property by natural hazards?

These questions and other related issues will be discussed when representatives from Logan County and local municipalities meet Thursday, November 1 at the Logan County Public Safety Complex on 911 Pekin Street in Lincoln. This group, the Logan County Hazard Mitigation Committee, will meet through the next several months to prepare the plan to reduce damages caused by natural hazards. The Committee meeting begins at 4 p.m. and is open to the public.

Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln, and Mt. Pulaski are participating in this planning process. "Participating in this planning process will help assure that each municipality receives all of the funds for which it is eligible when the next federally declared disaster strikes," said Terry Storer, Logan County Emergency Management Agency. There is still time for other municipalities to join the process.

"The plan should become our best resource to help county and municipal officials decide what steps to take to prepare for storms and other natural hazards. After this Plan is completed, comprehensive information will be available in one document to help guide those who are making decisions about how to better protect Logan County residents," said Dan Fulscher, Logan County Emergency Management Agency Director. "We already have an emergency response plan. The mitigation plan we are developing is aimed at reducing damages before these storms hit." he added.

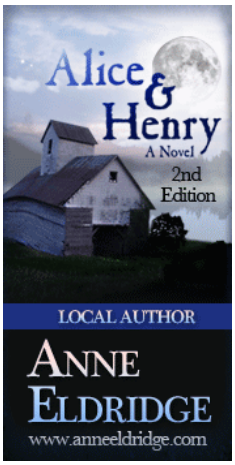
Developing public information materials, building storm shelters, designing roads, bridges, water supplies and other services to better withstand natural disasters, are some examples of the kind of projects and activities that can reduce storm damages.

Public comments will be used to develop a draft plan. After the draft plan is developed, a public forum will be held where the draft plan will be presented for review and comment. The draft plan will be revised based on comments from the public and the state and federal government agencies. Following these revisions, the plan will be presented for adoption at public meetings held by the County and at each of the participating municipalities.

"By identifying the frequency of these natural hazards and their magnitude in our county, we can better develop a strategy to reduce damages caused by these events," noted Fulscher.

Share Like 0







Lincoln Daily News
October 23, 2012

Tuesday, October 23, 2012

sponsored by 



Preventing damage caused by severe weather

From the Logan County Emergency Management Agency

Send a link to a friend

[October 23, 2012] The severe drought of 2012 raises important questions. How vulnerable are Logan County residents to drought and other natural hazards such as floods and tornadoes? What are the most frequently occurring natural hazards in Logan County? How much damage is caused to human health and property by natural hazards?



These questions and other related issues will be discussed when representatives from Logan County and local municipalities meet on Nov. 1 at the Logan County Public Safety Complex, 911 Pekin St. in Lincoln. This group, the Logan County Hazard Mitigation Committee, will meet through the next several months to prepare a plan to reduce damage caused by natural hazards. The committee meeting begins at 4 p.m. and is open to the public.

Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are participating in this planning process. There is still time for other municipalities to join the process.

"Participating in this planning process will help assure that each municipality receives all of the funds for which it is eligible when the next federally declared disaster strikes," said Terry Storer of the Logan County Emergency Management Agency.



Developing public information materials, building storm shelters, and designing roads, bridges, water supplies and other services to better withstand natural disasters are examples of the kinds of projects and activities that can reduce storm damage.

Public comments will be used to develop a draft plan. After the draft plan is developed, it will be presented for review and comment at a public forum. The draft plan will be revised



"The plan should become our best resource to help county and municipal officials decide what steps to take to prepare for storms and other natural hazards," said Dan Fulscher, director of the Logan County EMA. "After this plan is completed, comprehensive information will be available in one document to help guide those who are making decisions about how to better protect Logan County residents. We already have an emergency response plan. The mitigation plan we are developing is aimed at reducing damages before these storms hit."

[to top of second column]

based on comments from the public and state and federal government agencies. Following these revisions, the plan will be presented for adoption at public meetings conducted by the county and at each of the participating municipalities.

"By identifying the frequency of these natural hazards and their magnitude in our county, we can better develop a strategy to reduce damages caused by these events," noted Fulscher.

[Text from file received from the Logan County Emergency Management Agency]





< Top Stories index ***Back to top***

News | Sports | Business | Rural Review | Teaching and Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law and Courts | Leisure Time | Spiritual Life | Health and Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix G

The Lincoln Courier
October 23, 2012

LOGAN COUNTY

Meeting to address natural disasters

THE COURIER

Local emergency officials say the severe drought of 2012 raised important questions. How vulnerable are Logan County residents to drought and other natural hazards such as floods and tornadoes? What are the most frequently occurring natural hazards in Logan County? How much damage is caused to human health and property by natural hazards?

These questions and other related issues will be discussed when representatives from Logan County and local municipalities meet Thursday, Nov. 1, at the Logan County Public Safety Complex on Pekin Street in Lincoln. This group, the Logan County Hazard Mitigation Committee, will meet through the next several months to prepare the plan to reduce damages caused by natural hazards. The Committee meeting begins at 4 p.m. and is open to the public.

Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are participating in this planning process.

"Participating in this planning process will help assure that each municipality receives all of the funds for which it is eligible when the next federally declared disaster strikes," said Terry Storer, of the Logan County Emergency Management Agency. There is still time for other municipalities to join the process."

"The plan should become our best resource to help county and municipal officials decide what steps to take to prepare for storms and other natural hazards. After this Plan is completed, comprehensive information will be available in one document to help guide those who are making decisions about how to better protect Logan County residents," said Dan Fulscher, Logan County Emergency Management Agency Director.

SEE DISASTERS, A2

The Courier
Lincoln, IL

Tuesday, October 23, 2012

DISASTERS

From Page A1

"We already have an emergency response plan. The mitigation plan we are developing is aimed at reducing damages before these storms hit." he added.

Developing public information materials, building storm shelters, designing roads, bridges, water supplies and other services to better withstand natural disasters, are some examples of the kind of projects and activities that can reduce storm damages.

Public comments will be used to develop a draft plan. After the draft plan is developed, a public forum will be held where the draft plan will be presented for review and comment. The draft plan will be revised based on comments from the public and the state and federal government agencies. Following these revisions, the plan will be presented for adoption at public meetings held by the County and at each of the participating municipalities.

"By identifying the frequency of these natural hazards and their magnitude in our county, we can better develop a strategy to reduce damages caused by these events," noted Fulscher.

WAND TV Channel 17
November 1, 2012

< < Back

MEMBER CENTER: Create Account | Log In

SITE SEARCH WEB SEARCH BY Google Go

STORM CENTER 17 wandtv.com Champaign • Springfield • Decatur

Logan County EMA Working on County-wide Emergency Disaster Plan

Recommend Sign Up to see what your friends recommend.

Posted: Nov 01, 2012 10:20 PM CDT

Lincoln - Following the devastation in the northeast, the Logan County Emergency Management agency is revisiting its emergency plans.

On Thursday, the EMA and county wide agencies met and discussed what people can do in case of natural disasters in the area.

Disasters such as extreme drought, floods, tornadoes, blizzards, and earthquakes are all disasters that can impact people in Logan County.

Logan County's EMA director said it's important to be prepared for any kind of natural disaster.

"Let's take last year. We had one snow, a dusting. So people didn't have to worry about driving in snow, and the hazards, and the blizzards. So what's going to happen this year is if we do get the ice and snow, people are going to be driving faster and they're not going to be used to the black ice, and they're going to have to watch that," director Dan Filcher told WAND News.

Filcher also said the first thing to do when preparing for any kind of disaster is to make sure you have a NOAA weather radio handy.

WorldNow All content © Copyright 2000 - 2012 WorldNow and wand. All Rights Reserved.
For more information on this site, please read our Privacy Policy and Terms of Service.

LINCOLNDAILYNEWS.COM
Click here to return to the front

Today's Top Stories

Friday, January 11, 2013

sponsored by




Logan County Natural Hazard Mitigation Planning Committee will meet Thursday

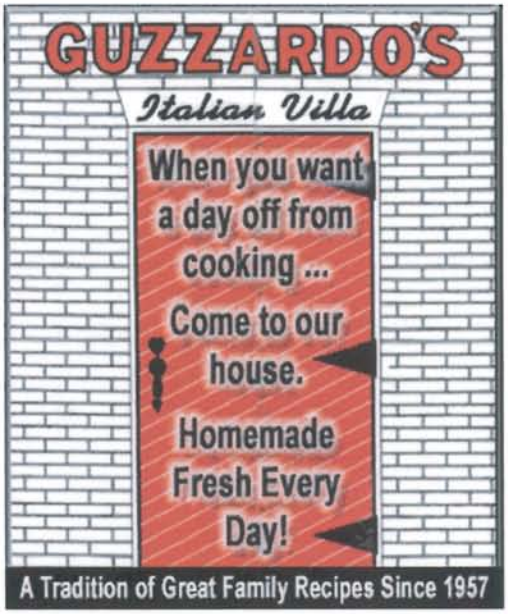
Send a link to a friend

[January 11, 2013] Steps to prevent injuries and deaths while maintaining vital services for Logan County residents when floods and severe storms hit will be discussed when the Logan County Natural Hazard Mitigation Planning Committee meets on Thursday at 4 p.m. at the Public Safety Complex, 911 Pekin St. in Lincoln. Meetings of the committee are open to the public.



This committee began work in August to prepare a plan that will identify projects and activities to protect Logan County residents and property from storms and other natural disasters. This plan, unlike all other emergency plans, is aimed at identifying projects and activities that can be taken before these disasters occur.

"Other emergency plans are directed at responding after a storm or natural disaster hits. This is the first time in Logan County that we are looking at actions that can reduce or eliminate damages caused by specific types of storms and other natural disasters," said Dan Fulscher, director of the Logan



Building storm shelters, resolving drainage problems, and retrofitting water supplies and other critical facilities to better withstand natural disasters are a few examples of the kinds of projects that might be included in the plan. Developing public information

County Emergency Management Agency.



Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are participating in this planning process.

[to top of second column]

materials and conducting drainage studies are examples of other activities that might also be included in the Natural Hazard Mitigation Plan.

"Developing a plan that is approved by the Federal Emergency Management Agency will help all the participating jurisdictions become eligible for state and federal grant money," added Terry Storer, committee chairman.

[Text from file received from Logan County Emergency Management Agency]



< Top Stories index

Back to top

News | Sports | Business | Rural Review | Teaching and Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law and Courts | Leisure Time | Spiritual Life | Health and Fitness | Teen Scene
Calendar | Letters to the Editor

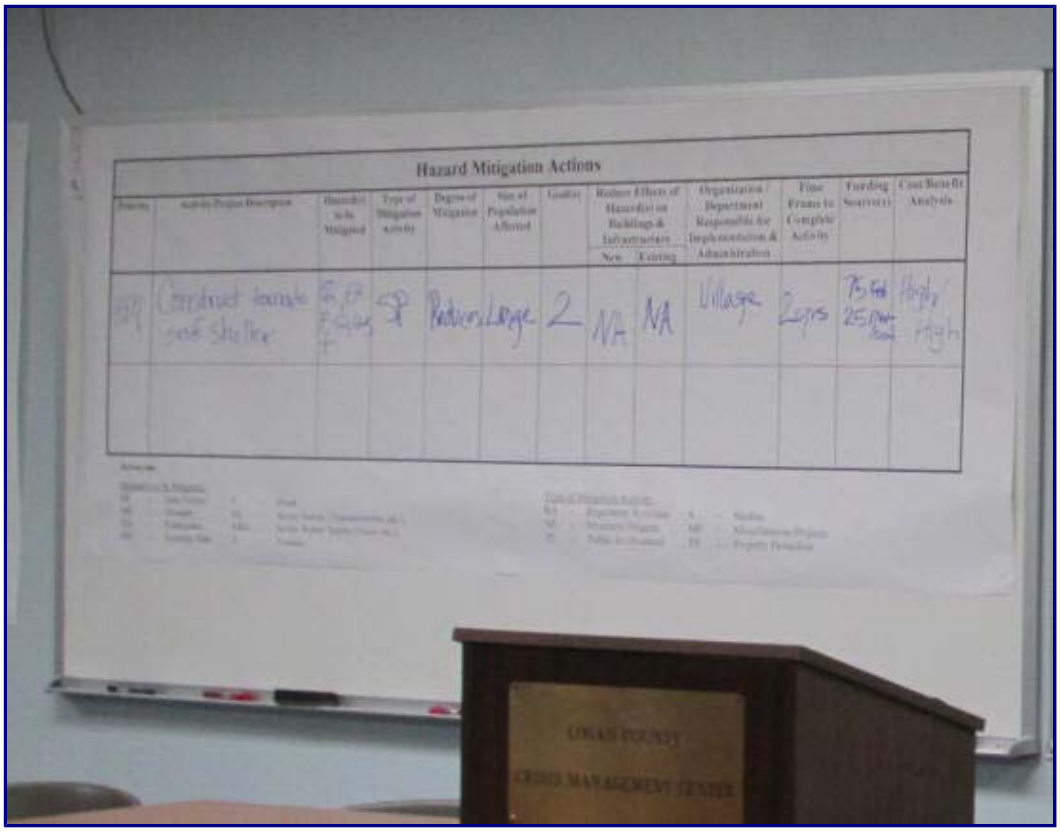
Lincoln Daily News
January 25, 2013











The Logan County All Hazards Mitigation Planning Committee met at the safety complex in Lincoln last week. Among the items discussed was a new form called a mitigation actions table. The form will help determine how to prevent large amounts of damage to critical facilities during a disaster. The form includes space for items such as funding sources, size of affected population and time frame for completion. Read more about the meeting in the story below.

Photo by Derek Hurley (Click on image for larger version.)



Community representatives think ahead on disaster recovery measures

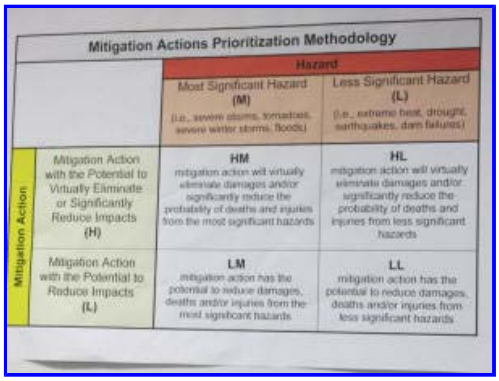
Magazines

LINCOLNDAILYNEWS.COM Click here to return to the front

Today's Top Stories

Friday, January 25, 2013

sponsored by GUZZARDO'S Italian Villa Click Here for Menu GRAUE INC.



Community representatives think ahead on disaster recovery measures

Send a link to a friend

[January 25, 2013] More than 30 people gathered at the Logan County Public Safety Complex on Jan. 17 for a meeting of the All Hazards Mitigation Planning Committee. The brief meeting provided a quick summary of the steps already taken, with a look toward the future in developing plans for mitigating potential damage from environmental sources.



Everyone in attendance was provided a packet of information with a summary of minutes from a previous meeting on Nov. 1, 2012, as well as historical and financial figures on past events that resulted in critical damage in the area.

Terry Storer opened the meeting and thanked everyone for attending. There were representatives from Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski.

Greg Michaud of Johnson, Depp and Quisenberry spoke to the group. Michaud is working with Logan County as a consultant in creating hazard mitigation plans.



Michaud said that the representatives at the meeting should find ways to work with their communities on developing a potential hazard mitigation action table.

County board member Gene Rohlfs asked about a possible example: What if the airport is



Michaud provided some statistics on previous damage in Logan County:

- Since 1950, there have been 59 tornadoes verified in Logan County. The combined damage cost $39 million and resulted in 75 injuries and one death. The average tornado is three miles long and 145 yards wide.
- Since 1951, records available show there have been 46 floods, causing at least $3.5 million in damage. While potential damage from stream flooding can be calculated (at least a quarter of a million dollars, depending on location), flash flooding is unpredictable.

Andrea Bostwick collected surveys from individuals present at the November meeting. Those surveys were focused on knowledge of previous hazards in which critical facilities were damaged.

Bostwick also demonstrated a new form that would need to be filled out by representatives of each area. The new form, called a mitigation actions table, would indicate ideas for how to prevent large amounts of damage to critical facilities. As an example, Bostwick used the building of a tornado shelter. The form includes space for items such as funding sources, size of affected population and time frame for completion.

[to top of second column]

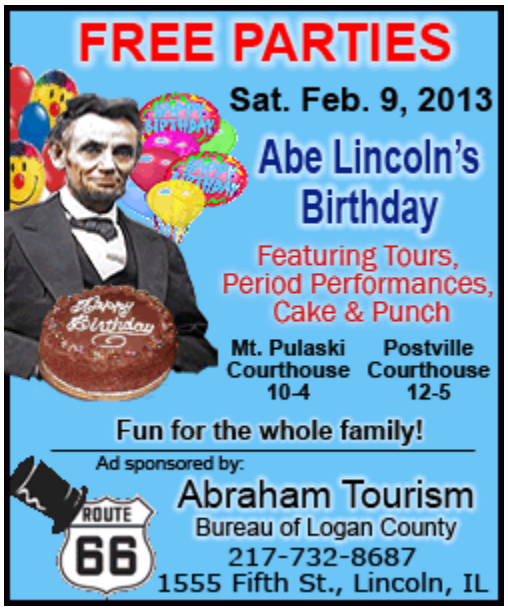
damaged in such (an event) as to lose power? Rohlfs also asked if it would be possible to include necessary supplies such as generators in this form.

Michaud replied that it would be a good idea to add details like that to the table.

"We really need the input," added Storer at the end of the meeting, who said it was good to think outside the box on this project.

The new forms will be filled out for the next meeting in the series. A date was set for June 13 at 4 p.m. in the safety complex. Bostwick said that at least one of these forms should be completed for each municipality.

[By DEREK HURLEY]



PANTAGRAPH.COM

Bloomington Pantagraph
January 30, 2013

Logan County working on being better prepared for storms, natural disasters

JANUARY 30, 2013 6:45 AM • BY KEVIN BARLOW | KBARLOW@PANTAGRAPH.COM

LINCOLN — Logan County Emergency Management Agency leaders are gathering information to prepare for events they hope never happen.

“We have learned a lot and have reviewed some of the real threats to Logan County,” said Terry Storer, deputy director of Logan County EMA. “Based upon those findings, we will organize a list of the critical infrastructure needs from the county and ask the representatives from these areas to create a sample project that if funded, would significantly improve their ability to survive a severe event.”

That is the key to the success of the implementation of the final plan, Logan County EMA Director Dan Fulscher said.

“Other emergency plans are directed at responding after a storm or natural disaster hits. This is the first time in Logan County that we are looking at actions that can reduce or eliminate damages caused by specific types of storms and other natural disasters,” he said.

The natural hazard mitigation planning committee was formed in August to prepare a plan that will identify projects and activities to protect Logan County residents and property from storms and other natural disasters. Leaders from Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are participating.

Storer said the committee will meet during the spring to categorize the list, which will be placed in the EMA’s master plan for natural disasters. Eventually, a final plan will be submitted to EMA and the committee will prepare grant requests for funding opportunities.

Building storm shelters, resolving drainage problems, retrofitting water supplies and other critical facilities to better withstand natural disasters are a few examples of the kind of projects that might be included, Storer said.

“It could be as simple as a back-up generator at a municipal water well, adding more sirens in a rural area or even improving roads to make it easier for the heavy rescue equipment like fire trucks to maneuver,” he said.

Storer said input from the public is vital because not all committee members are going to be aware of isolated problems such as frequent localized flooding areas.

“The fact that we are just getting together and discussing some of the scenarios puts us in a better position because we are talking about different scenarios throughout the county and identifying some problem areas and some solutions,” he said.

Decatur Herald Review
January 30, 2013

Logan County studies way to improve disaster readiness, recovery

JANUARY 30, 2013 12:01 AM • BY KEVIN BARLOW - LEE NEWS SERVICE WRITER

LINCOLN — Logan County Emergency Management Agency leaders are gathering information to prepare for events they hope never happen.

“We have learned a lot and have reviewed some of the real threats to Logan County,” said Terry Storer, deputy director of Logan County EMA. “Based upon those findings, we will organize a list of the critical infrastructure needs from the county and ask the representatives from these areas to create a sample project that if funded, would significantly improve their ability to survive a severe event.”

That is the key to the success of the final plan, said Dan Fulscher, Logan County EMA director.

“Other emergency plans are directed at responding after a storm or natural disaster hits. This is the first time in Logan County that we are looking at actions that can reduce or eliminate damages caused by specific types of storms and other natural disasters,” he said.

The natural hazard mitigation planning committee was formed in August to prepare a plan that will identify projects and activities to protect Logan County residents and property from storms and other natural disasters. Leaders from Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are participating.

Storer said the committee will meet in the spring to categorize the list, which will be placed in the EMA’s master plan for natural disasters. Eventually, a final plan will be submitted to EMA, and the committee will make requests for funding opportunities.

Building storm shelters, resolving drainage problems and retrofitting water supplies to better withstand natural disasters are a few examples of projects that might be included, Storer said.

“It could be as simple as a backup generator at a municipal water well, adding more sirens in a rural area or even improving roads to make it easier for the heavy rescue equipment like firetrucks to maneuver,” he said.

Storer said input from the public is vital because not all committee members are going to be aware of isolated problems, such as frequent localized flooding areas.

“The fact that we are just getting together and discussing some of the scenarios puts us in a better position because we are talking about different scenarios throughout the county and identifying some problem areas and some solutions,” he said.

kbarlow@pantagraph.com

Lincoln Daily News
June 11, 2013

LINCOLNDAILYNEWS.COM Click here to return to the front

Today's Top Stories

Tuesday, June 11, 2013

sponsored by GUZZARDO'S Italian Villa Click Here for Menu

Logan County Natural Hazards Mitigation Planning Committee meeting scheduled for Thursday

Send a link to a friend

[June 11, 2013] Projects and activities to protect residents and property from storms and other hazards will be discussed at the Logan County Natural Hazards Mitigation Planning Committee meeting on Thursday, June 13, at the Logan County Public Safety Complex, 911 Pekin St. in Lincoln. The meeting begins at 4 p.m. and is open to the public.



"Severe storms frequently cause damages to buildings, crops, roads and other critical infrastructure in this area and across Illinois. Since 1950 Logan County has had more tornadoes than any Illinois county except for McLean and Champaign. In addition, we have experienced an increase in the severity of heavy rainfall events during the last two decades. Taking preventative steps reduces the number of personal injuries and the amount of dollars lost," according to Terry Storer, Logan County Emergency Management Agency.

Logan County has an emergency response plan, but not a mitigation plan.

"Emergency response plans prescribe what actions should be taken after a storm hits. This mitigation plan identifies actions that should be taken before a storm occurs," Storer said.

Taking the publication of LOCAL NEWS Kicking and screaming into the 21st century!
LINCOLNDAILYNEWS.COM News and commentary from our community
www.lincolndailynews.com

Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are municipalities participating in the planning process.

While the public has provided input on portions of the plan, the entire plan will be presented for public review and comment before it is submitted to the state and federal government for approval.

[to top of second column]



"A public forum will be conducted this fall for interested persons to review the plan and ask questions of committee members. A two-week public comment period will be established to accommodate interested persons who are unable to attend the forum. We want to make sure that anybody who is interested has an opportunity to review and comment on the draft plan," said Storer.

"In addition, a copy of the draft plan will be placed on the county website for residents to view. We want to make it as easy as possible for all residents to view this draft plan so that they can read about what type of storm damage reduction projects are being considered," he added.

People interested can submit questions and comments to the committee members or directly to the Logan County Emergency Management Agency.

[Text from file received from the Logan County Emergency Management Agency]

Find what you need Locally!
Logan County Business Directory

Appendix G

AN EDITION OF
THE STATE Journal Register
Serving the Logan County area
Established 1856

The Courier

2009 & 2010 General Excellence Award Illinois Press Association

Tuesday, October 8, 2013 www.lincolncourier.com | Lincoln, Ill. 75 cents

Appendix G

Storm damages plan to be presented

For The Courier

Projects and activities to prevent injuries, deaths and property damage from major storms will be presented for public comment in the Logan County Natural Hazards Mitigation Plan. The Plan will be available for review at a public forum from 5 to 7 p.m. Oct. 17 at the Lincoln Park District, 1400 Primm Road, Lincoln. Members from the Logan County Natural Hazards Mitigation Planning Committee will be available to discuss this Plan.

"Persons can come and go at their convenience to review the plan and comment. If someone only has a few minutes to review the plan, ask a question, or comment, they can easily do so at anytime during the forum. This forum is designed to accommodate busy schedules. Unlike some conventional meetings, there are no formal presentations forcing attendees to wait before they are allowed to speak," according to Terry Storer, Logan County Emergency Management Agency.

Approximately 160 projects and activities were identified to protect Logan County residents and property from storms and other natural disasters. This plan, unlike all other emergency plans, is aimed at identifying projects and activities that can be taken before a natural disaster occurs. This Committee has been conducting working meetings open to the public since August, 2012.

"We have received public input to develop this Plan throughout the planning process. This input has included photographs, verifiable information about storms and insurance claims about damages as well as specific suggestions about potential projects that could reduce harm to people and property. This forum is an opportunity to

SEE DAMAGES, A2

DAMAGES

From Page A1

see the entire draft plan," added Storer.

Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are municipalities participating in the planning process.

Abraham Lincoln Memorial Hospital, American Red Cross, Country Financial, Mount Pulaski Rural Fire Protection District # 2 (Chestnut), and the Logan County Farm Bureau also served on the Committee.

A public comment period will remain open until October 31. Comments can be directed to the Logan County Emergency Management Agency. Following the public comment period, any revisions that are needed will be made before the Plan is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for approval.

Lincoln Courier
October 8, 2013

Lincoln Daily News
October 11, 2013

LINCOLNDAILYNEWS.COM Click here to return to the front

Today's Top Stories

Friday, October 11, 2013

sponsored by GUZZARDO'S Italian Villa Click Here for Menu

Logan EMA to host public forum on plan to reduce storm damage

Send a link to a friend 0 0

[October 11, 2013] Projects and activities to prevent injuries, deaths and property damage from major storms will be presented for public comment. The Logan County Natural Hazards Mitigation Plan will be available for review at a public forum on Oct. 17 from 5 to 7 p.m. at the Lincoln Park District, 1400 Primm Road in Lincoln.



Members from the Logan County Natural Hazards Mitigation Planning Committee will be available to discuss this plan.

"Persons can come and go at their convenience to review the plan and comment. If someone only has a few minutes to review the plan, ask a question or comment, they can easily do so at any time during the forum. This forum is designed to accommodate busy schedules. Unlike some conventional meetings, there are no formal presentations forcing attendees to wait before they are allowed to speak," according to Terry Storer of the Logan County Emergency Management Agency.



Approximately 160 projects and activities were identified to protect Logan County residents



Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski are municipalities participating in the planning process.

Abraham Lincoln Memorial Hospital, American Red Cross, Country Financial, Mount Pulaski Rural Fire Protection District 2 in Chestnut and the Logan County Farm Bureau also served on the committee.

A public comment period will remain open until Oct. 31. Comments can be directed to the Logan County Emergency Management Agency. Following the public comment period, any revisions that are needed will be made

and property from storms and other natural disasters. This plan, unlike all other emergency plans, is aimed at identifying projects and activities that can be done before a natural disaster occurs. The committee has been conducting working meetings open to the public since August 2012.

"We have received public input to develop this plan throughout the planning process. This input has included photographs, verifiable information about storms and insurance claims about damages, as well as specific suggestions about potential projects that could reduce harm to people and property. This forum is an opportunity to see the entire draft plan," added Storer.

[to top of second column]

before the plan is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for approval.

[Text from file received from Logan County Emergency Management Agency]





< Top Stories index ***Back to top***

PANTAGRAPH.COM

Bloomington Pantagraph
October 15, 2013

Logan County identifies pre-disaster projects

20 HOURS AGO • BY KEVIN BARLOW L KBARLOW@PANTAGRAPH.COM

LINCOLN — Logan County leaders have identified about 160 projects and activities as they look to protect the county from storms and other natural disasters.

Members of the Logan County Natural Hazards Mitigation Planning Committee will unveil the proposals at a public forum from 5 to 7 p.m. Thursday at the Lincoln Park District.

“We have received public input to develop this plan throughout the planning process,” said Terry Storer of the Logan County Emergency Management Agency. “This input has included photographs, verifiable information about storms and insurance claims about damages, as well as specific suggestions about potential projects that could reduce harm to people and property.”

The plan is aimed at identifying projects and activities that can be done before a natural disaster occurs. The committee has been conducting workshop meetings since August 2012 with representatives from the county and towns of Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski.

“It’s really a great project and I feel we accomplished quite a bit,” said Atlanta Mayor Fred Finchum. “This gave us the opportunity to identify some needs, do some research on what it will take to fix those needs, and the next step is to look for grant money so we can make the necessary changes.”

The plan will be submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for approval.

“A lot of us in the rural communities have similar problems,” Finchum said. “We have storm tiles that are 100 years old and they don’t drain the way we would like them to drain. So, that sometimes floods the streets. That sometimes floods the yards. That sometimes floods basements. Other towns have the same problem and we can combine our efforts somewhat and look for solutions, and more importantly, federal funding, to help fix those problems.”

Finchum hopes to find answers so city leaders can communicate with residents quickly in case a major incident happens.

“With today’s technology – and several schools and communities already have it through cell phones – we want to be able to quickly inform people if there is some type of emergency or evacuation necessary,” he said. “It is something we have identified that is important to us, but I think overall, this project will go a long way in helping to make our county a safer place.”

Decatur Herald Review
October 15, 2013

Logan County gathers disaster prep ideas

13 HOURS AGO • BY KEVIN BARLOW - LEE NEWS SERVICE WRITER

LINCOLN — Logan County leaders have identified about 160 projects and activities as they look to protect the county from storms and other natural disasters.

Members of the Logan County Natural Hazards Mitigation Planning Committee will unveil the proposals at a public forum from 5 to 7 p.m. Thursday at the Lincoln Park District.

“We have received public input to develop this plan throughout the planning process,” said Terry Storer of the Logan County Emergency Management Agency. “This input has included photographs, verifiable information about storms and insurance claims about damages, as well as specific suggestions about potential projects that could reduce harm to people and property.”

The plan is aimed at identifying projects and activities that can be done before a natural disaster occurs. The committee has been conducting workshop meetings since August 2012 with representatives from the county and towns of Atlanta, Broadwell, Elkhart, Emden, Hartsburg, Lincoln and Mount Pulaski.

“It’s really a great project, and I feel we accomplished quite a bit,” said Atlanta Mayor Fred Finchum. “This gave us the opportunity to identify some needs, do some research on what it will take to fix those needs, and the next step is to look for grant money so we can make the necessary changes.”

The plan will be submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for approval.

“A lot of us in the rural communities have similar problems,” Finchum said. “We have storm tiles that are 100 years old, and they don’t drain the way we would like them to drain. So, that sometimes floods the streets. That sometimes floods the yards. That sometimes floods basements. Other towns have the same problem, and we can combine our efforts somewhat and look for solutions — and more importantly, federal funding — to help fix those problems.”

Finchum hopes to find answers so city leaders can communicate with residents quickly in case a major incident happens.

“With today’s technology — and several schools and communities already have it through cellphones — we want to be able to quickly inform people if there is some type of emergency or evacuation necessary,” he said. “It is something we have identified that is important to us, but I think overall, this project will go a long way in helping to make our county a safer place.”

kbarlow@pantagraph.com



Wednesday, October 16 2013, 06:45 PM CDT

Logan County Plans For Natural Disasters

Natural disasters can't be prevented, but Logan County leaders are making sure they're prepared for them. Officials there have spent the past year and a half developing a plan for worst-case scenarios. This project is all about being ready, by identifying what can be done to prepare for a natural disaster now so Logan County communities will have an easier cleanup later.

The catch is that projects in the plan can't be funded until a natural disaster hits.

"Once FEMA makes the money available post-disaster, the state of Illinois would contact us saying they'd be taking applications for projects based on the cost of the supporting disaster," Terry Storer, the Deputy Director of Logan County's Emergency Management Agency, said.

That means when federal emergency management assistance becomes available, work in Logan County can begin. It also mean what are often times multi-million dollar projects, won't cost Logan County taxpayers any extra money.

"Our biggest job will be, as funds become available, that we're letting everybody know they're available, making sure that their projects are written properly so they can go after that money and get the money," Logan County EMA Director Dan Fulscher said.

City and county officials have been working together to develop the natural disaster mitigation plan.

Appendix G

It names more than 160 projects in the plan, ranging from road and bridge projects to storm drain improvements. Basically they're identifying projects that will help prepare for a natural disaster, and plans to have in place to clean up directly after a disaster.

Officials worked with the National Weather Service office in Lincoln to find out which projects would get the highest priority.

"We shared information with them about frequency of tornadoes, and certain strengths of tornadoes, frequency of certain amounts of rainfall, extreme rainfall events and flooding, a lot of winter weather statistics," Meteorologist Chris Miller said.

The disaster mitigation plan includes public input. Some people were concerned with frequently flooded streets that directed water into their basements. Keeping drivers safe was also isolated as a major concern.

"If we see a road that floods too often or a bridge that's undersized, this is a possible way to get some funding to reduce the hazards associated with that," Logan County Engineer Bret Aukamp said.

You can tell Logan County officials what you think of their plans. They'll be presenting their ideas at a public forum Thursday, from 5-7 p.m. at the Lincoln Park District.

Like 0 Tweet 0 0

Appendix G

Lincoln Dail News
November 11, 2013

LINCOLNDAILYNEWS.COM Click here to return to the front

Today's Top Stories

Monday, November 11, 2013

sponsored by 

New Logan County Hazards Mitigation Plan heads into approval processes

Send a link to a friend 0 0

[**November 11, 2013**] **A** new Logan County plan aimed at preventing loss of life and reducing property damage is now completed and being readied for several steps of approval processes.



The Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee met on Oct. 17 for its last session. The committee's work, which took a year, was to identify needs, define and rank projects related to hazards that could affect lives, health and property in Logan County.

The Logan County Hazards Mitigation Plan is the result of a nearly five-year process spearheaded by the Logan County Emergency Management Agency, with deputy director Terry Storer in charge of developing the plan.

The committee's planning stage was led by consultant Greg Michaud, an environmental specialist, and Andrea Bostwick, an environmental analyst, both of Johnson, Depp & Quisenberry of Springfield.

Storer said that contracting with a consultant for this stage was the best way to go. It definitely saved on costs, and Storer said he felt that they got the job done quicker and better this way. The consulting firm had templates already developed and knew what they were doing. Storer said it had been good to work with Michaud and Bostwick.



What types of projects are in the Logan County plan?

The committee began by considering past disaster records.

Since 1950, there have been 59 tornadoes verified in Logan County. The combined damage cost $39 million and resulted in 75 injuries and one death. The average tornado is 3 miles long and 145 yards wide.

Since 1951, records available show there have been 46 floods, causing at least $3.5 million in damage. While potential damage from stream flooding can be calculated (at least a quarter of a million dollars, depending on location), flash flooding is unpredictable.

Appendix G

Remington Seeds, LLC
Contract Production, Packaging and Distribution of Quality Seed
1615 State Route 10 Ph. 217-735-4488
Lincoln, IL 62656 Fax: 217-732-1706
www.remingtonseeds.com

The committee consisted of representatives from governmental jurisdictions within Logan County and other public sectors, such as agencies associated with health care, insurance, GIS, agriculture and emergency services, including law enforcement and fire departments. Entities included the cities of Atlanta, Mount Pulaski and Lincoln; the villages of Emden, Hartsburg, Broadwell, Elkhart and San Jose; the Logan County offices of assessments, board, clerk, EMA, 911 dispatch, highway, public health, sheriff, zoning/GIS; the Logan-Mason-Menard Regional Office of Education; Mount Pulaski Rural Fire Protection District 2 (Chestnut); Abraham Lincoln Memorial Hospital; Illinois Central Management Services; Anita Frizzell; and plan consultants from Johnson, Depp & Quisenberry.

What was put in the Logan County plan?

Projects related to the most frequent types of damage, primarily weather-related, in Logan County.

So, what does having a plan do for Logan County?

Much like having a Comprehensive Economic Development Strategy, or CEDS, which correlates with a Comprehensive Plan of community and county infrastructure needs, the All Hazards Mitigation Plan is linked to the Logan County EMA's Emergency Response Plan. The Hazards Mitigation Plan enables greater access to funding, grant money primarily, that would aid in prevention or recovery from disasters, with some funding that otherwise might not be accessible.

During the final half-hour meeting that took place two weeks ago, the committee learned more about getting those funds.

Before applications can begin, the plan needs

Natural and man-made hazards included in the Logan County All Hazards Mitigation Plan include:

- Severe storms with hail, lightning or heavy rain.
- Severe winter storms with snow, ice and extreme cold.
- Flooding.
- Extreme heat.
- Drought.
- Earthquakes.
- Dams.
- Man-made hazards:
    - Hazardous substances (generation and transportation).
    - Waste disposal.
    - Waste management.
    - Terrorism.

The committee identified that in Logan County, high wind and tornado damage should be of greater concern than flooding.



Below is a small sampling of actual projects in the drafted plan:

- In the county: Storm siren systems, safe shelter in the Logan County Courthouse, backup generators at the airport, grounding system at the courthouse to protect critical systems from a lighting strike or an electromagnetic pulse event.

- For Beason and Chestnut: Fire hydrants in Beason, and a water storage tower to aid in suppressing fires in the Chestnut-

to go to state and federal levels for approvals. Then the Logan County plan comes back down to the local level for adoption by all the jurisdictional participants. Committee members will be notified by email when it returns.

After a jurisdiction has adopted the plan, it can apply for federal mitigation grants for projects in the plan as funds become available. In the event of a state-declared or federally declared disaster, having a plan would also assist in recovery fund applications to the Illinois Emergency Management Agency and Federal Emergency Management Agency. In addition, for other non-disaster-related grants, having projects in the plan would gain favor for those requests.



Dan Fulscher, Logan County EMA director, further elaborated on how partnering projects in the mitigation plan with other construction needs could help everyone. He illustrated with something he had heard during the county meeting just the night before. The county's animal control facility is overcrowded and needs more space. The plan is to budget each year until the saved-up fund is adequate to build.

Fulscher suggested it might be possible to add a storm shelter for neighbors in the office portion of the building project. A mitigation grant could reduce the construction costs by as much as 75 percent.

Bundling projects this way is a good use of dollars and does more for a community, he pointed out. Fulscher encouraged everyone to look at their projects in the plan and "think outside the box;" bundling mitigation needs with other community needs if possible.

Michaud complimented the participants for their work in choosing potential projects. He observed that disasters throughout the world, in the U.S. and in Illinois in the past year

Beason area.

- In the countryside: Various flood management and relief actions were proposed, particularly to prevent flooded roadways. Examples included increasing the culvert size to prevent roadway flooding at 875th Street, and cleaning brush and debris out of waterways at bridge and culvert locations within the township.
- Elkhart's plan included potential hazards related to the Viper mine, such as if the dam would be breached. The plan proposes creating flood plains.
- To protect our children, hardening materials are proposed for Logan County school windows. This would include window safety films. And, make the buildings resistant to natural and man-made hazards.

Following the last meeting of the committee, there was an open house for the public to review and comment on the proposed document. A two-week comment time concluded on Oct. 31.

Now, any public comments that were submitted would be added by the consultants, and Storer said that within the next few weeks, the document would be submitted to IEMA. If approved by IEMA, it will go on to FEMA for approval.

What's in the future planning?

A subgroup will meet annually to update any project status, and add or amend projects for jurisdictions that are already part of the plan.

A full review of the plan and the opportunity to add jurisdictions would take place every five years.

At the conclusion of the meeting, all those who had participated were recognized with a certificate for their dedication and contributions.

"illustrate the need for mitigation planning if we are to reduce property damages, deaths and injuries from severe weather."

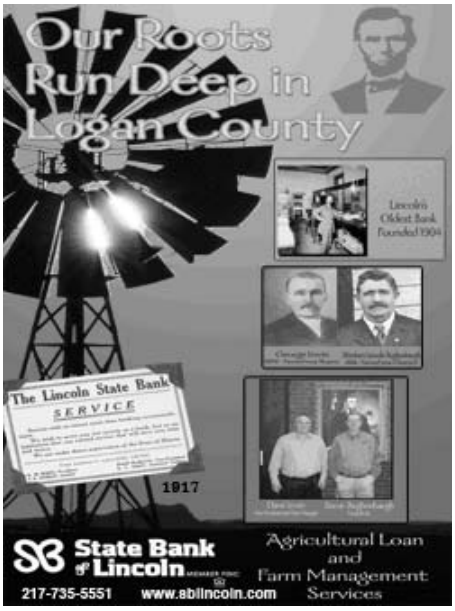
How was the plan constructed?

The plan was divided by countywide interest and community-specific interest.

A cross grid identified and rated how proposed projects might address a hazard, with listed hazards being dam failure, drought, extreme heat, earthquake, flood, severe storm, winter storm and tornado.

- Would the project reduce or eliminate the effect of the hazard?
- Type of mitigation activity needed: regulatory actions, structural projects, public involvement, studies, miscellaneous and property protection.
- Size of population affected.
- Would the project reduce hazard effects on new or existing structures and infrastructure?
- Time frame to complete project.
- Funding sources and a cost-benefit analysis.

[to top of second column]



All Hazards Mitigation Committee: Terry Carlton, Barb Kline, Fred Finchum, Mike Harrison, William Kennett, Joe Ryan, Margaret Lee, Arnold Collier, Ivan Rademaker, Tom Anderson, Dean Leesman, Mark Miller, Gene Rohlfs, Sally Litterly, Shana Altman, Dan Fulscher, Terry Storer, Cheryl Hedrick, Alana Sorrentino, Bucky Washam, James Drew, Bret Aukamp, John Bunner, Rosanne Brosamer, Will D'Andrea, Jean Anderson, Mike Patridge, Reynold Goff, Anita Frizzell, Kirby Rogers, Chris Miller.

[By JAN YOUNGQUIST]

Past related articles

- Community representatives think ahead on disaster recovery measures
- Logan County EMA to begin preparing countywide plan for natural disasters



< Top Stories index ***Back to top***

[this page is intentionally left blank]

PUBLIC FORUM – PLANNING PROCESS HANDOUT

APPENDIX H

LOGAN COUNTY MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN

PUBLIC FORUM – OPEN HOUSE

OCTOBER 17, 2013
LINCOLN PARK DISTRICT
5:00 P.M. – 7:00 P.M.

Each year natural hazards (i.e., severe thunderstorms, tornadoes, severe winter storms, flooding, etc.) cause damage to property and threaten the lives and health of Logan County residents. Since 1965, Logan County has had 8 federally-declared disasters.

In addition, between 2002 and 2012 there have been 95 thunderstorms with damaging winds, 31 severe hail events, 26 tornadoes, 20 flood and flash flood events, 20 heavy rain events, 16 severe winter storms (snow and ice), 8 lightning strike events, 5 extreme heat events, 2 droughts, 1 extreme cold event and 1 earthquake felt by residents in the County. While natural hazards cannot be avoided, their impacts can be reduced through effective hazard mitigation planning.

What is hazard mitigation planning?

Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and man-made hazards. This process helps the County and participating municipalities reduce their risk by identifying vulnerabilities and developing mitigation actions to lessen and sometimes even eliminate the effects of a hazard. The results of this process are documented in an all hazards mitigation plan.

Why prepare an all hazards mitigation plan?

By preparing and adopting an all hazards mitigation plan, participating jurisdictions become eligible to apply for and receive federal hazard mitigation funds to implement mitigation actions identified in the Plan. These funds, made available through the Disaster Mitigation Act of 2000, can help provide local government entities with the opportunity to complete mitigation projects that would not otherwise be financially possible.

Who participated in the development of the Logan County Multi-Jurisdiction All Hazards Mitigation Plan?

Recognizing the benefits that could be gained from preparing an all hazards mitigation plan, the Logan County Board passed a resolution on March 17, 2009 authorizing the development of the Logan County Multi-Jurisdictional All Hazards Mitigation Plan. The County then invited all the local government entities within Logan County to participate. The following jurisdictions chose to participate in the Plan's development:

- Atlanta
- Broadwell
- Elkhart
- Emden
- Hartsburg
- Lincoln
- Logan, Mason & Menard Counties Regional Office of Education
- Mount Pulaski
- Mount Pulaski Rural Fire Protection District #2 (Chestnut)

LOGAN COUNTY MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN

How was the Plan developed?

The Logan County Multi-Jurisdictional All Hazards Mitigation Plan was developed through the Logan County Multi-Jurisdictional All Hazards Mitigation Planning Committee. The Planning Committee included representatives from each participating jurisdiction, the general public as well as agriculture, emergency services (Red Cross, fire and law enforcement), healthcare, GIS and insurance. The Planning Committee met five times between August 2012 and October 2013.

Which natural and man-made hazards are included in the Plan?

After much discussion, the Planning Committee chose to include the following natural and man-made hazards in this Plan:

- severe storms (thunderstorms, hail, lighting & heavy rain)
- tornadoes
- severe winter storms (snow, ice & extreme cold)
- flood
- extreme heat
- drought
- earthquakes
- dams
- man-made hazards including:
  - hazardous substances (generation and transportation)
  - waste disposal
  - hazardous material incidents
  - waste remediation
  - terrorism

What is included in the Plan?

The Plan is divided into sections that cover the planning process; the risk assessment conducted on each of the previously identified natural and man-made hazards; the mitigation strategy, including lists of mitigation actions identified for each participating jurisdiction; recommendations; and plan maintenance and adoption. The majority of the Plan is devoted to the risk assessment.

This risk assessment identifies the natural and man-made hazards that pose a threat to the County and includes a profile of each natural hazard which describes the location and severity of past occurrences, reported damages to public health and property, and the likelihood of future occurrences. It also provides a vulnerability assessment that evaluates the assets of the participating jurisdictions (i.e., residential buildings, critical facilities and infrastructure) and estimates the potential impacts each natural and man-made hazard would have on the health and safety of the residents of Logan County as well as the buildings, critical facilities and infrastructure located within the County.

What happens next?

Any comments received at tonight's public forum will be are incorporated into the Plan before it is submitted to the Illinois Emergency Management Agency (IEMA) and the Federal Emergency Management Agency (FEMA) for review. Once IEMA and FEMA have reviewed and approved the Plan, it will be presented to the County and each participating jurisdiction for formal adoption. After adopting the Plan, each participating jurisdiction can apply for federal mitigation funds and begin implementation of the mitigation actions identified in the Plan.

[this page is intentionally left blank]

PUBLIC FORUM – PLAN COMMENT SHEET

APPENDIX I

LOGAN COUNTY MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN

PUBLIC FORUM – OCTOBER 17, 2013
COMMENT SHEET

The Logan County Multi-Jurisdictional All Hazards Mitigation Plan evaluates damage to life and property from natural and man-made hazards that occur in the County. This Plan also identifies projects and activities submitted by the County and each participating jurisdiction that will help reduce these damages. This comment sheet should be used to provide feedback on the draft Plan.

What comments, concerns or questions do you have regarding the draft Plan? (Use additional sheets if necessary.)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Please Print Your Name, Address, and Phone Number Below

Name: _____ Phone: _____

Address: _____

_____ Zip Code: _____

Comments will be accepted until October 31, 2013.

Place
Stamp
Here

Mr. Terry Storer
Logan County EMA
911 Pekin St.
Lincoln, IL 62656

[this page is intentionally left blank]

BUSINESS COMMUNITY PARTICIPATION PACKET

APPENDIX J

Logan County Emergency Management Agency
911 Pekin Street Lincoln, IL 62656 217-732-9491
Fax: 217-735-2244 loganema@lincolnil.us

September 17, 2012

Andi Hake, Executive Director
Lincoln-Logan Chamber of Commerce
1555 Fifth Street
Lincoln, IL 62656

Dear Andi:

Maintaining business operations after a natural disaster strikes, such as a flood, snow storm, or tornado, can be vital to customers and employees. In some instances, the ability to recover quickly can make the difference between staying in business or closing.

Logan County is developing a plan, called the Logan County All Hazards Mitigation Plan, to prevent and reduce damages caused by natural and man-made disasters. As part of this planning process, I am contacting you to inform you that your Chamber and businesses throughout Logan County will have the opportunity to review and comment on this draft plan. A public forum will be held and a two week public comment period will begin the evening of the forum. The Plan will be available on the County website for review and comment and at the offices of municipalities participating in the planning process.

Enclosed is a brochure about how businesses can prepare for disasters and a fact sheet that provides more information about the Logan County All Hazards Mitigation Plan.

If you or your members have questions about this planning process, feel free to contact me.

Sincerely,

Terry Storer
Deputy Director
Logan County EMA

Preventing Damages Caused By Storms

Severe weather in the form of floods, tornadoes, snow storms, and thunderstorms cause damage to property and human health in Illinois every year. Logan County is highly vulnerable to tornado, flash flood, and severe storm damage. Consequently, Logan County and eight municipalities will develop a plan aimed at preventing damages caused by storms. This plan, called the Natural Hazard Mitigation Plan, will focus on prevention. The County already has an emergency response plan.

Why Plan?
Preparing this plan will help accomplish three objectives:

1. ***Raise public awareness*** about storm damage

2. ***Identify activities and projects*** that can help prevent and reduce specific types of damage caused by storms

3. Make Logan County and municipalities who participate ***eligible for federal funds after a natural disaster occurs. In addition, the county and participating municipalities will become eligible for federal/state funding*** for mitigation activities and projects

How Can I Participate?
There will be numerous opportunities for Logan County residents to participate. Rather than prepare a plan and request public comment, an ongoing dialogue will be conducted throughout the development of the plan.

- Persons representing agriculture, business, communities, emergency management, government, insurance, law enforcement, public works, and utilities among other interests from across the County will be asked to provide input and serve on a **Hazard Mitigation Committee**

- **Working sessions**, open to the public, of the Hazard Mitigation Committee will be conducted to help prepare this plan and obtain comment.

- A **public forum** and a **public comment period** will be conducted to present the entire draft plan for public review and comment.

Who Can I Contact For More Information?
Questions about the plan and the planning process should be directed to:

Terry Storer or Dan Fulscher
Logan County Emergency Management Agency
911 Pekin Street
Lincoln, IL Tel: 217/732-9491 E-Mail: loganema@lincolnil.us







Why bother? Disasters don't happen here.

Even if you think you are not in a disaster-prone area, something like a chemical tanker truck overturning can prevent you and your employees from getting to your facility.

Even if a flood doesn't put your business under water, customers and supplies may not be able to get to you.

Power outages, brown-outs or surges can affect your daily business operations.

Many disasters, like wind storms, tornadoes and earthquakes, can strike quickly and with little or no warning.

What can I do?

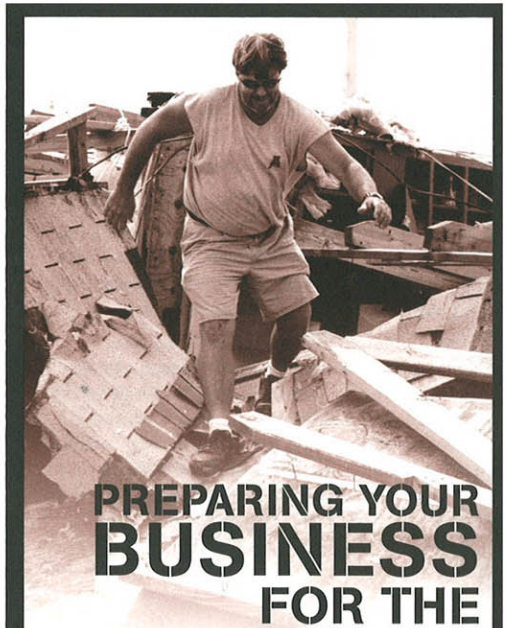
Find out which natural and technological hazards can happen in your area.

Get information about how to prepare your employees and clients to respond to possible hazards and provide help. Disaster safety information and CPR/first aid training are available from your local Red Cross chapter. Get more information at **www.redcross.org.**

Network with others who have or need to develop risk or contingency management plans.

Attend seminars and get information from local risk management associations or chapters.

ARC 1235
April 2001



PREPARING YOUR BUSINESS FOR THE UNTHINKABLE

Disasters can happen anywhere, often with little or no warning.

Is your business prepared?

What can you do to protect your business, employees and customers?

Where should you begin?

www.redcross.org

American Red Cross

Disaster Recovery Begins Before a Disaster

No business should risk operating without a disaster plan. While reports vary, as many as 40 percent of small businesses do not reopen after a major disaster like a flood, tornado or earthquake. These shuttered businesses were unprepared for a disaster; they had no plan or backup systems.

When you start to develop your disaster plan, consider three subjects: human resources, physical resources and business continuity. Think about how a disaster could affect your employees, customers and workplace. Think about how you could continue doing business if the area around your facility is closed or streets are impassable. Think about what you would need to serve your customers even if your facility is closed.

Develop a Plan

Start building your plan now.
Here are some suggestions your may want to consider:

- ➔ Keep phone lists of your key employees and customers with you, and provide copies to key staff members.
- ➔ If you have a voice mail system at your office, designate one remote number on which you can record messages for employees. Provide the number to all employees.
- ➔ Arrange for programmable call forwarding for your main business line(s). Then, if you can't get to the office, you can call in and reprogram the phones to ring elsewhere.
- ➔ If you may not be able to get to your business quickly after an emergency, leave keys and alarm code(s) with a trusted employee or friend who is closer.
- ➔ Install emergency lights that turn on when the power goes out. They are inexpensive and widely available at building supply retailers.
- ➔ Back up computer data frequently throughout the business day. Keep a backup tape off site.
- ➔ Use UL-listed surge protectors and battery backup systems. They will add protection for sensitive equipment and help prevent a computer crash if the power goes out.
- ➔ Purchase a NOAA Weather Radio with a tone alert feature. Keep it on and when the warning signal sounds, listen for information about possible severe weather and protective actions to take.
- ➔ Stock a minimum supply of the goods, materials and equipment you would need for business continuity.
- ➔ Consult with your insurance agent about special precautions to take for disasters that may directly impact your business. Remember, most policies do not cover earthquake and flood damage. Protect valuable property and equipment with special riders. Discuss business continuity insurance with your agent.
- ➔ Keep emergency supplies handy, including—
  - Flashlights with extra batteries.
  - First aid kit.
  - Tools.
  - Food and water for employees and customers to use during a period of unexpected confinement at your business, such as if a tanker truck overturned nearby and authorities told everyone in the area to stay put for an extended period.

For more information on suggested disaster supplies, see **http://www.redcross.org/services/disaster/beprepared/supplies.html.**

Reduce Potential Damage

Prevent or reduce disaster damage in your facility by taking precautions, such as—

- ➔ Bolting tall bookcases or display cases to wall studs.
- ➔ Protecting breakable objects by securing them to a stand or shelf using hook-and-loop fasteners.
- ➔ Moving to lower shelves large objects that could fall and break or injure someone.
- ➔ Installing latches to keep drawers and cabinets from flying open and dumping their contents.
- ➔ Using closed screw eyes and wire to securely attach framed pictures and mirrors to walls.
- ➔ Using plumber's tape or strap iron to wrap around a hot water heater to secure it to wall studs.

You should also consider having a professional install—

- ➔ Flexible connectors to appliances and equipment fueled by natural gas.
- ➔ Shutters that you can close to protect windows from damage caused by debris blown by a hurricane, tornado or severe storm.
- ➔ Automatic fire sprinklers.





Protect Your Employees, Customers and Business

Designate one employee from each work shift to be the safety coordinator. This person will make all decisions relating to employee and customer safety and to the safety of the business itself. Safety coordinators should know how to contact the owner or operator at all times.

Everyone in your facility should know how to prepare for a disaster and what to do if a disaster occurs. Contact your local Red Cross chapter for specific information about how to stay safe in a tornado, earthquake, fire, flood, hurricane or other hazard.

You may also want to get a copy of the *Emergency Management Guide for Business and Industry* from your Red Cross chapter or **http://www.redcross.org/services/disaster/beprepared.**

Another source of useful information is *Open for Business*, a booklet developed by the Institute for Business and Home Safety and the Small Business Administration. It is available at **http://www.ibhs.org.**



www.redcross.org

[this page is intentionally left blank]

HAZARD MITIGATION PLANNING LETTER SENT TO ADJACENT COUNTIES

APPENDIX K

Logan County Emergency Management Agency
911 Pekin Street Lincoln, IL 62656 217-732-9491
Fax: 217-735-2244 loganema@lincolnil.us

TO: McLean County (Curtis Hawk); DeWitt County ESDA (Teresa Barnett); Mason County (Greg Griffin); Macon County (Jim Root), Tazewell County EMA (Dawn Cook);Sangamon County (Dave Butt) and Menard County (Larry Graf)

From: Terry Storer, Logan County EMA

Subject: Hazard Mitigation Planning

Date: August 17, 2012

The purpose of this memorandum is to invite you to attend a planning meeting of the Logan County Natural Hazards Mitigation Committee. This committee is preparing a countywide Natural Hazards Mitigation Plan. Since we share a common border, there may be issues and concerns you have regarding this Plan. We are preparing this plan to meet the Federal Emergency Management Agency's (FEMA) prerequisite for hazard mitigation funds.

Johnson, Depp & Quisenberry, an environmental and engineering consulting firm experienced in preparing these plans, is leading our planning process.

The next meeting of the Committee will be:

Thursday, November 1
Logan County Safety Complex (Sheriff, EMA & 911 Center)
911 Pekin Street
Lincoln, IL
4 p.m. – 5 p.m.

The Committee meetings are open to the public.

If you have questions or comments on our mitigation planning effort, or if you would like to participate, please feel free to contact me. You may also contact Greg Michaud, our mitigation planning consultant, at 217/529-4534

HAZARD EVENT PHOTOGRAPHS

APPENDIX L

March 8, 2009 Thunderstorm with Damaging Winds
Unincorporated Logan County, Illinois



Damage at Gail's Pumpkin Patch north of Beason





Winds blew in garage doors and blew out the side of a building at the Mt. Pualski Products' Skelton Plant east of Lincoln

Photographs provided by Logan County EMA

August 4, 2009 Thunderstorm with Damaging Winds
Lincoln, Illinois



Photographs provided by Logan County EMA

August 4, 2009 Thunderstorm with Damaging Winds
Lincoln, Illinois



Photographs provided by Logan County EMA

August 4, 2009 Thunderstorm with Damaging Winds
Lincoln, Illinois







Photographs provided by Logan County EMA

August 4, 2009 Thunderstorm with Damaging Winds
Lincoln, Illinois





Photographs provided by Logan County EMA

April 25, 2012 Thunderstorm with Damaging Winds
Lincoln, Illinois







Photographs provided by Logan County EMA

April 25, 2012 Thunderstorm with Damaging Winds
Lincoln, Illinois



Photographs provided by Logan County EMA

April 25, 2012 Thunderstorm with Damaging Winds
Lincoln, Illinois



Photographs provided by Logan County EMA

April 25, 2012 Thunderstorm with Damaging Winds
Lincoln, Illinois



Photographs provided by Logan County EMA

April 25, 2012 Thunderstorm with Damaging Winds near New Holland, Illinois







Photographs provided by Logan County EMA

April 19, 1927 - Tornado
Cornland, Illinois





Clips provided by Chris Miller, NWS Weather Forecast Office - Central Illinois

May 9, 1995 - F3 Tornado
Elkhart & Lincoln Area, Illinois

5 miles southwest of Elkhart





Flamingo Heights Subdivision south of Lincoln - 23 homes were damaged

I-55 just south of Elkhart - 50 to 75 homes and several businesses were damaged in Elkhart



Clips provided by Chris Miller, NWS Weather Forecast Office - Central Illinois

April 4, 2003 - F1 Tornado
near Lincoln, Illinois



Tornado spotted near I-55 mile marker 123 south of Lincoln





The tornado damaged the communication tower at the backup 911 center

Photographs provided by Logan County EMA

April 4, 2003 - F1 Tornado
near Lincoln, Illinois







Photographs provided by Logan County EMA

May 30, 2004 - F0 Tornado
Morningside Trailer Park, Lincoln, Illinois







Photographs provided by Logan County EMA

May 30, 2004 - F0 Tornado
Morningside Trailer Park, Lincoln, Illinois







Photographs provided by Logan County EMA

May 30, 2004 - F0 Tornado
Morningside Trailer Park, Lincoln, Illinois



Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois







Photographs provided by Logan County EMA

August 19, 2009 - EF3 Tornado
Unincorporated Logan County, Illinois





Photographs provided by Logan County EMA

November 30, 2006 Winter Storm
Logan County, Illinois







Photographs provided by Logan County EMA

November 30, 2006 Winter Storm
Logan County, Illinois







Photographs provided by Logan County EMA

December 18, 2009 Ice Storm
Lincoln, Illinois







Photographs provided by Logan County EMA

December 18, 2009 Ice Storm
Lincoln, Illinois







Photographs provided by Logan County EMA

December 18, 2009 Ice Storm
Lincoln, Illinois







Photographs provided by Logan County EMA

December 18, 2009 Ice Storm
Lincoln, Illinois







Photographs provided by Logan County EMA

December 18, 2009 Ice Storm
Lincoln, Illinois







Photographs provided by Logan County EMA

December 18, 2009 Ice Storm
Lincoln, Illinois



Photographs provided by Logan County EMA

Erosion Control Issues
Logan County, Illinois



Structure Number 054-5409 in Prairie Creek Township. Severe erosion at upstream face.



Structure Number 054-3003 on Nicholson Road over Kickapoo Creek. This abutment was protected with riprap in 2007. The piling had been exposed for a number of years. Deferring maintenance on this bridge could have washed out the entire abutment.

Photographs and narrative provided by Bret Aukamp, Logan County Highway Engineer

Erosion Control Issues
Logan County, Illinois

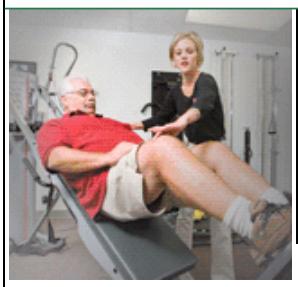


Pipe culvert washout in Atlanta Township. The County Bridge fund is used to assist the townships when repairing drainage problems that are above 0.02% of their EAV.

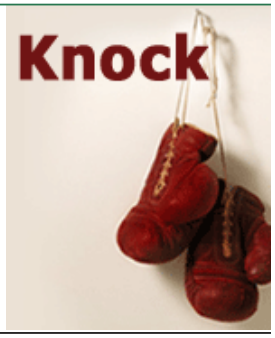
Photographs and narrative provided by Bret Aukamp, Logan County Highway Engineer

HAZARD EVENT NEW ARTICLES

APPENDIX M



LINCOLNDAILYNEWS.COM
News and commentary from our community



Logan County Treasurer Mary Ellen Bruns Click Here for TAX SEARCH
ABRAHAM LINCOLN TOURISM BUREAU
Community Action PARTNERSHIP Click for Services

In today's edition

81 Articles
82 Photos
41 Classifieds
4 Obituaries

Got a news tip? Click here to email it to us or call 217-737-3979.

Need Advertising? Click here to email us or call 217-737-7418.

HEARTLAND COMMUNITY COLLEGE Lincoln IQ Experience 217-735-1731
Ted's GREAT STEAKS! CLICK HERE
Bank of Chestnut (217) 796-3305 Member FDIC
VISIT COLDWELL BANKER DEVONSHIRE REALTY HERE
Lizzy's Place 819 Woodlawn Click for Menu & Coupons
MKS Jewelers & Gifts (Click here for savings)
State Bank of Lincoln Mortgage Lending CLICK HERE Member FDIC
Hundman LUMBER Click here to SHOP OUR GREAT WEBSITE

Friday, Aug. 21, 2009
published daily from 8am
Lincoln, Illinois

Weather Road conditions

Ad Tracker
Advertising Info

Google

Web LDN Search

Top Stories | Other News | Business | Health | Rural Review | Community | Community Calendar | Features | Sports
Home & Family | Tourism | Teaching & Learning | Obituaries | Spiritual Life | Classifieds | Business Directory | Archives

Neighbor helping neighbor follows widespread destruction

True to its nature, the Logan County community rapidly pulled together to supply labor and equipment anywhere it was needed. At every site of destruction it looked like you see here: totally organized with large equipment and lines of trucks.



Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

How did they survive?

![click on photos below to enlarge]

Joe Elias and Mark Hinds were in a Quonset to the left of a shed that this truck was in before the twister struck. The truck was moved five feet to the right. Both structures were gone and Elias was under the truck when it was over. Hinds was deposited farther back behind the pile on the left at the edge of the field. Notice the debris packed up against the passenger side of the truck, the direction where Elias had been prior to the destruction, and also the long pipes and debris against the driver's side of the truck.
How did these guys survive?

Pictures by Jan Youngquist

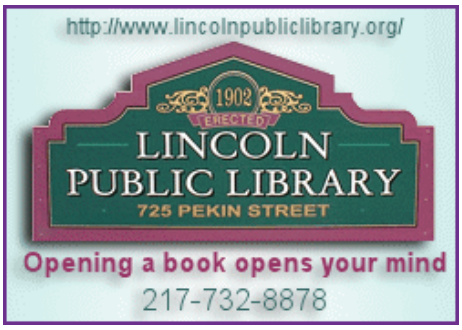












Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

LINCOLNDAILYNEWS.COM
Click here to return to the front

Homes destroyed, badly damaged by storm

![click on photos below to enlarge]

Justice Caswell lived just up the road from the Eliases and was especially happy to be alive. He was in his house when it was picked up and moved three feet. Later he and his aunt were helping the Elias daughters look for whatever they could retrieve from their rubble. The home Justice lived in with his mother was not safe to return to. More pictures of the homes below.

Pictures by Jan Youngquist





Live in the country and tired of Dial-Up Internet?
We have FAST BROADBAND Internet available in most parts of rural Logan County at reasonable prices. Call 217-735-2677 for details.





http://www.lincolnpubliclibrary.org/
1902 ERECTED
LINCOLN PUBLIC LIBRARY
725 PEKIN STREET
Opening a book opens your mind
217-732-8878





Triple C Bar-B-Q
Delicious Pulled Pork Bar-BQ
Mouthwatering Schnitzels
Daily Specials
217-732-2600
Click for Website
837 Woodlawn Rd. - Lincoln
Owner, Kay Greer





Classifieds lead to cash!
Click here to place your ad

Back to top

Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

Farm community takes hit from storm

![click on photos below to enlarge]

The farm community took a hit Wednesday. Here a grain bin under construction is destroyed and spread over the countryside. An unknown number of acres of beautiful 7-foot corn have been struck flat. As we take pictures at ground level a surveillance copter surveys damage from the air.

Pictures by Jan Youngquist

















Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

LINCOLNDAILYNEWS.COM
Click here to return to the front

Disaster along Primm Road

![click on photos below to enlarge]

Pictures by Jim Youngquist










GRAUE INC.
CLICK HERE FOR THIS WEEK'S SPECIALS
CHEVROLET BUICK PONTIAC Cadillac GM
1905 N. Kickapoo St., Lincoln, IL
217-735-4444 or 800-475-8258 • www. graueinc.com

Triple C Bar-B-Q
Delicious Pulled Pork Bar-BQ
Mouthwatering Schnitzels
Daily Specials
217-732-2600
Click for Website
837 Woodlawn Rd. - Lincoln
Owner, Kay Greer

Brickey Photography
Unique Images by Jennifer
ENGAGEMENT / WEDDINGS SPECIAL
click for details

We Repair Laptops!
Quality repairs at affordable prices! Estimates & complete repairs on most out-of-warranty laptop brands.
Computer Consulting Associates
601 Keokuk
Lincoln
735-2677
CCA

Back to top

Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

Aerial view of farmstead 1 south of Lincoln

![click on photos below to enlarge]

Notice the wide circular patterns in the crops on the right as the path approaches this farmstead from the southwest and then seemingly veers slightly left, leaving a trail of debris beyond the farm.

Aerial pictures by Jan Youngquist





Live in the country and tired of Dial-Up Internet?
We have FAST BROADBAND Internet available in most parts of rural Logan County at reasonable prices. Call 217-735-2677 for details.





IGA CLICK HERE and GRAB YOUR COUPON!



http://www.lincolnpubliclibrary.org/
1902 ERECTED
LINCOLN PUBLIC LIBRARY
725 PEKIN STREET
Opening a book opens your mind
217-732-8878

Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

Aerial view of farmstead 2 south of Lincoln

![click on photos below to enlarge]

Notice the debris spread out well beyond the farmstead and the paint removed from the side of the white house.

Aerial pictures by Jan Youngquist





Brickey Photography
Unique Images by Jennifer
ENGAGEMENT / WEDDINGS
SPECIAL
click for details





Triple C Bar-B-Q
Delicious Pulled Pork Bar-BQ
Mouthwatering Schnitzels
Daily Specials
217-732-2600
Click for Website
837 Woodlawn Rd. - Lincoln
Owner, Kay Greer

Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

Aerial view of farmstead 3 south of Lincoln

![click on photos below to enlarge]

Aerial pictures by Jan Youngquist













Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

Ground, crops show trail of damage

[click on photos below to enlarge]

Aerial pictures by Jan Youngquist





Notice the thin white ribbon from the bottom to top of the picture. It is where a piece of heavy debris was dragged along and etched the land. Also notice the loopy swirls to the left of the ribbon line. Sometimes the loops were even in size and in a line. Other times it was like they did a little jiggy dance. The entire 22-mile path from Williamsville to Beason has swirls of flattened crops, and the fields are littered with debris.

Left, lower: Swirl marks are engraved at a 45-degree angle across the upper portion of the dark bean field













Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

LINCOLNDAILYNEWS.COM
Click here to return to the front

What a mess! An aerial view

![click on photos below to enlarge]

Blown away, dragged around and dumped wherever; messes everywhere. That's the condition on the ground across southern Logan County. Larger pieces of metal buildings scraped over the earth, carving paths through crops. Notice one pile of debris makes it appear as though there was building there, but where is the road? Large areas of 7-foot corn were leveled. Farmers will have a special challenge this year harvesting with such debris-riddled fields.

Aerial pictures by Jan Youngquist





Brickey Photography
Unique Images by Jennifer
ENGAGEMENT / WEDDINGS
SPECIAL
click for details





We Repair Laptops!
Quality repairs at affordable prices! Estimates & complete repairs on most out-of-warranty laptop brands.
Computer Consulting Associates
601 Keokuk
Lincoln
735-2677
CCA





Triple C Bar-B-Q
Delicious Pulled Pork Bar-BQ
Mouthwatering Schnitzels
Daily Specials
217-732-2600
Click for Website
837 Woodlawn Rd. - Lincoln
Owner, Kay Greer



Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

Even timber took a hit

![click on photos below to enlarge]

Note crews working in tree cluster to clear lines. Topped and toppled trees fell into waterways, blocked roadways, downed power lines.

Aerial pictures by Jan Youngquist





IGA CLICK HERE and GRAB YOUR COUPON!





GRAUE INC.
CLICK HERE FOR THIS WEEK'S SPECIALS
CHEVROLET BUICK PONTIAC Cadillac GM
1905 N. Kickapoo St., Lincoln, IL
217-735-4444 or 800-475-8258 • www. graueinc.com

Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

Storm damage in Logan County

![click on photos below to enlarge]

Now that's a real Railsplitter! In the first picture, a board slammed into this tree on the Phil and Ruth Austin farm and actually embedded itself in the tree, splitting the large limb in the foreground.

Pictures by Mount Pulaski correspondent Phil Bertoni.





Emergency services had a busy day.





A pool liner wraps around a tree.



This barn at the former Betty Hickey farm is down to kindling.





This house was moved off its foundation.



AmerenCILCO crews had plenty to do.



Back to top

Appendix M



The roof from this home is out in the fields.

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

Flooding around the county

![click on photos below to enlarge]

A pictorial survey of flooding still surrounding Lincoln at 4:30 p.m. on Friday, June 6, 2008. Views were taken traveling clockwise around the area, beginning on Lincoln's southwest side.

pictures by Jan Youngquist. Special thanks to pilot Curtis Fox!



View from southwest side of Lincoln; looking east/northeast; at the top is the south end of Lincoln; IC Railroad runs along left side with wastewater treatment plant at the top end; Lincoln Lakes and homes surrounded by floodwaters are at the bottom right.



Looking southwest from Lincoln's southwest side; Sysco is bottom left; I-55 heads left toward Springfield; broad view of Salt (left) and Kickapoo (upper right) Creek flood waters.





Looking from the west side of Lincoln toward the east; Route 10 intersects I-55; Lincoln's west side business district is beyond I-55 intersection; Kickapoo Creek flooding in the foreground.



From the north side of Lincoln looking southwest; Lincoln is in the upper left corner; the small, bright white triangle in upper left is part of Eaton Corp.; I-55 crosses in foreground; north bound old Route 121 borders the upper right, Kickapoo Creek slowly shrinking back.





To the north of Lincoln submerged fields slowly emerge. Kickapoo and Sugar Creeks closed roads.



To the northeast of Lincoln; Lawndale has surfaced. View is to the NW; I-55 in the foreground.

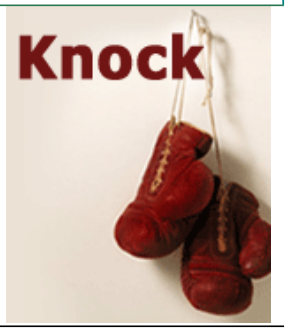


Appendix M



LINCOLNDAILYNEWS.COM
News and commentary from our community

Logan County Treasurer Mary Ellen Bruns Click Here for TAX SEARCH
ABRAHAM LINCOLN TOURISM BUREAU
Community Action PARTNERSHIP Click for Services



In today's edition

69 Articles
52 Photos
48Classifieds
3 Obituaries

Got a news tip? click here to email it to us or call 217-737-3979

Monday, May 18, 2009
published daily from 8am

Weather Road conditions

Ad Tracker
Advertising Info

Google
Web LDN Search

Top Stories | Other News | Business | Health | Rural Review | Community | Community Calendar | Features | Sports
Home & Family | Tourism | Teaching & Learning | Obituaries | Spiritual Life | Classifieds | Business Directory | Archives

HEARTLAND COMMUNITY COLLEGE Lincoln IQ Experience 217-735-1731
DERON POWELL Insurance Agency, Inc. 217-792-3371 Click for Video Mt. Pulaski & Elkhart
Ted's GREAT STEAKS! CLICK HERE
Bank of Chestnut (217) 796-3305 Member FDIC
VISIT COLDWELL BANKER DEVONSHIRE REALTY HERE
MKS Jewelers & Gifts (Click here for savings)
State Bank of Lincoln Mortgage Lending CLICK HERE Member FDIC
Hundman LUMBER Click here to SHOP OUR GREAT WEBSITE
LINCOLNDAILYNEWS ADVERTISING INFORMATION -Click Here-



An aerial view of Logan County just north of Lincoln shows the waters of Kickapoo Creek beyond its banks. Kickapoo is expected to crest in flood stage at 14 feet.

Aerial picture and others below taken by LDN aerial photographers Marvin Schumaker, Jan Youngquist and Curt Fox.



Need some new ideas, some tips, something to get you going on your home & yard? Find the goods in LDN's Spring 2009 Home Improvement Supplement. Click Here!

TOP STORIES sponsored by:

GRAUE INC. click here to see our inventory www.graueinc.com

- Lincoln youth struck by car life-flighted to Peoria hospital
- Perfect weather favors 2nd annual Spring

Grab Your Fork

Area Gas Prices
Regular Gasoline per Gallon
Lincoln

Appendix M

LINCOLNDAILYNEWS.COM
Click here to return to the front

An aerial view of Kickapoo Creek leaving its banks

[click on photos below to enlarge]

Pictures by Marvin Schumaker, Jan Youngquist and Curt Fox



















Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

PRESERVING OUR MISSION.
ABRAHAM LINCOLN Memorial HOSPITAL

LINCOLNDAILYNEWS.COM
News and commentary from our community

SPECIAL RATES!

Logan County Treasurer Mary Ellen Bruns Click Here for TAX SEARCH
ABRAHAM LINCOLN TOURISM BUREAU
community Action PARTNERSHIP Click for Services

In today's edition

61 Articles
36 Photos
42 Classifieds
8 Obituaries

Got a news tip? Click here to email it to us or call 217-737-3979.

Need Advertising? Click here to email us or call 217-737-7418.

Introducing Lincoln Christian UNIVERSITY

This Week's AUTO TIPS Click Here
brought to you by: CHARRON'S AUTO REPAIR

BEE'S CUB CADET Click For Season Closeouts

DERON POWELL Insurance Agency, Inc. 217-792-3371 Click for Video Mt. Pulaski & Elkhart

Bank of Chestnut (217) 796-3305 Member FDIC

VISIT COLDWELL BANKER DEVONSHIRE REALTY HERE

Wednesday, Nov. 4, 2009
published daily from 8am
Lincoln, Illinois

Weather Road conditions

Ad Tracker
Advertising Info

Google
Web LDN Search



The National Weather Service reported that parts of Logan County received more than 3 inches of rain at the end of last week. This led to flooding through Tuesday. Parts of both 1225th Avenue and 1325th Avenue south of Lake Fork were under water Saturday and Sunday. A motorist's vehicle was swept into the floodwaters about 11 a.m. on Saturday. When rescuers arrived, the vehicle was in the middle of half-mile-wide water.

For more exclusive aerial pictures of the flooding, see below.

Aerial picture by Jan Youngquist (Click on picture for larger image.)

TOP STORIES sponsored by:

GRAUE INC. click here to see our inventory www.graueinc.com

- Federal officials to announce grant to spur economic development in Logan County

Grab Your Fork

Appendix M

LINCOLNDAILYNEWS.COM
Click here to return to the front

Aerial pictures of county flooding -- album 1

![click on photos below to enlarge]

Pictures by aerial photographer Jan Youngquist







These three pictures are from west and south of Lincoln. The next two are while flying over Salt Creek north of Chestnut.





Live in the country and tired of Dial-Up Internet?
We have FAST BROADBAND Internet available in most parts of rural Logan County at reasonable prices. Call 217-735-2677 for details.

IGA CLICK HERE and GRAB YOUR COUPON!

Click here for HUSTLER MOWERS
BEE'S CUB CADET
217-732-4300
1302 State Rt. 10 East, Lincoln (across from LCC)

Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

LINCOLNDAILYNEWS.COM Click here to return to the front

Aerial pictures of county flooding -- album 2

![click on photos below to enlarge]

These aerial pictures are of the roads surrounding Lake Fork.

Pictures by aerial photographer Curt Fox




Brickey Photography
Unique Images by Jennifer
ENGAGEMENT / WEDDINGS
SPECIAL
click for details




We Repair Laptops!
Quality repairs at affordable prices! Estimates & complete repairs on most out-of-warranty laptop brands.
Computer Consulting Associates
601 Keokuk
Lincoln
735-2677
CCA




http://www.lincolnpubliclibrary.org/
1902 ERECTED
LINCOLN PUBLIC LIBRARY
725 PEKIN STREET
Opening a book opens your mind
217-732-8878

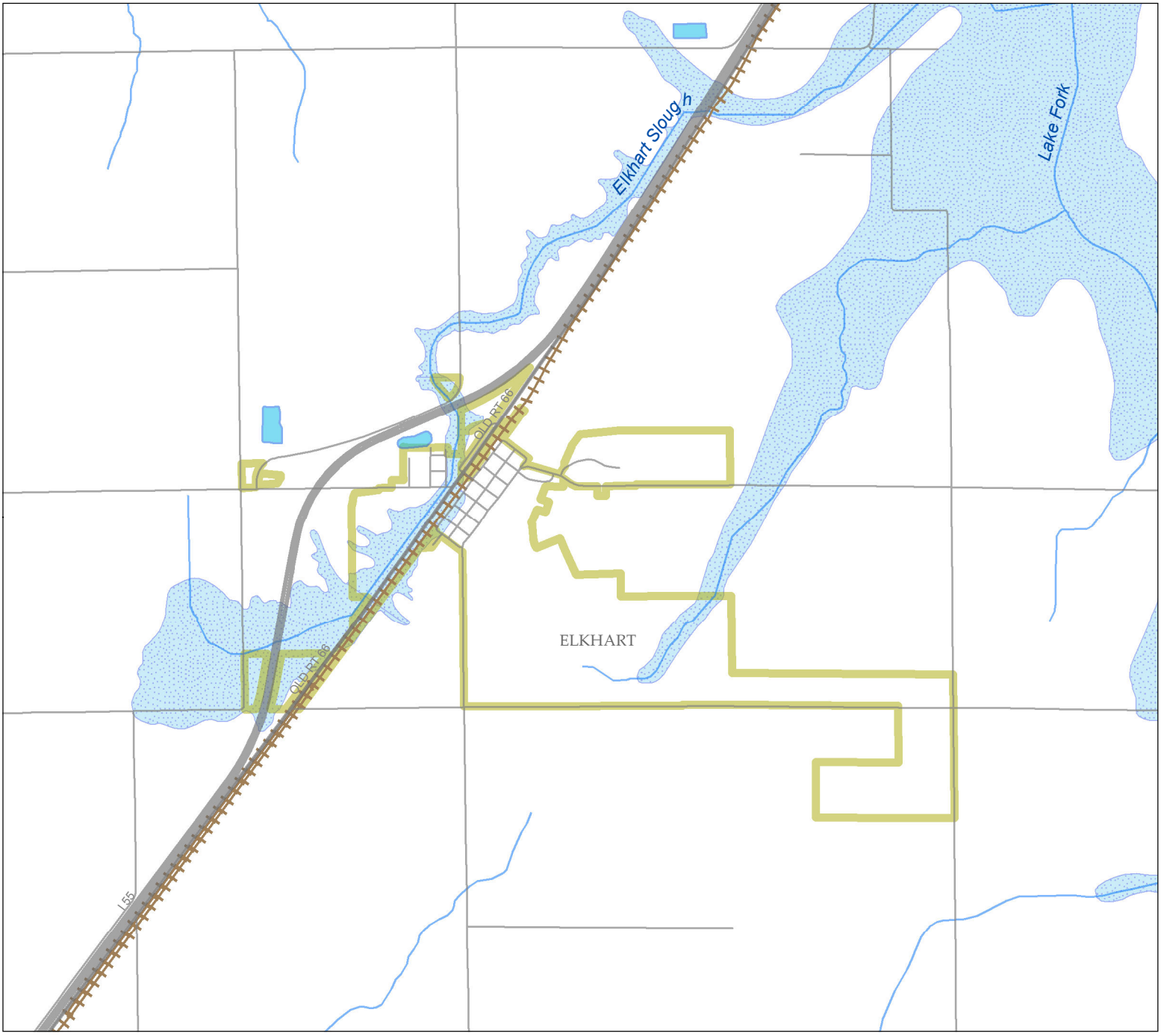
Back to top

News | Sports | Business | Rural Review | Teaching & Learning | Home and Family | Tourism | Obituaries
Community | Perspectives | Law & Courts | Leisure Time | Spiritual Life | Health & Fitness | Teen Scene
Calendar | Letters to the Editor

Appendix M

FLOODPLAIN MAPS FOR NFIP-PARTICIPATING MUNICIPALITIES

APPENDIX N



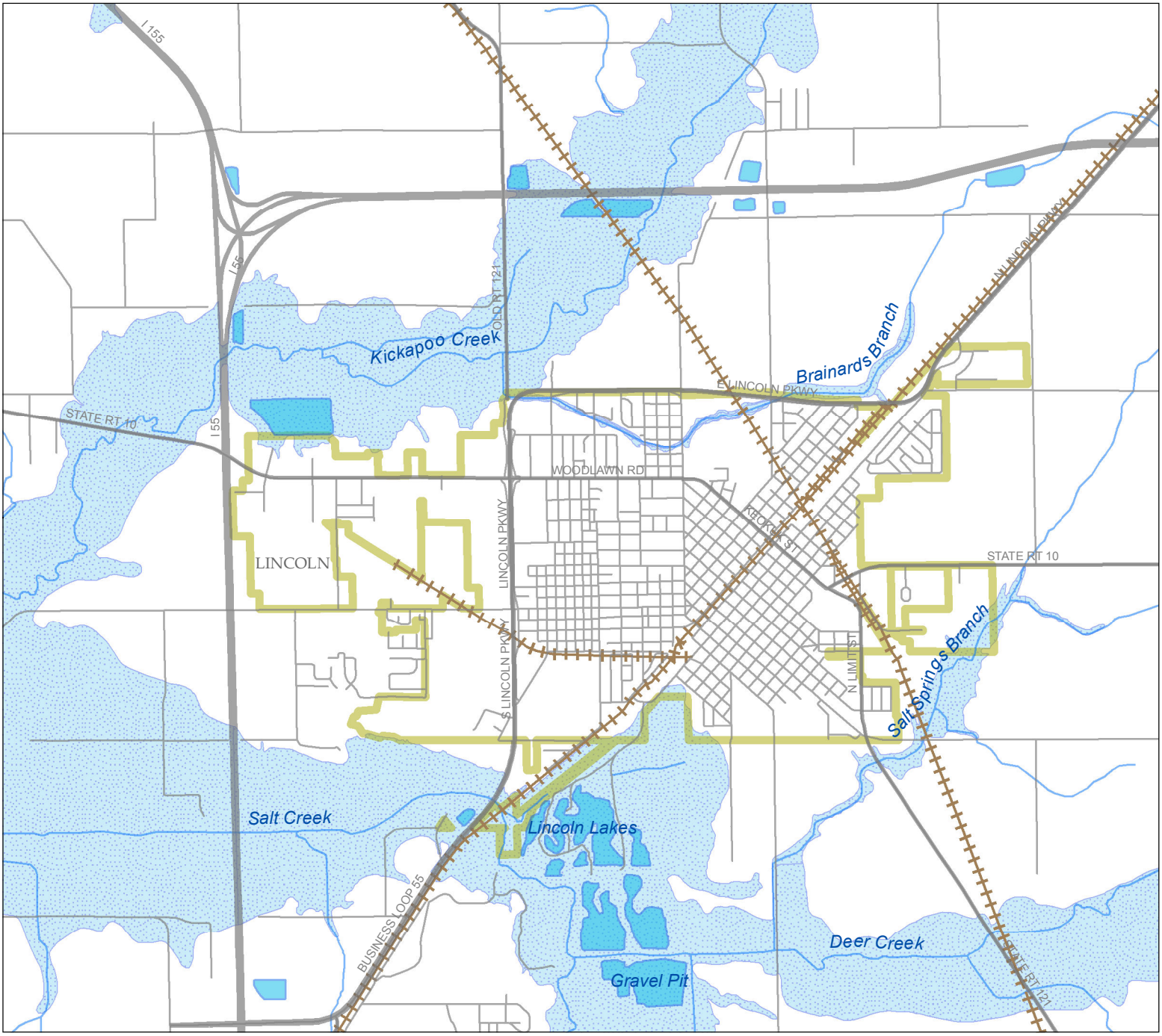
Zone A
Zone AE
Road Centerlines
Rivers & Streams
Railways

100 - Year Floodplain Boundary
Elkhart, IL
November 2012

N
W E
S

Courtesy of Logan County GIS Committee
and Logan County Highway Department

Appendix N



Zone A
Zone AE
Road Centerlines
Rivers & Streams
Railways

100 - Year Floodplain Boundary
City of Lincoln, IL
November 2012

N
W E
S

Courtesy of Logan County GIS Committee
and Logan County Highway Department

Appendix N

[this page is intentionally left blank]

PLAN ADOPTION RESOLUTIONS

APPENDIX O

CITY OF ATLANTA, Illinois
Resolution of Adoption
of the
Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, City of Atlanta, Illinois is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the City of Atlanta desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan was developed in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the City of Atlanta, Illinois has participated in developing the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Logan County; and

WHEREAS, the City of Atlanta, Illinois adopted in 2014 the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which had been previously approved by FEMA;

NOW THERFORE, be it resolved that the city of Atlanta, Illinois hereby:

1. Adopts the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which **adds mitigation projects to the list of mitigation projects for our jurisdiction** as the official Hazard Mitigation Plan of the City of Atlanta, Illinois and
2. Agrees to participate in the annual and 5-year updates to this Plan.

ADOPTED on January 21, 2014

CERTIFIED by _____
Fred R. Finchum, Mayor

ATTESTED by _____
Kenneth R. Martn, Clerk

#2014-279
(City of Lincoln of Logan County), Illinois
Resolution of Adoption
of the
(Logan County) Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, (City of Lincoln) is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the (City of Lincoln) desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the (Logan) Multi-Jurisdictional Natural Hazards Mitigation Plan was developed in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, (City of Lincoln) has participated in developing the (Logan) Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of (Logan); and

WHEREAS, (City of Lincoln) adopted in (2014) the (Logan County) Multi-Jurisdictional Natural Hazards Mitigation Plan which had been previously approved by FEMA;

NOW THERFORE, be it resolved that the (City of Lincoln in Logan County) hereby:

1. Adopts the (Logan) Multi-Jurisdictional Natural Hazards Mitigation Plan which **adds mitigation projects to the list of mitigation projects for our jurisdiction** as the official Hazard Mitigation Plan of (City of Lincoln in Logan County); and
2. Agrees to participate in the annual and 5-year updates to this Plan.

ADOPTED on January 21, 2014

CERTIFIED by (SIGNATURE) Keith Snyder (COUNTY or MUNCIPAL SEAL)
(NAME & TITLE) Keith Snyder, Mayor

ATTESTED by (SIGNATURE) Susan K. Gehlbach
(NAME & TITLE) Susan K. Gehlbach, City Clerk

Mt. Pulaski Rural Fire Protection District)
} ss.
Logan County, Illinois)

MT. PULASKI RURAL FIRE PROTECTION DISTRICT

RESOLUTION OF ADOPTION OF THE

LOGAN COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Mt. Pulaski Rural Fire Protection District (MP Fire District) is subject to natural hazards, including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the MP Fire District desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the Unites States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Logan County Multi-Jurisdictional Natural Mitigation Plan (Mitigation Plan) was developed in accordance with regulation of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the Logan County Board adopted in 2013 the official Mitigation Plan which had been previously approved by FEMA;

NOW THEREFORE, BE IT RESOLVED that the Mt. Pulaski Rural Fire Protection District hereby:

1. Adopts the Logan County Multi-Jurisdictional Natural Hazards Plan, including the adding of Mitigation Projects for the MP Fire District's jurisdiction to the official Mitigation Plan of Logan County, Illinois; and
2. Agrees to participate in the Annual and 5-Year updates to the Plan.

ADOPTED ON January 21, 2014

CERTIFIED BY _____ Michael Morris, President, Board of Trustees

ATTEST _____ Leslie Hild, Treasurer, Board of Trustees

LO 13-1417

Logan County, Illinois
Resolution of Adoption
of
The Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, Logan County is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, Logan County desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan was developed in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, Logan County has participated in developing the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Logan County; and

WHEREAS, Logan County adopted in 2014 the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which had been previously approved by FEMA;

NOW THEREFORE, be it resolved that Logan County hereby:

1. Adopts the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which **adds mitigation projects to the list of mitigation projects for our jurisdiction** as the official Hazard Mitigation Plan of Logan County; and
2. Agrees to participate in the annual and 5-year updates to this Plan.

ADOPTED on January 22, 2014

CERTIFIED by Robert Farmer
Robert Farmer, Chairman
Logan County Board

LOGAN COUNTY SEAL

ATTESTED by Sandy Littrell
County Clerk & Recorder

Village of Hartsburg, Illinois
Resolution of Adoption
of the
Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, the Village of Hartsburg, IL is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the Village of Hartsburg, IL desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan was developed in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the Village of Hartsburg, IL has participated in developing the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Logan County; and

WHEREAS, the Village of Hartsburg, IL adopted in 2014 the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which had been previously approved by FEMA;

NOW THERFORE, be it resolved that the Village of Hartsburg, IL hereby:

1. Adopts the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which **adds mitigation projects to the list of mitigation projects for our jurisdiction** as the official Hazard Mitigation Plan of the Village of Hartsburg, IL; and
2. Agrees to participate in the annual and 5-year updates to this Plan.

ADOPTED on January 27, 2014

CERTIFIED by _____
Norma J. Bathe, Mayor

ATTESTED by _____
Doris Last, Village Clerk

Resolution No. 2014-01
VILLAGE OF ELKHART, Illinois
Resolution of Adoption
Of the
Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, the VILLAGE OF ELKHART is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the VILLAGE OF ELKHART desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan was developed in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the VILLAGE OF ELKHART has participated in developing the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Logan County; and

WHEREAS, THE VILLAGE OF ELKHART adopted in 2014 the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which had been previously approved by FEMA;

NOW THERFORE, be it resolved that the VILLAGE OF ELKHART hereby:

1. Adopts the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which **adds mitigation projects to the list of mitigation projects for our jurisdiction** as the official Hazard Mitigation Plan of the VILLAGE OF ELKHART; and
2. Agrees to participate in the annual and 5-year updates to this Plan.

ADOPTED on February 3, 2014

CERTIFIED by _____
Village Mayor

ATTESTED by _____
Village Clerk

Village of Emden, Illinois
Resolution of Adoption
of the
Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, The Village of Emden is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the Village of Emden desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan was developed in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the Village of Emden has participated in developing the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Logan County; and

WHEREAS, the Village of Emden adopted in 2014 the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which had been previously approved by FEMA;

NOW THERFORE, be it resolved that the Village of Emden hereby:

1. Adopts the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which **adds mitigation projects to the list of mitigation projects for our jurisdiction** as the official Hazard Mitigation Plan of the Village of Emden; and
2. Agrees to participate in the annual and 5-year updates to this Plan.

ADOPTED on March 10, 2014

CERTIFIED by _____
Daniel Evans, Mayor Pro Tem

ATTESTED by _____
Lori Lessen, Clerk



Logan/Mason/Menard Regional Office of Education
Logan County, Illinois
Resolution of Adoption
of the
Logan Multi-Jurisdictional All Hazards Mitigation Plan

WHEREAS, Logan County is subject to natural and man-made hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the Logan/Mason/Menard Regional Office of Education desires to prepare and mitigate for such natural and man-made hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Logan Multi-Jurisdictional All Hazards Mitigation Plan was developed in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the Logan/Mason/Menard Regional Office of Education has participated in developing the Logan Multi-Jurisdictional All Hazards Mitigation Plan covering member jurisdictions of Logan County:

NOW THERFORE, be it resolved that the Logan/Mason/Menard Regional Office of Education hereby:

1. Adopts the Logan County Multi-Jurisdictional All Hazards Mitigation Plan as the official Hazard Mitigation Plan of the Logan/Mason/Menard Regional Office of Education; and
2. Agrees to participate in the annual and 5-year updates to this Plan.

ADOPTED on March 12, 2014

CERTIFIED by Jean Anderson

Jean Anderson,
Regional Superintendent
of Schools
Logan/Mason/Menard
Counties #38

(SEAL)



ATTESTED by Sandra Blane

Sandra Blane, Assistant
to the Superintendent

Village of Broadwell, Illinois
Resolution of Adoption
of the
Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, the Village of Broadwell is subject to natural hazards including floods, tornados, severe winter storms and drought among others, that pose risks to public health and property; and

WHEREAS, the Village of Broadwell desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Logan County Multi-Jurisdiction Natural Hazards Mitigation Plan was developed in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the Village of Broadwell has participated in developing the Logan County Multi-Jurisdiction Natural Hazards Mitigation Plan covering member jurisdictions of Logan County; and

WHEREAS, the Village of Broadwell adopted in 2014 the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which had been previously approved by FEMA;

NOW THEREFORE, be it resolved that the Village of Broadwell hereby:

1. Adopts the Logan County Multi-Jurisdictional Natural Hazards Mitigation Plan which adds mitigation projects to the list of mitigation projects for our jurisdiction as the official Hazard Mitigation Plan of the Village of Broadwell, and
2. Agrees to participate in the annual and 5-year updates to this Plan.

ADOPTED on March 25th, 2014

CERTIFIED by Amanda Bishop

ATTESTED by William H. Kennett

William H. Kennett

Village President, Bill Kennett

RESOLUTION OF ADOPTION
OF THE
LOGAN MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN

WHEREAS, the City of Mt. Pulaski is subject to natural and man-made hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the City of Mt. Pulaski desires to prepare and mitigate for such natural and man-made hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Logan Multi-Jurisdictional All Hazards Mitigation Plan was developed in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the City of Mt. Pulaski has participated in developing the Logan Multi-Jurisdictional All Hazards Mitigation Plan covering member jurisdictions of Logan County;

NOW THEREFORE, be it resolved that the City of Mt. Pulaski hereby:

1. Adopts the Logan County Multi-Jurisdictional All Hazards Mitigation Plan as the Official Hazard Mitigation Plan of the City of Mt. Pulaski; and

2. Agrees to participate in the annual and 5- year updates to this Plan.

ADOPTED on April 8th, 2014.

CERTIFIED by _____
Jim Fuhrer, Mayor

ATTESTED by _____
Kelly Cowan, City Clerk